

MINING NETWORKS IN THE MAKING:
RIVER SAND AND STONE MINING IN SOUTH SULAWESI, INDONESIA

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Abstract

This dissertation examines the factors and processes that have shaped sand and stone mining activities in the Jeneberang river, in South Sulawesi, Indonesia from the 1970s to 2022. My focus is the making of “mining networks” which, following Actor Network Theory, I frame as socio-material associations/processes that take provisional forms. Like other social scientific research on sand mining, I consider various political, economic and sociocultural aspects that shape who participates in mining, how and why. Additionally, I examine the material dimensions of both the geographical area that I study and the mined river materials to provide a spatially grounded analysis of the regional political economy of sand and stone mining in the Jeneberang river. I also analyze the actions that local people undertake to shape how mining happens so that they gain some benefits. Thus, this dissertation is grounded in terms of sociocultural dynamics and political economic processes but it is also place-based in terms of material features and changes.

My research questions query how material and human factors shape mining networks and with what implications for local people and local mining businesses. To account for the agency of the material and people in shaping socio-material and political economic outcomes, I draw on a materiality approach and the moral economy framework. I combine insights from recent social scientific research on sand mining, critical resource geography’s focus on materiality, political ecology’s ideas on the relationship between materiality and resource access, political economy of mining’s focus on social mobilization and resistance processes, and the moral economy framework.

I argue that material elements—including the river, water, sand, stones, topography—and human elements—such as the actions of local people—actively participate in a continuous shaping of mining networks. I also put forward the idea that mining networks can be better understood as “in the making” rather than as end products. The dissertation contributes to the sand mining literature which has generally approached the material aspects of mining settings as the contexts within which social phenomena unfold and has yet to further explore the actions of local people in shaping how mining happens.

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Chapter 1. Introduction

1.1. Problem statement and justification

Urbanization processes have accelerated since the 1990s and, as a result, today more than half of world population lives in cities. The rapid growth of urban centers has been accompanied by a boom in the construction industry. This has entailed the intensification of resource extraction. This include materials such as sand and stones, that have been crucial for creating the built environments that we inhabit.

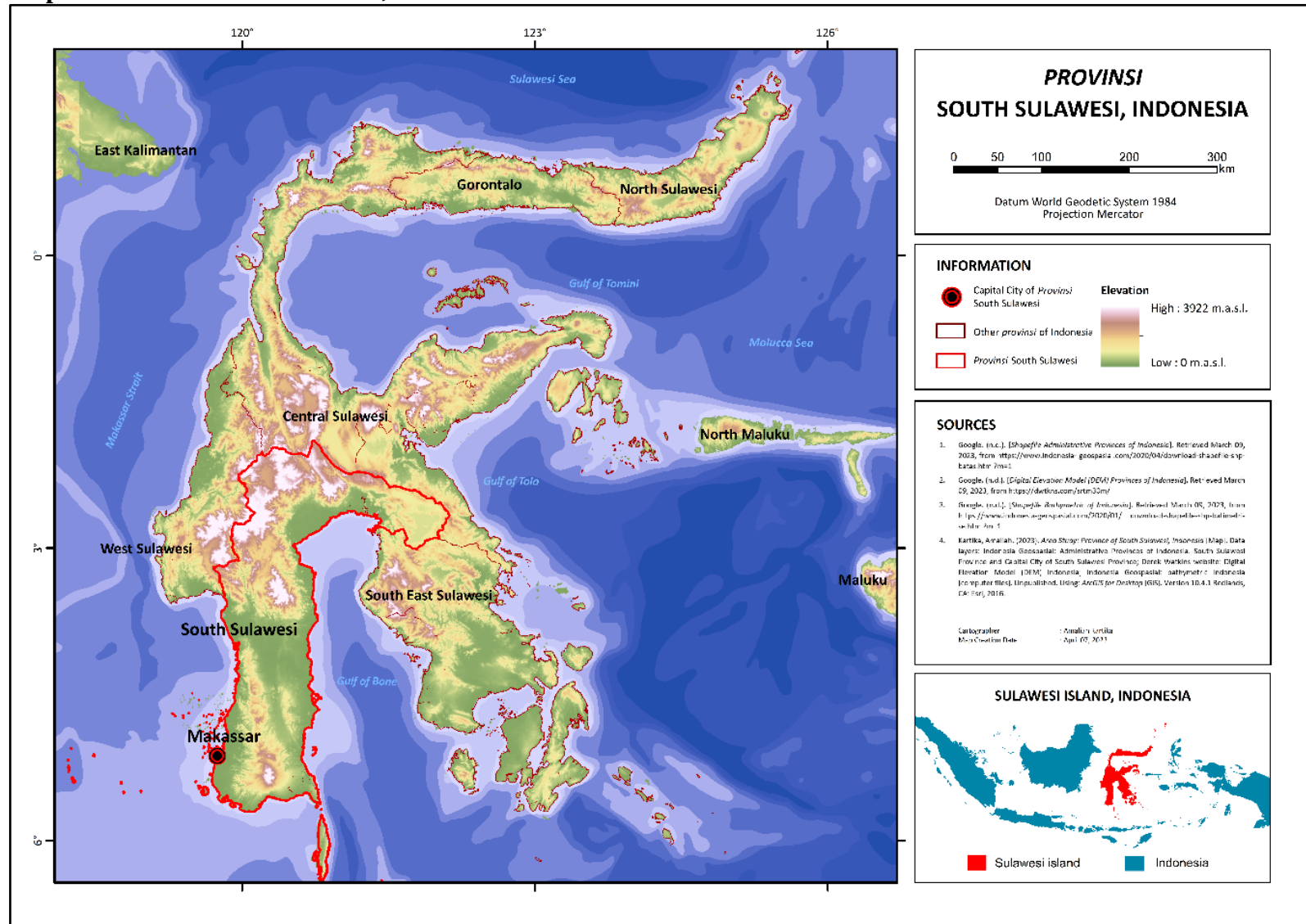
There are different kinds of sand used for various purposes. However, most of the sand extracted world-wide “pours into the construction industry, where it is used to make concrete and asphalt” (“An improbable global shortage”, 2017). Sand and gravel account for the largest share of solid material extracted world-wide (Kareem & Ramzan, 2016; Torres et al., 2017). Paradoxically, as many other researchers have noted, their mining has been underexamined in scholarly work until very recently. This is particularly striking considering that sand and stone mining happens everywhere. However, not all geographical spaces where they are sourced from have the same material characteristics.

Recently, social scientists have documented sand mining operations in a diversity of places that includes the Mekong, Tonle Sap and Bassac rivers in Cambodia (Marschke et al., 2021), the Maoling river in China (Zhu, 2020), the Pongly river in Bangladesh (Khan & Sugie, 2015), the transboundary Salween river in Myanmar (Lamb & Fung, 2022), the transboundary Usumacinta river in Mexico (Kauffer & Torres, 2023), the Tatao river in Iran (Farahani & Bayazidi, 2018), the Teno river in Chile (Narváez González & González Reyes, 2015), and the Tegeta and Mpiji rivers in Tanzania (Shitima & Suykens, 2022). Studies also include non-riverine locations such as quarries in Morrocco (Ameziane & Suykens, 2023) and active volcanoes in Indonesia (Miller, 2022).

In this dissertation I examine the making of a sand and stone mining network in the Jeneberang river in South Sulawesi, Indonesia. The period I study goes from the 1970s to late 2022 which I defined based on my empirical findings. The Jeneberang is located near the historical city of Makassar, the largest city in Eastern Indonesia and capital city of *Provinsi*¹ South Sulawesi (see Map 1.1). This river has been historically important for the people, governments and economies in South Sulawesi. Historically, the materials for building Makassar have been sourced from the Jeneberang. The area is now a geographical setting that experiences the pressure of rapid urban growth, in the fourth most populated country in the world.

¹ The first-order political subdivisions in Indonesia are *Provinsi*.

Map 1.1. Provinsi South Sulawesi, Indonesia.



I examine the ways in which material, political, economic, and sociocultural factors have shaped the organization of river sand and stone mining activities. I pay special attention to the material features of both the mining area and the mined sand and stones to explore the significance that the heterogeneity of the physical environment has for differentiated experiences with sand and stone mining across geographies. The contrast between what I found in the field in 2019 regarding popular opposition to and dissatisfaction with mining activities and what I had read on sand mining in the early stages of my research encouraged me to take ‘the material’ more seriously and to give it a central place in my thinking and my writing.

I argue that material elements—including the river, water, sand, stones, topography—and human elements—including the actions of local people—actively participate in shaping mining networks. How and why do the material and human shape mining networks? In the Jeneberang river, the material has interacted with processes that include an increasing need for construction materials from Makassar, political and economic interests around state-sanctioned access to mining sites, pro-local employment policies, the relations between governments at different scales, and uneven power relations between the actors involved in mining. In the process, the interplay between material and human factors has created conditions that enable or constraint the participation of some actors over others in mining. One major implication of all this is that small-scale mining businesses owned by local individuals have been displaced and replaced by medium- and large-sized firms, although these are still regional in terms of ownership and head offices. Another main implication has been a decreasing size of manual workforce in mining. Related to my first argument, I also put forward the idea that mining networks can be better understood as “in the making” rather than as end products.

In the case of local people as active participants in shaping the mining network in the Jeneberang, I show that, in order to benefit from mining, they have designed and implemented several mechanisms that channel economic benefits to them. These mechanisms are underpinned by what I see as locals’ claims for a right to subsistence and/or for a right to derive economic benefits from mining. Through these mechanisms, people

living in the surrounding areas of mining sites have moulded the actions of mining companies towards them. The implications of all this are that these people have been able to mobilize their claims and achieved that some of the benefits from mining trickle down to them. More broadly, I argue that this has contributed to a lack of popular opposition to river sand and stone mining among the communities that have long lived around the Jeneberang.

Sand and stones have formed the material basis for Asia's rapid urbanization. Within East Asia, Indonesia has the third-largest amount of urban land after China and Japan (World Bank, 2016). Moreover, Indonesian cities are growing faster than cities in other Asian countries (World Bank, 2016). When mentioned in sand mining research, Indonesia has been often depicted as one of the main sand sources for Singapore (Ansori, 2007; Global Witness, 2010; Franke, 2014). However, international sand supplier is not the only role the country has played. Indonesia is also a major consumer of sand and stones as the country has needed them to meet the increasing demand of its construction sector.² Moreover, the country has also deeply relied upon sea sand to develop its many land reclamation projects that have enabled Indonesia to further its urban growth (Yorhanita, 2019).

Around the globe, sand (and stone) mining is not a new phenomenon. However, the environmental, social, cultural, economic, and political impacts of this activity are becoming increasingly evident (or are being made more evident to us) (Peduzzi, 2014; Gavrilitea, 2017; Álvarez Andrade & Ravelo García, 2018; UNEP, 2019). Moreover, the conflicts associated with this activity and the high-profile cases of global trade of sand and sand scandals have contributed to put the spotlight on it in different parts of the world (Global Witness, 2010; Cambodian Center for Human Rights, 2016; Mahadevan, 2019). Academic and grey literature, as well as other ways of knowledge documentation and dissemination (Delestrac, 2013; ABC News, 2017; Mam, 2018; DW, 2021) have increased sand mining's visibility especially in recent years.

This research contributes to our knowledge and understanding of river sand and stone mining. I have meticulously mapped and documented several aspects related to the organization of

² It is estimated that about six to seven tons of sand and gravel are needed for each ton of cement (cited in Peduzzi, 2014, p. 208).

mining activities. These include the physical environment of the mining settings, the spatial distribution of mining operations, the kind of mining businesses, the workers of the sector and the jobs they do, the types of river materials that are mined, the estimated mined volumes, the temporalities of mining, labour arrangements, the mining methods and equipment, and the access (or the lack of it) to mining sites and mining equipment.

I lump together all the non-human and human aspects mentioned above, and the interactions among them, under the noun “**mining network.**” This is a central concept that I use throughout the dissertation. Drawing on Actor Network Theory (Latour, 2005), I define mining networks as place-based socio-material associations/processes that take provisional forms. Thus, when I talk about mining networks in the dissertation, I refer to associations of workers, companies, mining equipment, mining sites, sediments of different grain size, the river channel, the riverbed, the river basin, a dam and a reservoir, among other human and non-human elements. My focus is a regional rooted mining network (Rocheleau & Roth, 2007) operating at the extraction phase, and I look at the ways in which the network operates within a place-based scale. Thus, my use of the noun “networks” is not related to broader production network analyses such as global production network (GPN) and global commodity chain (GCC) research.

The regional rooted mining network that I analyze entails that human labour is embedded in transforming the (already) transformed river and its basin. Explanatory frameworks such as the co-production of nature literature show how human labour is embedded in transforming “nature” to produce commodities or exchange values. In the dissertation, I have made visible how the Jeneberang river and its basin have been constantly transformed through labour such as dam building, mining in the lower reaches, mining in the upper reaches, and so on. However, in my analysis I do not frame these processes as co-production of nature. From an Actor Network Theory perspective, nature is not understood as a pre-constituted ontological category but as a product of narratives framed by nature-society dualisms. Due to this I found it more appropriate to discuss specific elements that constitute the network such as the river, the basin, the sand, the stones, the dam, and so on.

The research question and sub-questions below have guided my study.

- In the context of sand and stone mining in the Jeneberang river, how and why the material and human factors shape mining networks and with what implications for local people and local mining businesses?
 - What and who have shaped the mining network that operates in the Jeneberang?
 - How and why have they shaped the network?
 - How has the mining network that operates in the Jeneberang changed over time?
 - What have the changes in the mining network meant for local people and local mining businesses?

In the following section I elaborate on the literature I have drawn on to build a conceptual framework relevant for addressing these questions. But before moving forward, I find relevant, for the arguments that I make throughout the dissertation and for some aspects of my examination, to clarify a few things. One first issue is that, because of the way in which I entered the field, I did not look at community groups outside those involved in mining, except for a preliminary exploration that I made through surveys with some farmers. My focus was participation in the mining network, and I mostly talked to the workers of mining. I am aware that I might have missed some part of the rural population who, for whatever reason, might be marginalized from participation. Moreover, my approach on participation in mining also entailed that my study was not designed to explore whether divisions, tensions, and conflicts exist among different groups in the area I study, although I learned about some instances of tensions around mining in contemporary times. But in general, this means that I am not doing a historical rural ethnography of the region which would have allowed me to trace an older history of the area and to explore past and present divisions. Finally, I did not look at land tenure issues, but I considered access to land used as mining sites. This part of my analysis was grounded on both what people in the area indicated regarding ownership and what I saw as signs of ownership acknowledgment by others. However, I did not explore

how land tenure has been defined over time and I did not bring up issues related to state-sanctioned rights over the land in conversations either.

1.2. Conceptual approach

I explore the shaping of a river sand and stone mining network and its transformation through an approach that combines insights from recent social scientific research on sand mining, critical resource geography's focus on materiality, political ecology's ideas on the relationship between materiality and resource access, political economy of mining's focus on social mobilization and resistance processes, and the moral economy framework. I also draw on other ways in which a materiality approach has been employed outside critical resource geography (Myers, 2015; Barua, 2016; Luning & Pijpers, 2017; Libassi, 2023). The result is a conceptual approach that considers the ways that material, political, economic, and sociocultural factors interact and shape mining networks in specific ways. Bringing all these literatures in conversation with each other has helped me elucidate the making of mining networks and see these networks as "in the making" rather than as end products.

In this section I present an overview of the key literatures on which I draw. In subsequent chapters I provide details of my engagements with and contributions to them, as relevant for each chapter. In all three body chapters I engage with the sand mining literature. My engagement with materiality is presented in Chapter 3 and Chapter 4. In Chapter 4 I engage with a body of work within the artisanal and small-scale mining (ASM) literature that focuses on the relationship between ASM mining and large-scale mining. I do not outline this scholarship here, but I elaborate on it in Chapter 4 itself. In Chapter 5 I engage with moral economy ideas and a subset of research within the mining literature that focuses on mining companies-local communities' relationships. I do not elaborate on my engagements with these two strands of literatures in this section; I explain my engagements with them in Chapter 5 itself.

Actor Network Theory and Rooted Networks

Mining networks is a key concept in my study. I have drawn on ANT (Latour, 2005) and the idea of rooted networks (Rocheleau & Roth, 2007; Cantor et al., 2018) to define them as place-based socio-material associations and processes that take provisional forms. Then, I

frame them as spatially rooted temporary socio-material associations and processes that come together around the removal of river sand and stones (sediments of different grain size). My focus is on the extraction phase. The adjective “rooted” helps to make explicit that socio-material relations are grounded in particular shifting territories (following Cantor et al., 2018).

My understanding is that these networks are made up of material and social elements, and their interactions. I refer to social elements and processes in a broad sense which includes political and economic dimensions. Mining networks are dynamic in the sense that they get transformed and take different forms over time as their constitutive parts change. Despite this, they continue to be grounded in specific territories that also change over time. Thus, when I talk about the mining networks in the Jeneberang I refer to the changing associations of and interactions between the following elements: sections of the Jeneberang river (the lower and the upper reaches), human-driven transformations in the river channel, river sand and stones, excavators, a variety of mining (and processing) equipment, a diversity of workers’ categories, large-scale mining companies, small-scale local mining businesses, labour arrangements, access to mining sites, and mining licensing. My focus is on what I see as two different forms that the mining network has taken. An ANT approach to mining networks enables me to avoid taking them for granted and think of them as ongoing processes/“in the making” instead. A grounded example of this includes how local people actively shape the behaviour of large-scale mining companies in their daily encounters. I hope I have successfully showed this in my analysis.

But I also draw on ANT to put to work a perspective from which mining networks result from the convergence of material and social aspects. This is like what Gallardo Zavaleta et al. (2023) have termed “the sandy field of forces” as a proposal for a local approach to study the exploitation of sediments. “The notion of the sandy field of forces refers [] to the framework consisting of the confluence of environmental and anthropic interactions by which the actions of local social actors are articulated for the exploitation of [] sediments” (Gallardo Zavaleta et al., 2023; p. 4). Through an ANT perspective I see that mining networks are continuously (re)shaped by the interplay of material and social factors that include the

features of the Jeneberang river and its basin, a monsoon climate, heavy rainy seasons, landslides, water levels, the features of the mountainous area where the Jeneberang originates, the sand and the stones, tectonic activity, hillside collapses, landslides, the existence of a dam, a reservoir and sediment control structures, urban sprawl, rising demand for construction materials, family and kinship relationships, the politics of sand governance (e.g. pro-local employment policies, issuance of mining licences, taxes on river sand and stones, uneven power relations, preference for industrial mining), claims to a right for subsistence, shared values, political participatory channels for communities, and so on.

Sand mining literature

Throughout the three body chapters of the dissertation, I engage with the emerging sand mining literature, to which I add stone, to better account for the physical heterogeneity of our world. In subsequent chapters I generally refer to the mining activities I study as “river sand and **stone** mining” or “river sand and **stone materials** mining”.³ Due to the relevance of stone mining in the Jeneberang, throughout the dissertation I frame it as something apart from sand mining. However, in the sections where I explain my engagements with the literature, I only call it “**sand mining** literature” to make it consistent with what is being discussed by other scholars in Geography and cognate disciplines. Regarding the sand and the stones from the Jeneberang, I refer to them as such or as sediments of different grain size throughout the dissertation. I decided to do so, and not to call them aggregates, to acknowledge that they are important not only for humans and that they play crucial roles other than as construction materials.

I build on social scientists’ growing efforts to understand the political economy of sand and stone mining, specifically the forces and processes that shape the organization/configurations of mining activities. Scholars have analyzed political (and legal) factors that help explaining why and how certain people and businesses come to be the key players in sand mining (Khan & Sugie, 2015; Hougaard & Vélez-Torres, 2020; Ameziane & Suykens, 2023). Generally,

³ Following the grain size classification of sediments done by geologist Wentworth (1922), by “stones” and “stone materials” I mean river materials that include natural occurring granules, pebbles, cobbles, and boulders. In Chapter 3 I explain more specifically the materials that are removed from the Jeneberang.

these accounts have focused on social, political, and economic processes. I build on this strand of scholarship by presenting *the material/non-living* and *local people* as active constituents of the social realities we examine. In the first two substantive chapters I foreground the material features of the Jeneberang river and its basin, the characteristics of the materials that are mined, and the technologies used to mine them. In the last substantive chapter, I put local people at the center of my examination of locals as active shapers of mining networks.

Additionally, by stepping back and unpacking the present organization of mining activities I show that as mining networks' constitutive parts/components change over time, so does the mining network as a result. This shows that mining networks are constantly reshaped and that, therefore, they get constantly transformed.

My main contribution to the sand mining literature lies in making visible the active role of the material/non-living and local people in shaping mining networks. Sand mining research has explored the impacts of mining operations as a key theme (Lowe, 2018; Lamb et al., 2019; Lamb & Fung, 2022; Kusumaningrum et al., 2021; Marschke et al., 2021; van Arragon, 2021; Miller, 2022). I show that the impacts are in a two-way direction. For this reason, I have employed the verb “shape” throughout the dissertation, to emphasize the mutual constitution of mining networks and material, economic, political, and sociocultural realities. I look at the impacts of the present form of the mining network in terms of corporate structure and employment for local people, but I also dig into the recent past to understand how the current mining network came into existence. I do not address the impacts on local ecologies, and the impacts on livelihoods which I address have to do with sand and stone-mining based livelihood opportunities.

When accounting for the social, cultural, economic, and political processes associated to sand mining, social scientists oftentimes have provided detailed information about the material specificities of the sand mining settings they study. For instance, Khan & Sugie (2015) explain that the Pongly river is between 70 and 100 m wide and that “shallow parts of the riverbed appeared when the river water dried up in the end of the dry season” (p. 3). Narvaéz González & González Reyes (2015) detail the existence of sediments of volcanic origin and

moraine⁴ in the area they study (Viluco) and how the Teno river that originates in the Andes deposits in such area the sediments the river transports (pp. 23-25). Gallardo Zavaleta et al. (2023) describe some of the environmental conditions in the Mexican sections of the Usumacinta river. But in general, in sand mining analyses, the material aspects are approached as the contexts within which social phenomena unfolds. I have put “the material” at the center of my account and showed its generative capacities. By doing so, I show that bringing “the material” to the forefront of our examinations can help to build more holistic explanations of the processes we study. A comparative analysis of mining activities can show how the mining of the same substance (sand in this case) can produce similar and/or different social and political economic outcomes across space and time (even in one same research site). I believe that my work thus addresses the suggestions of John (2021) regarding how to study sand.

I also draw on local research on mining in the Jeneberang river which mainly consists of undergraduate theses. This collection of research has documented a variety of empirical information of the area I study that include the job opportunities in mining for local populations (Syam, 2016), the development of mining activities (Aswan et al., 2020; Kusumaningrum et al., 2021), land use change implications of river sand and stone mining (Makmur, 2017), the relationships between mining companies and local communities (Sari, 2014), government surveillance of mining operations (Hamida, 2016; Nurmala, 2022), the role of the local government in the issuance of mining licenses (Rahim et al., 2012), and the continuity of mining operations downstream from Bili-Bili dam (Syam, 2021). Other studies that focus on South Sulawesi more broadly have also shed light on sand mining governance as it relates to the issuance of mining licenses (Khairunnisa, 2018), to the links between uneven power relations, local politics, and sand mining (Suprianto, 2017), to government surveillance (Nuralam et al., 2017) and to enforcement activities (Husna, 2013). I add to this body of work by going back to the recent past to offer a historical political economy overview of mining activities in the area from a comparative perspective across time and space (lower

⁴ “A large mass of rocks and dirt that is carried along with a glacier and is left behind when the glacier melts” (Cambridge Dictionary, n.d.).

and upper reaches). My contribution also lies in encouraging further reflections on the elements that help us to more holistically account for the present realities we witness.

I have also drawn on local research on the Jeneberang river system and mining in the Jeneberang from the perspective of engineering science, science and technology studies, natural resource management, and the natural sciences. These studies have focused on biophysical processes such as sediment distribution (Lukman et al., 2016), sediment characteristics (Amir, 2021), sedimentation (Asrib et al., 2011), changes in sediment discharge (Dhanio et al., 2008), morphological changes of the river (Arafat et al., 2015a; Hasbi & Tumpu, 2020), tectonic movement (Sudradjat et al., 2013), landslides' triggering factors (Hasnawir & Kubota, 2008), landslide susceptibility (Solle et al., 2013), and the impacts of debris flow on infrastructure (Nenny et al., 2019). I have also consulted local research on issues related to sand and stone mining in the Jeneberang such as the changes in the physical environment (Pratama & Surur, 2021), the sustainability of mining activities (Anas et al., 2013), and the cost of environmental impact (Arjan et al., 2020). In general, this cluster of studies has not explored the socioeconomic and political aspects of mining activities. My work, then, complements this existing research that has not engaged the social and political economic dynamics of mining.

Materiality approaches

I draw on the ideas of materiality developed by Bakker and Bridge (2006; 2021) in their attempt to revitalize a Critical Resource Geography (Valdivia et al., 2021). Their focus is on the “matter of nature”, on biophysical materials in geographical political economy. Their 2006 article was my starting point. Both of their pieces (2006; 2021) have been extremely useful for navigating the abundant research that uses a materiality approach, for defining my own path within this body of work, and for triggering ideas for my study. A materiality framework is one of the methodological and analytical tools I employ to bring the material dimension/the material world to the forefront of my examination. The material refers to the non-living which includes environments —such as the (transformed) physical environments of mining operations— and “things” —such as the mined river materials and the mining equipment used.

The reasons that pushed me to employ a materiality perspective resonate with the motivations behind the turn to materiality that Bakker and Bridge (2021) outline. First, I am interested in acknowledging and documenting the copresence of the non-human. I have made the non-human present throughout most of the dissertation by constantly referring to it and by providing rich details.

Second, I am interested in showing the complexity of the non-human in terms of its heterogeneity. Documenting some of the diversity that the noun “non-human” encompasses helps the simultaneous purpose of making its complexity evident and avoiding its simplification. I present the heterogeneity of the material/non-living by (non exhaustively) differentiating between physical environments, seasons, technologies, and so on. I did not intend to work the heterogenous non-human through dichotomies — such as upper and lower reaches of the river, sandy and rocky environments, dry and rainy season— but those are the contrasts that became evident for me. More precisely, I saw diversity through those lenses. Additionally, I have found it the most effective way of making diversity evident for readers. However, sometimes on the ground there is no such a definite differentiation between heterogenous environments and things. Instead, they are continuous. For instance, there are dry moments during the rainy season as there are times when it does not rain. In other cases, the distinction among non-dichotomous heterogenous things is clearer such as in the case of sediments of different grain sizes (fine sand, coarse sand, pebbles, cobbles, etc.).

Third, I also use a materiality approach to highlight the generative capacities of the material for shaping certain political economic outcomes and social relations. In the case of my study, the focus is on the generative capacities of the mined river materials, of the physical environments where they are mined, and of the mining equipment, all of which have shaped what I call the “mining network.”. I frame mining networks as socio-material associations/processes that take provisional forms. I see them both as the outcomes that flow from the way that the material, sociocultural, political, and economic dimensions interact (Bakker & Bridge, 2021), and as embedded within material, political, economic, and socio-cultural forces that shape the provisional form they take. In the Jeneberang, the material is simultaneously a factor that contributes to shape mining networks and a constitutive part of

them.⁵ In Chapter 3 and Chapter 4 I elaborate on the specific political economic and social outcomes that have been shaped by the generative capacities of the material/non-living.

Fourth, and related to the point above, I apply a materiality perspective to my study to decenter how we understand agency, to redistribute it “away” from humans and, in turn, to better capture the interpenetration of people and things (Bakker & Bridge, 2006, p. 19; Bakker & Bridge, 2021, p. 43). In Chapter 3 and Chapter 4 I address not only **what** the material does (Bakker & Bridge, 2006, p.18) in the political economic and social processes I study, but also **how** the material does it. Put it in another way, I have delved not only into the outcome but also into the process. To account for the active role of the material, I have employed a relational perspective of agency that “highlights the ‘co-constituted’ character of phenomena conventionally labeled either social or nonhuman” (Bakker & Bridge, 2021, p. 48). I see different relational ways in which agency works. To discuss this, I draw on three distinct but related conceptual tools: “rooted networks” (Rocheleau & Roth, 2007); “liveliness of the Earth” (drawing on ideas of Bakker & Bridge, 2021, and Lehman, 2016); and “affordances” (Barua, 2016). I have compartmentalized my use of each of them to make them analytically manageable. But these three conceptualizations are not necessarily mutually exclusive, and the ways in which I employ them are not exhaustive. All three terms put forward a relational understanding of agency. In Chapter 3 and Chapter 4 I unpack these concepts. I also explain the use I make of them and the usefulness I see in them.

I also draw on research that uses the concept of access in a Political Ecology approach. This work has helped me elucidate ways in which the material features of “things” shape both labour relations and the ability of people to “derive benefits from things” (*access* in the words of Ribot & Peluso, 2003). Some of the key studies that have provided insights include Myers (2015) concern for how the materialities of rattan explains access for collectors in the forest of Central Sulawesi, Indonesia; Luning & Pijpers’ analysis (2017), which looks at how geological features enable artisanal and large-scale industrial miners in Ghana to target gold

⁵ My use of the noun “mining networks” is twofold: to follow or mimic the nomenclature “production networks”, and to communicate that these networks are related to ANT ideas in two ways. One is that the networks’ constitutive parts include non-human and human elements, and the other is that mining networks themselves flow from other networks where human and material aspects interact.

ore; and the work by Libassi (2023) who uses materiality to examine the connections between the material qualities of gold ore materialities and small-scale mining labour practices in West Java, Indonesia. Luning & Pijpers (2017) and Libassi (2023) have been particularly illuminating as their research is at the intersection of materiality and analyses of small-scale mining livelihoods.

The way in which Myers (2015), Libassi (2023) and Luning & Pijpers (2017) use a materiality framework is different from but supplementary to the idea of “affordances” (Barua, 2016). The idea of materiality in the research of the first four authors points to the ways in which the material features of the non-human shape 1) the ability of humans to derive benefits from things; 2) differentiated experiences of mining and social differentiation, and 3) cohabitation between miners operating at different scales. The term “affordances” as used by Barua (2016) emphasizes what non-humans and the non-living “afford” for their commoditization (or for human labour as I employ the term). Moreover, the idea of “affordances” is very precise at indicating that the qualities of the non-human that we consider they “afford” come to be defined as such at the very moment of the encounter with humans. Thus, I partially draw upon the idea of materiality as employed by Myers (2015), Libassi (2023) and Luning & Pijpers (2017), but rely on the concept of “affordances” to highlight that the properties of river sand and stones I elaborate on are not inherent to them; they become their qualities only in the very moment of their interaction with humans.

I recognize that my field research and my academic work do not stand outside the place-based socio-material associations that I analyze; I situate myself and my research work as part of the socio-material associations I study. Thus, my relational understanding of agency also entails my acknowledgment that my presence and interactions with many people in the field might have contributed to produce different practices, understandings, and relationships in the geographical research area I selected for my study. The potential impacts of my presence, of the relationships I have established, of the conversations I had, and of my work have yet to be seen in the years to come.

Throughout the dissertation I interchangeably use the nouns “material features”, “materialities”, “material aspects”, “material dimension”, and “the material” to refer to the

non-living. And I refer to river sand and stones as river materials, not as resources nor as commodities, although I recognize that there have been resource-making and commoditization processes through which the river sand and stones have been brought into being as such. However, I do not examine the commoditization process of river sand and stones, nor the labour embedded in such a process.

In the field, some people in the mining sector use the language of “*galian C*” to refer to river sand and stones.⁶ Such a term was introduced in the now outdated regulatory framework on mining that categorized mined materials in three groups: A (strategic), B (vital), and C (neither A or B) (Peraturan Pemerintah Nomor 39 Tahun 1960). Group C lumped together materials such as limestone, quartz sand, gypsum, clay, marble, and others not included in groups A and B like river sand and stones (Art. 1, Peraturan Pemerintah Nomor 39 Tahun 1960).⁷ Others in the field called the river sand and stones by their names (*pasir* for sand, *batu kali* for stones, *sirtu* for a mix of both). I have decided not to frame the river sand and stones as resources or commodities as a way to acknowledge that these materials might matter differently in other ontologies and that they are also relevant for non-humans including riverine ecologies, the river system, ocean ecologies, and so on. However, I have not investigated in detail the processes through which sand and stones from the Jeneberang have become resources and commodities. This, perhaps, is a productive line of future research.

Sediments literature

In parallel to the sand mining literature, a cluster of social science concerned with sediments has been growing recently (Bremner, 2020a; Bremner, 2020b; Parrinello & Kondolf, 2021). My work contributes to bridging this scholarship with the sand mining literature I outlined above. River sand and stones are sediments of different grain size. In my dissertation, (transformed) sediment fluxes help make better sense of the history of mining in the Jeneberang river (Parrinello & Kondolf, 2021, p. 3). Moreover, my historical examination of

⁶ I started to use the term “*galian C*” in the field once I realized some people used it. Thus, in some cases I might have been the one triggering its use by others.

⁷ The valid mining law by the time of my field research in 2019 (Undang-Undang Nomor 4 Tahun 2009), and its related government regulation (Peraturan Pemerintah Nomor 23 Tahun 2010), changed the classification of mined materials; river sand and stones became under the category of rocks (*batuan*).

river sand and stone mining is an analysis of the relationship between sediment and society (Parrinello & Kondolf, 2021, p. 3). My use of an approach that combines insights from sand mining research and materiality has helped me bringing sediments to the forefront of my examination. Such a framework could be a promising way to make sediments more visible in our political economic and social accounts. My focus on the active role of spaces and “things” in shaping mining networks is very much akin to the phrase “the social life of sediment” put forward by Parrinello & Kondolf (2021). This refers to the idea that “sediment participates in social assemblages not only through meanings but through material powers and actions” (p. 2). I highlight the active participation of sediments in the shaping of place-based socio-material associations materialized in the form of shifting mining networks. I also refer to the dynamic Earth systems (Bremner, 2020a; Bremner, 2020b) that produce sediments through the idea of “the liveliness of the Earth”.

Research on urbanization-sand mining links and urbanization-aggregates mining connections

I situate the changes of the mining networks I study within broader transformations of urban growth and urban expansion of Makassar and surrounding areas. In my analysis, there is a strong link between Makassar’s urbanization and urban sprawl, a growing demand for river sand and stones from the Jeneberang for meeting the construction sector’s needs, and changes in the organization of mining activities that include their intensification, their further mechanization, their diversification to include stone crushing activities, and so on. Due to this, my research is connected to and aims at contributing to a body of work that has analyzed the links between urbanization and the mining of sand, stone and gravel (aggregates) that are demanded by and used in the construction sector.

These kinds of studies can also be classified as part of the sand mining literature. The difference lies in the strong emphasis they put on urbanization or issues about urbanization to explain changes in sand extraction. An example of this is Rahman & Suykens’ work (2023) who investigated the local relations between urbanism and transitions in sand production (p. 1) in Bangladesh. They studied the relations between on-site mining and large-scale urbanization (p.3). They analyzed this from a co-constitution perspective where sand

transformed the landscape (from rural to urban) and at the same time the landscape impacted sand extraction which became no longer viable in the urban space and was pushed to peripheral areas (p. 5). Another example of this type of work is the study by Kusumaningrum et al. (2021) which provides a short historical perspective about the connections between urban development and sand mining in the Jeneberang. I contribute to this strand of research by making visible the extractive activities that lie behind urbanization processes.

Related research focuses on regional aggregates industries. An example of this is the study by Sandberg and Wallace (2013) who examined the politics around pits and quarries in terms of trans-communal resistance to the industry coming from workers and people living in the surroundings. The characteristic of the cases analyzed is the presence of a multinational firm (Holcim from Switzerland) which, they state, exemplifies the industry profile (p. 70). Chambers and Sandberg (2007) work also shows the activism around the aggregates industry in Caledon, Ontario. An important insight of this work is the idea of aggregate regions being constructed through narratives from various actors. My study adds to this work by presenting contrasting mining actors and local/regional dynamics in terms of resistance or generalized acceptance among affected rural communities. It also contributes by showing the material construction of aggregate regions through the human-driven transformations in the Jeneberang river. Both of these analyses make evident that the extraction of aggregates shapes urban spaces and triggers opposition.

Hydroextractivism

Finally, I situate my research within the literature on extractivism. Specifically, within debates on the conceptualization of *extractivism(s)*. I am aware of the origins and development of the term in Latin America to explain natural resource extraction in this region. But I believe that my findings and my interpretations of river sand and stone mining in South Sulawesi, Indonesia can offer insights into the heterogeneity of both the material world and the grassroots politics around resource extraction and, in turn, inform our views of *Extractivism* as coined by Gudynas (2013) and employed beyond academia. In the individual chapters, however, I do not draw on this body of scholarship for developing and supporting my arguments.

Gudynas (2013, p. 3; 2018, p. 62) defines extractivism as a type of natural resources extraction characterized by being of high intensity or by extracting a high volume of materials and by having an export market as destination. He has elaborated a typology for extractive activities. According to this, for an extractive activity to be considered as extractivism it must be at the intersection of high intensity or high volumes extracted and having an export market as destination. In my view, this contemporary conceptualization of extractivism has introduced a hierarchization of extractive activities. Only the activities that meet the rigid standards to be considered as extractivism would seem to be the most problematic and worthy of study. Thus, the hierarchy the term introduces has the potential not only to direct unequal attention to a variety of experiences with extractive activities but also to undermine the relevance of those that “do not make it” to the status of extractivism.

The case study I analyze would not be considered as extractivism according to this definition. It is difficult to quantitatively determine what high intensity exactly means and the standard needs to be situated within the assessment of what is sustainable in the context being studied. Thus, this is a parameter that might or might not hold true for the river sand and stone mining activities I examine. Regarding the destination market as a feature to define whether mining activities in the area I study fit in Gudynas’ idea of extractivism, the main destination markets in the Jeneberang are the local and regional markets. By local I mean in the same *kabupaten*⁸, not that the main market is the very same place where the materials “naturally” accumulate and are removed from. In this sense, the extracted materials are indeed displaced from their “place of origin” —a rural area— to the place where they are finally used (either directly as construction materials or as raw materials to produce mortar and concrete). Mining activities in the Jeneberang are addressed to meet the growing demand of urban areas and it is to cities where materials are transported to continue the urban sprawl.

I see that river sand and stone mining is equally important to other forms of resource extraction characterized as extractivism, especially considering its ubiquity. In the sand mining literature, Bisht (2021) has recently made the call for categorizing sand mining as extractivism. But rather than packing and transporting the concept from the Latin America

⁸ The second-order political subdivisions in Indonesia are *Kabupaten/Kota*.

realities to other geographies, I believe that the conceptual framework of extractivism can be widened based on field research. Kauffer Michel (2018; 2021) has done so, and recently proposed a broadening of Gudyna's conceptualization of extractivism. Kauffer Michel frames extractivism as the extraction of natural resources that 1) brings about environmental, social, and economic impacts, 2) triggers opposition reactions, 3) unleashes conflictive situations that give rise to violence, and whose commercialization mainly benefits actors external to source spaces (2018, 42; 2021, p. 180). This definition of extractivism is more open to include instances of mining like the one I study.

Kauffer Michel (2018, pp. 35, 42, 43) proposes to see extractivism as a contemporary dynamic sociopolitical phenomenon where resistance, conflicts, and (different manifestations of) violence are the main elements. Based on my field findings I ask —would it be possible to talk about extractivism without having resistance, conflicts, and violence? There are other ways in which “the political” manifest in the relationships between people who live around mining areas and the actors/businesses who undertake mining activities. If we are to follow Kauffer Michel's (2018, p. 51) view of “the political” not only as conflict but also as social regulation (*regulación social*), then mining in the Jeneberang can be labelled as extractivism as local populations have designed and implemented social mechanisms other than organized resistance (I elaborate on this in Chapter 5) which are also tools in their political repertoire. The absence of visible forms of resistance does not mean the absence of uneven power relations, tensions, conflicting interests, and complicated negotiations. Based on field observations, I argue that in some cases, the lack of observable opposing movements has more to do with local experiences where the livelihoods local people lead have not been affected by extractive activities to the extent of threatening their interests and subsistence (moral economy) and/or with the existence of other mechanisms through which dissatisfaction and disagreement are channeled so that the grassroots politics around resource extraction take forms other than resistance.

I also argue for broadening the understanding of extractivism as a sociopolitical phenomenon to bring “the material” to the center of the definition as extractivism is, above all, about a specific type of relationship with the nonhuman (either living beings or the non-living). Such

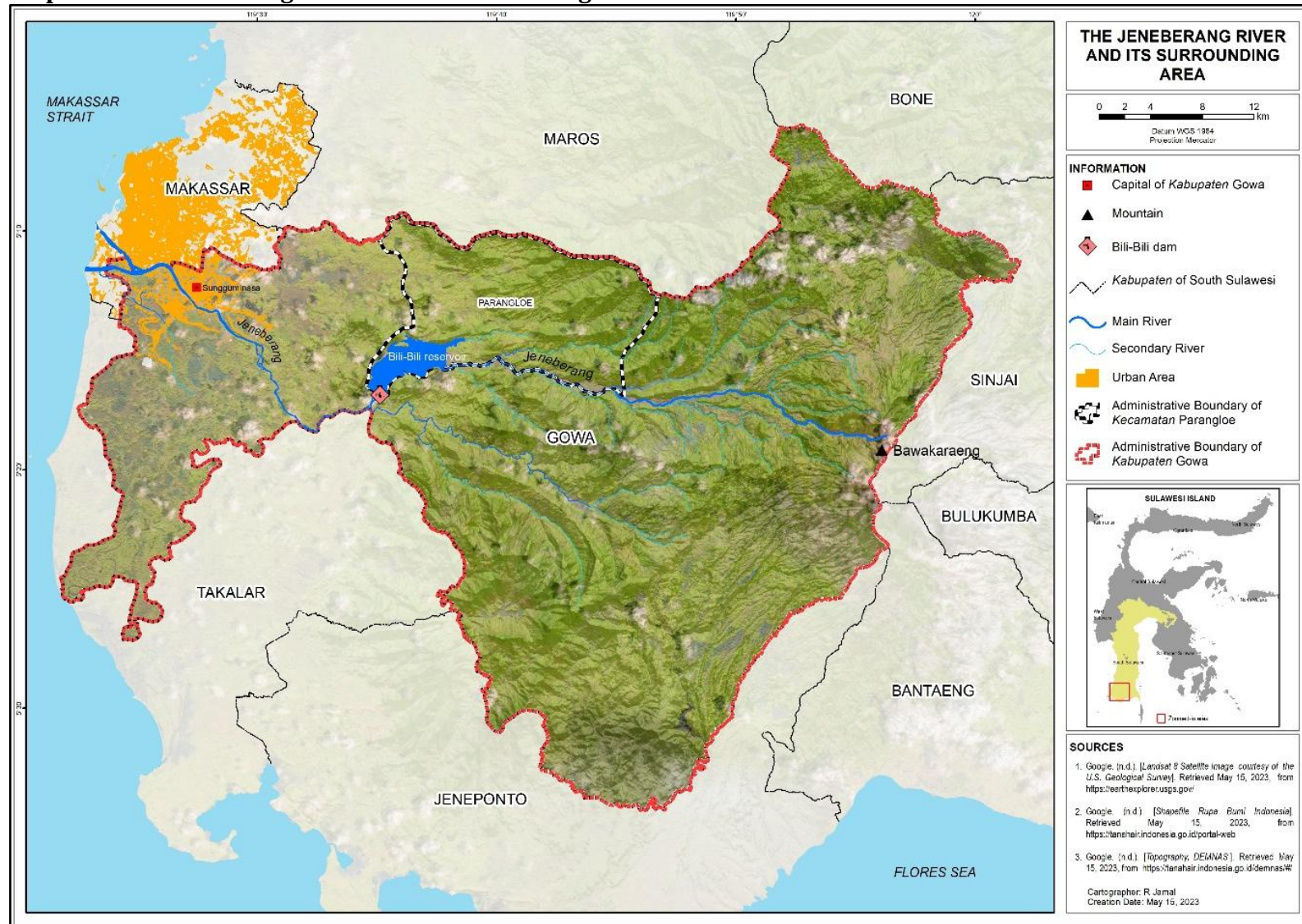
an addition could help considering how “matter” shapes extractivism, as a specific form of resource extraction, understanding “matter” not only as the diversity of “things” subjected to extractivism but also referring to the heterogeneity of geographies where it is undertaken (diversity of features distributed spatially).

In line with her proposal for widening the concept of extractivism, Kauffer Michel has recently come up with the concept of hydroextractivism (2018, p. 48; 2021, p. 181) to approach extractivism-water links, specifically in five circumstances where extractivism impacts water resources (2018, pp. 48-51). I draw on this idea to frame the river sand and stone mining activities in the area I study as a form of hydroextractivism. I do not analyze how mining in the river channel transforms the riverbed, the river channel, water flows, or sediment debit, but the “hydro” prefix in the concept helps to highlight the specific material features of the geographical area and the type of mining that is undertaken there: the removal of sand and stones (which are sediments of different grain size) from a water body (Kauffer Michel, 2018, p. 51). The relationship between (changing flows and levels of) water in the river and sediments is central to my account. This dissertation focuses on an instance of aquatic hydroextractivism (*extractivismo acuático*); water is where mining activities are conducted and the aquatic space is impacted (e.g. the use of mining equipment and the removal of sediments modify the components of the water body, including sediments) (Kauffer Michel, 2021, p. 185).

1.3.Spatiotemporal context

I provide here a general introduction to the research site I selected. In each chapter I add more specific details of the research area. As I mentioned earlier, the geographic focus of the dissertation is the Jeneberang river which is the main waterbody in Provinsi South Sulawesi, Indonesia. Administratively, the river is within one provinsi. Map 1.2 shows its location.

Map 1.2. The Jeneberang River and its surrounding area.



The Jeneberang river

The Jeneberang river is one of the main rivers in South Sulawesi and it has been historically important. In the past, the Jeneberang was the centre of life of the Kingdom of Gowa (c. 13th – 17th century), one of the largest kingdoms in Eastern Indonesia. The local kingdoms of South Sulawesi embraced Islam early in the 17th century; the Gowa Kingdom initiated conversion to Islam throughout the area which has become the major religion of several ethnic groups such as Makassarese, Buginese and Mandarese (Mattulada, 1982, p.11). In its beginnings, the Kingdom of Gowa was an interior agricultural polity centered on rice cultivation. The kingdom was a rice exporter during the 16th-17th century (Kementerian Kebudayaan dan Pariwisata & Balai Pelestarian Peninggalan Purbakala Makassar, 2011, p. 6). But the relevance of the Jeneberang for the kingdom was not limited to agricultural production; the river was also a key means of transportation and communication between the center of the kingdom, the interior areas located at its eastern part, and even the coastal areas (Kementerian Kebudayaan dan Pariwisata & Balai Pelestarian Peninggalan Purbakala Makassar, 2011, p. 6).

As shown in Map 1.2, administratively, most of the Jeneberang is located within [what today is](#) Kabupaten Gowa. But the river also runs through Kabupaten Takalar and Makassar, south and east of Gowa respectively. Makassar is located at the mouth of the Jeneberang. The Jeneberang continues to be at the center of life of contemporary Gowa and surrounding areas. It is, in a sense, a source of life in South Sulawesi. The Jeneberang is crucial for agriculture and for sustaining fishing-based livelihoods. It also provides water resources for domestic consumption, industrial use, irrigation, and hydropower generation in these areas. More related to the case I study, the river has also been essential for the provision of the sand and the stones that have been used for the urban growth of Makassar, Gowa and neighbouring areas.

The Jeneberang is approximately 75 km in length, its width ranges from 60 to 100 m, and its depth varies between 3-10 m. The river rises at Mt. Bawakaraeng, runs east from west and discharges into the Makassar Strait (see Map 1.2). The Jeneberang is a seasonal river; it depends on yearly rainfall for its water. The climate conditions of the area are influenced by

the monsoon and are characterized by a dry season (from around May to October) and a rainy season (from about November to April). The rainfall fills the Jeneberang and sometimes overflows its banks during the peak of the rainy season (approximately between January and February). After the rainy season, the Jeneberang has much less water content. The catchment area of the Jeneberang is approximately 780-860 km².

The Jeneberang river is not a pristine water body. Historian Anthony Reid (2000, p. 447) documented that by the 17th Century the river had already been redirected to a strategically more advantageous location. More recently, in the 1990s, the Indonesian government, with technical and financial support from Japan International Cooperation Agency (JICA), built Bili-Bili multipurpose dam and reservoir in the middle reaches on the Jeneberang's mainstream, around 30 km away from the south river mouth.⁹ The dam project also involved the construction of several sediment control structures; five are sand pockets and two are sabo dams. These are located from the reservoir upwards, to the upper reaches of the river channel. Sand pockets are long and tall concrete-made barriers built in the cross-section of the Jeneberang, from the left riverbank to the right one. Their function is to control sediment flow by facilitating that sediments accumulate behind them. Sabo dams "accumulate sediment and suppress production and flow of sediment" (International Sabo Association, n.d.a). Sabo dams, for example, prevent boulders from rolling down (International Sabo Association, n.d.b). Bili-Bili dam and reservoir were completed by 1999, the five sand pockets by 2000, and the sabo dams by 2001 (JICA, 2005b, pp. T7-1, T7-2). The dam was built mainly to protect Makassar and its surroundings (Kabupaten Gowa included) from flood damage. The project also included the construction of Kampili and Bissua weirs downstream of Bili-Bili dam. Bili-Bili has altered the water flow as it holds up to approximately 375 million cubic of water. The dam, the reservoir, the sand pockets and the sabo dams have also altered the transport of sediments originating in the hilly area.

⁹ The Jeneberang splits into two streams at around Km 4.5 which causes it to have a north and a south river mouth; the northern mouth has been narrowed and canalised (JICA, 1982, p. 8) which is another evidence of the ways in which the river has gone through human-made transformations.

I frame the Jeneberang river and its basin as a historical physical environment to highlight that it has been recurrently transformed through human actions. One of the biggest and most recent alterations has been the construction of Bili-Bili dam and reservoir, the sand pockets and the sabo dams. I use Bili-Bili dam as a landmark to distinguish between the lower and the upper reaches. The lower reaches comprise the area downstream from Bili-Bili dam and the upper reaches is the area above it. Throughout the dissertation I interchangeably use the nouns ‘lower reaches’/ ‘downstream area’ to refer to the approximately first 30 km from the Jeneberang south river mouth upwards, and the nouns ‘upper reaches’/ ‘upstream area’ to refer to the area between Km 30 and Km 60.

Mining in the Jeneberang

Mining activities in the Jeneberang have a long history. It is presumed that stones from the Jeneberang river were used for building forts during the Gowa-Tallo Kingdom (12th-17th Centuries) and the Dutch colonial period (17th-20th) (as cited in Dariati, 2005, p. 509; and in Kusumaningrum et al., 2021, pp. 206, 207). More recently, studies conducted by JICA (1980a, 1980b, 1982) show that the removal of sand and stone materials in the active channel of the Jeneberang has been going on at least since the 1970s, something people in the field also said. A community member we interviewed in his capacity as a representative of a community organization reported that is said that there has been mining in the Jeneberang since the time of the Indonesia’s Independence in the 1940s. This was supported by one of the oldest men we met in the field. He is now around 80 years old and said that he has done manual mining since he was 5 years old, confirming the existence of mining activities since at least the 1940s-1950s.

The Jeneberang has historically been a key source of sand and stone materials for Makassar’s urban development due to its proximity. Makassar’s current population amounts to around 1.5 million people, making it the third largest city outside Java Island. This capital city plays a key role connecting the eastern and western islands of Indonesia. However, Makassar’s importance goes back to its role as a major trading port since the time of the Kingdom of Gowa (c. 14th century) before Dutch colonialism, a time when the Strait of Makassar was under the control of the navy and merchant marine of the Kingdom (Mattulada, 1982, p.13).

Gowa, on its part, is one out of 24 kabupaten/kota of South Sulawesi and some of its zones are part of Makassar's metropolitan area. During the Kingdom of Gowa (c. 14th-20th centuries), Gowa was the center of political power.

From at least the 1970s to the early 2000s, most of the mining in the Jeneberang river channel was conducted in the lower reaches, closer to its estuary. Since the early 2000s until today mining activities have been concentrated in the upper reaches. I interpret that the construction of Bili-Bili dam and reservoir triggered the government's decision to promote the relocation of mining activities to their current location in the upstream area. Both the "natural" and transformed characteristics of the Jeneberang river and its basin matter for how people in the area have undertaken mining activities in the river channel.

The geographical characteristics of the Jeneberang river and its basin are crucial for understanding what the place has done for the process of mining. The Jeneberang is in a highly active tectonic area and the hilly areas where the river raises are collapse-prone. As a result, there are in the area repeated hillside collapses that produce large quantities of sediment and debris runoff (JICA, 1980a, p. 7; JICA, 1982, pp. 8, 9; JICA, 2005b, p. 3-1) and cause a high deposition of materials in the Jeneberang (Sudradjat et al., 2013). Yearly heavy rainfalls related to the monsoon-influenced climate of the area also contribute to landslide activity and to the transportation of sediments to the river. Sand and stones, which are sediments of different grain size, were already available in the area even before Bili-Bili dam, the reservoir, and the sediment control structures that I mentioned earlier were constructed in the 1990s. The dam, the reservoir, and particularly the sand pockets have boosted the potential for mining activities and have been key for how mining operations take place today as they influence how the sand and the stones accumulate along the river channel in the upper reaches of the Jeneberang.

Today, mining in the upstream area of the Jeneberang consists in the removal and appropriation of sand and stone materials from the active river channel. Mining is undertaken at industrial levels, and it is largely mechanized as excavators are the main mining equipment

used.¹⁰ Mining activities, as they happen today, started in the early 2000s with the gradual arrival of several private mining firms—which are local in origin and operations—and the state-owned mining company *PD. Jasa Konstruksi*—which is owned and operated by the government of Kabupaten Gowa. Sand and stone mining in the Jeneberang is regulated through licensing. Licenses or permits can be renewed every five years and indicate the specific land area to be used as a mining site (within the river channel), the geographic coordinates of the site, a visual representation of the site, and the materials to be mined.

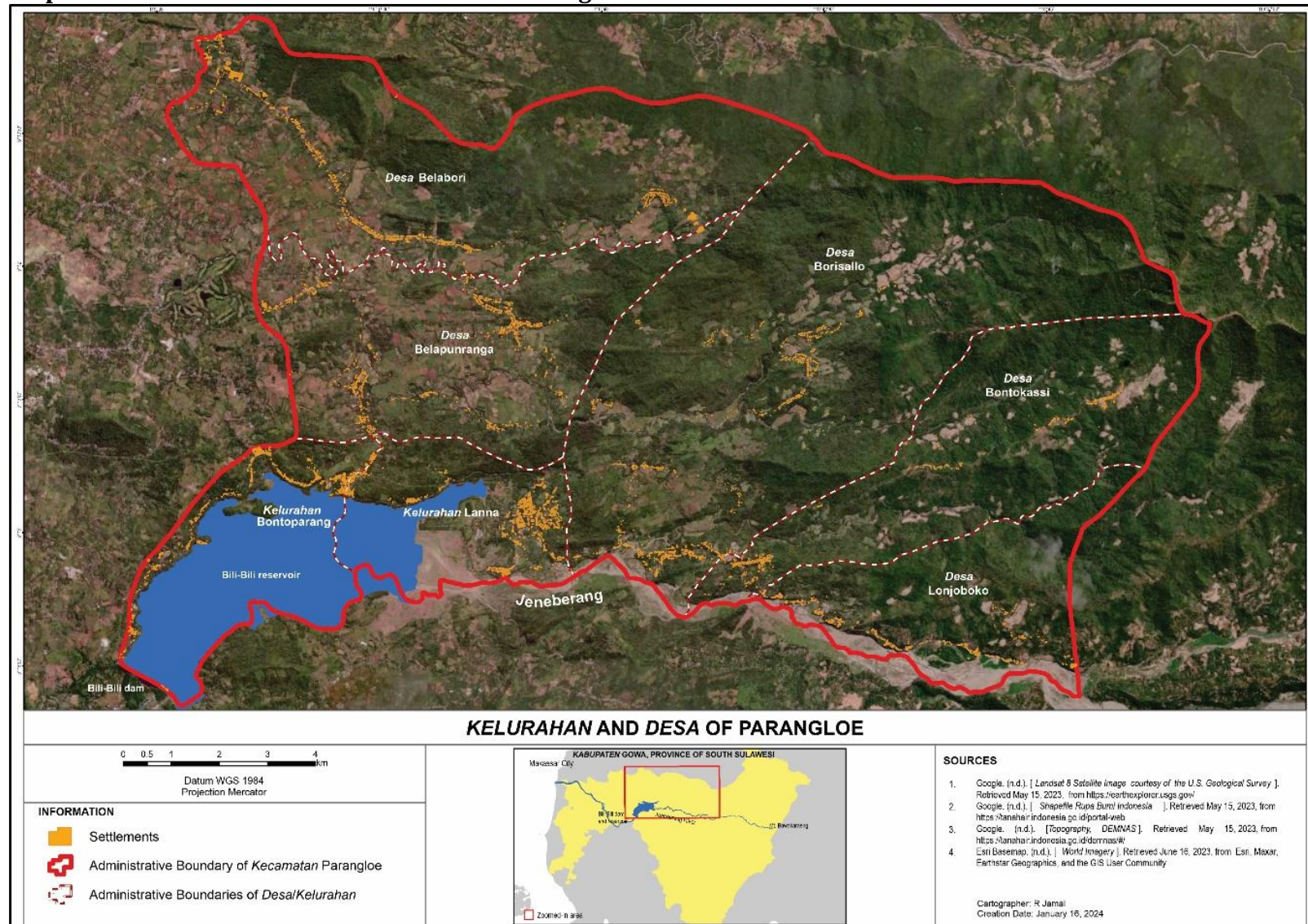
Administratively, most of the mining area upstream the river channel belongs to *Kecamatan*¹¹ Parangloe, one of 18 *kecamatan* of Kabupaten Gowa. Parangloe is between 30-40 km or one-two hours away from Makassar. A part of Parangloe is by the Jeneberang river and the other part is on the mountain side, and it is administratively divided into two *kelurahan* and five *desa*.¹² I focus on the riverine part of Parangloe which includes Kelurahan Lanna, Desa Borisallo, Desa Bontokassi and Desa Lonjoboko (see Map 1.3 below).

¹⁰ To put things into perspective, current mining operations in Parangloe can be categorized as large-scale when compared to the scale of operations prior to the early 2000s; namely, before medium- and large-sized mining companies started to operate in the area. By then, mining was undertaken at small-scale, and it was predominantly manual. Although people were already using excavators, there were not as many as today, as told by people in Parangloe. However, based on the approximate total of mining land area, mining activities in Parangloe fall short of the scale of mining operations in other geographical areas. For instance, while the concession of IndoMet coal mining project in Kalimantan covers 350,000 ha (Brown & Spiegel, 2017, p. 107) and PT Vale Indonesia's concession area for nickel mining in Sulawesi comprises 118,000 ha (PT Vale, n.d.), the officially recorded land area under mining permits in the Jeneberang river was approximately 275 ha in 2019 (information shared by South Sulawesi's Department of Energy and Mineral Resources -ESDM). In the same way, based on the approximate daily volumes of mined river sand and stones, the volumes mined in the Jeneberang fall short of the volumes mined in other often-cited geographical areas for sand mining. While in India, for example, trucks load around 1,250 tons (or 628 m³) of river sand every day in a single mining site (around 500 trucks with a capacity of 2.5 tons each) (Rege, 2016, p. 107), in Parangloe the approximate daily volumes of mined river sand and stones from **all** mining sites amount to 3,500 m³. Therefore, I define the scale of current mechanized mining activities in Parangloe as industrial/large when compared to non-mechanized mining in the local area.

¹¹ *Kecamatan* are the third-order political subdivisions in Indonesia.

¹² *Kelurahan* and *Desa* are the administrative units below the *Kecamatan* level.

Map 1.3. Kelurahan and Desa of Kecamatan Parangloe.



Parangloe is a hilly rural area inhabited by approximately 19,500 people as of 2023 (Badan Pusat Statistik Kabupaten Gowa, 2023b). Demographically, Parangloe is quite homogeneous in the sense that most people are ethnic Makassarese and Muslims (Badan Pusat Statistik Kabupaten Gowa, 2023a).¹³ This happens within South Sulawesi's ethnic diversity where Buginese, Makassarese, Torajanese, Mandarese and others live. The main livelihood that people in Parangloe lead is agriculture.

The sand and stone materials that are removed from the Jeneberang are mainly consumed locally, as explained above. The market includes Makassar and surrounding areas —like some parts of Kabupaten Gowa— that have been urbanizing rapidly. According to many people we interviewed, the construction materials used for the development of Makassar's and Gowa's urban areas have been sourced from the Jeneberang river. It can be argued that there is a strong causal effect between the expansion of built-up areas in Makassar and Gowa and the demand for these river materials because sand and stones are two main ingredients of concrete.¹⁴ River sand and stones have other uses in the area too; I explain them in Chapter 3.

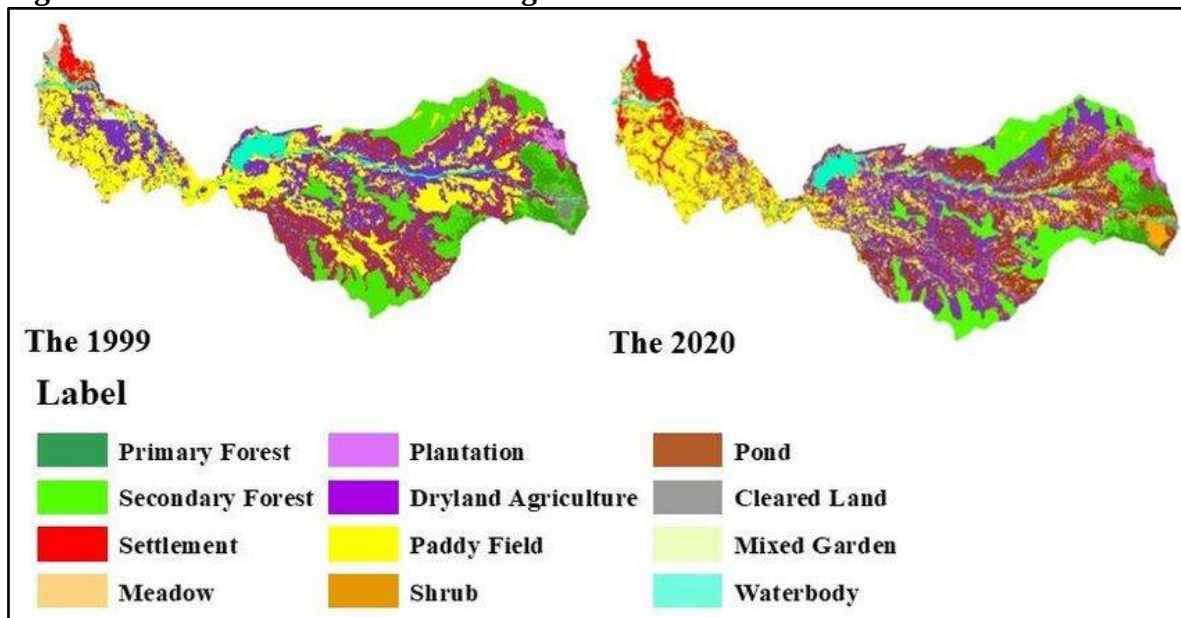
Land-use changes in Makassar show that the built-up area has increased by 13% from 1999 to 2019, from around 60 km² to 84 km² (Liong et al., 2021, p. 4). This means that today around half of Makassar's territory is urban (48%). In Kabupaten Gowa, the built-up area has increased from around 38 km² in 1998 to 63 km² in 2016 (Munawir et al., 2019, p. 242), mainly in the area contiguous to Makassar. Despite the fact that Gowa's urban area is still very small when compared to its total territory of 1,883 km², Gowa's urban expansion is of major importance as it has rapidly accelerated in the last few years. From 1998 to 2011, its built-up area increased by 10 km². More recently, in only five years, from 2011 to 2016, it increased by 15 km² (Munawir et al., 2019, p. 242). For the expansion of their built-up areas, Makassar and Gowa have required many cubic meters of concrete and, in turn, many cubic meters of sand and crushed stone that are key ingredients of concrete.

¹³ I did not find official statistics on the ethnic configuration of Parangloe, but at first glance I was able to confirm that the area is inhabited mainly by Makassarese and there are some Buginese.

¹⁴ The demand and consumption of sand and stones from the Jeneberang is out of the scope of the dissertation.

To complement this, estimates of land use land cover changes in the Jeneberang river basin show that the land area used for settlements increased from 14 km² in 1999 to 50 km² in 2020 (Widodo et al., 2021, p. 5) which, it can be assumed, has entailed a growing use of construction materials. This increase in the land area used for settlements has been characterised by the expansion of the urban area. Figure 1.1 below shows in red the changes in urban sprawl in the Jeneberang river basin during the first two decades of the 21st century. The red areas in the figure correspond to Makassar and parts of Kabupaten Gowa. For the demand of river sand and stones, urban sprawl means an expanding network of roads and a corresponding rising demand of materials for building them.

Figure 1.1. Land use in the Jeneberang river basin in 1999 and 2020.



Source: Widodo et al., 2021, p. 4. Figure available via License Creative Commons Attribution 3.0 Unported: https://www.researchgate.net/publication/353563867_Land_use_change_study_and_the_increased_risk_of_floods_disaster_in_Jeneberang_watershed_at_Gowa_Regency_South_Sulawesi_Indonesia

The river materials sourced from the Jeneberang are also consumed regionally and nationally, according to the explanations provided by some of the workers and companies that we interviewed. In some cases, their destination, in raw or processed form, includes other locations in Sulawesi Island. In other cases, although very limited, they have been sent to other Indonesia's islands.

Despite its local features, in terms of the removal, appropriation, trade and consumption of river materials mostly occurring at the local level, the mining of sand and stones in the Jeneberang is also tied to other scales. It is intertwined with the global scale in that international urbanization trends have influenced the urban growth of Makassar and neighboring areas, including the extensive use of concrete. And, although this is not something new, the pace and rate at which it has been happening make it unique. It is also linked to the global level in that JICA, through its research and consultancy, contributed to shape where mining takes place today. Ties to the national level are evident in the role of the Indonesian central government pushing for the development of Makassar as the urban center of Eastern Indonesia.

Other uses of the Jeneberang

The history of Makassar and Gowa have been intertwined with the Jeneberang river. Apart from being a key source of materials used in the construction sector, the Jeneberang has also been crucial in the provision of water resources for domestic consumption, industrial use, irrigation, and hydropower generation. By the 1920s, the city government had provided adequate drinking water facilities whose source was the Jeneberang river (Pradadimara, 2003: p. 81). In its lower reaches, the river is still navigated by people in Makassar and Kabupaten Gowa who get on *katinting* (a small boat with an engine) for their transportation (Baharuddin, 2015; Yusran, 2017; Ara, 2018).

The recent history of Parangloe has also been deeply connected to the Jeneberang river, its water, its fish, its sand, and its stones. Most of the population in Parangloe leads agricultural livelihoods; the Jeneberang has provided them with water resources for the irrigation of their fields. The crops that residents cultivate include rice, corn, peanuts, cassava, sweet potato, green beans, water spinach, aubergine, mangoes, durian, bananas, jackfruit, coconut, coffee, cocoa, aren palm, and a variety of fruits and vegetables that are cultivated in hilly areas. Parangloe is one of the major suppliers of fresh vegetable produce for Makassar (Mahyuddin et al., 2021) and it also has the highest cattle population in Kabupaten Gowa (Lisson, 2008, p.11). Regarding rice, in Parangloe it is mostly grown on dry/non-flooded/non-sawah fields. The table in appendix A provides detailed information about the importance of this type of

agricultural practice in Parangloe, as reflected by the land area cultivated in this way in 2019 and 2022 (the two moments when I was there).

The sawah fields in Parangloe are located by the riverbank, and include irrigated, rain-fed, and tidal rice fields. As of 2022, most of the sawah farmland were irrigated fields (874.6 ha) that yielded two or more harvests in a year. The land area of rain-fed rice fields and tidal farmland was much smaller (210 ha and 66.4 respectively), and both yielded only one harvest (Badan Pusat Statistik Kabupaten Gowa, 2023c, pp. 31-33). Thus, in the section of the Jeneberang that runs through Parangloe farming interacts with river sand and stone mining very closely. Photo 1.1 and Photo 1.2 below show the paddy and corn fields that exist in some areas of the riverbank located further up the stream. Further down river, farmers grow peanuts in the river channel during the dry season (see Photo 1.3).

Photo 1.1. Paddy fields in the riverbank and mining in the river channel (around Desa Lonjoboko in Aug 2019).



Photo credit: Wendy Alejandra Medina de Loera.

Photo 1.2. Sand and stone mining next to paddy fields during the dry season (Desa Lonjoboko, Parangloe, Aug 2019).



Photo credit: Wendy Alejandra Medina de Loera

Photo 1.3. Peanut cultivation in mining site during the dry season (Kelurahan Lanna, Parangloe, Aug 2019).



Photo credit: Wendy Alejandra Medina de Loera

The Jeneberang has also been generative of fishing livelihoods; fishing activities in the upper reaches are undertaken mainly during the rainy season (interviews and observations) (see Photo 1.4). In its upstream area, the Jeneberang is also a recreational space with eateries —like *Lesehan Cahaya Agung*— and ecotourism sites —such as Bili-Bili Park and *Pantai Sicini*— by the riverside. Thus, in its upper reaches, the Jeneberang has not only sustained sand and stone mining-based livelihoods.

Photo 1.4. Fishing in the Jeneberang during rainy season.



Photo credit: Wendy Alejandra Medina de Loera.

1.4.Organization of Dissertation

Apart from the Introduction, the dissertation has five chapters: a research methods chapter, a conclusions chapter, and three substantive chapters. In what follows I explain what each chapter is about, their place in the dissertation, and the arguments that I develop in each of them.

In Chapter 2 I explain the research design of my study and the methods I employed. I also provide details of my motivations for undertaking this study, my positionality, my research process, and some of the decisions I took during my research journey which have shaped the outcome that materialized in my dissertation.

In Chapter 3, which is the first substantive chapter of the dissertation, I document the river sand and stone mining sector in the Jeneberang in two periods: one that roughly goes from the 1970s to the early 2000s, and the other from the early 2000s to 2022. I analyze the two mining networks that I have identified for each period with a focus on the changes in mining businesses' ownership. My argument is that the interaction between the material features of river sand and stones and the geographical spaces where they are mined, the politics of sand governance as they relate to state-licensed access to mining sites, and an increasing demand for river sand and stones has shaped two contrasting networks. A former network that was labour-intensive and a current network that is technology- and capital-intensive. This transformation has had implications for local small-scale mining businesses (sole proprietorships). The transformation has meant that the present network is less inclusive of them and is dominated by medium- and large-sized private companies and one state-owned company that undertake large-scale or industrial mining. The decreasing inclusion of local small-scale mining businesses has been partially because mining equipment has become less affordable to those not attached to capital. The transformation has also entailed that mining is mostly concentrated in the hands of these bigger companies because of their access to permits and to mining sites (based on either state-sanctioned written licenses or the actual consent of government authorities). Local small-scale businesses owners are still part of the present mining network, but transformations in the historical physical environment, the politics of sand governance, and the demand-supply of construction materials have brought

about changes in the ways in which they engage in mining. The general pattern is that they now work in partnership with the big companies.

Related to my main argument, in Chapter 3 I also show that mining networks are dynamic and variable across time and geographical locations, even in one same research area. To do this, I offer a historical perspective of the mining network in the Jeneberang that shows how and why it has changed over time. My analysis lays out the material and human factors that have shaped the network in the approximately last 50 years. By bringing material, political, economic, and sociocultural dimensions into the analysis of the shaping of mining networks I have developed a more holistic way to explain how, when and under what conditions networks are organized in ways more/less accessible for local people and/or for small-sized mining businesses. Again, attention is on mining businesses owners (those who in theory conduct mining activities), not on workers (those who indeed undertake mining activities). However, discussing the present business structure has necessarily meant to delve into labour arrangements and, in turn, into workers of the current mining network.

In Chapter 4 I examine the (mainly) local composition of a key element of the current (2000-2022) mining network: the workforce. Thus, my focus is on the workers of the present mining network. I document who the workers of the river sand and stone mining network are and the work they do. I also describe several labour arrangements that exist around river sand and stone mining and identify the following categories of workers: workers of private mining companies, workers of excavator owners/renters, excavator owner/renters, manual miners, and local former small-scale miners. The labour relationships these categories of workers are engaged in include wage labour relationships, self-employment and what I call redistributive relationships. My argument is that the interplay between the materialities of the mined river materials and the geographical area from where they are removed, the mining equipment used, the type of mining actors, sociocultural dynamics, and the politics of sand governance has shaped a mining network that has local workers as a constitutive part of it. In this chapter, the politics of sand governance refer to pro-local employment policies encouraged by the government at different scales.

Regarding the material characteristics of the Jeneberang and the sand and stones removed from there, I show in the chapter the significant role they have played for enabling the incorporation of unskilled local workers in large, small, and very small-scale mining operations. Especially considering that the sand and the stones in the Jeneberang do not need to be removed from the mother rock, they naturally occur in their usable form for the construction sector in Makassar and surroundings, they are already congregated and “ready to be taken”, and they can be managed without the use of heavy-duty machinery (in contrast, for example, of large marble or sandstone slabs).

The main implication of the interaction between the material and human factors that I lay out in Chapter 4 is that the workforce of the present mining network is constituted by local people. A broader implication is that this has contributed to a lack of popular opposition to river sand and stone mining among the communities that have long lived around the Jeneberang. It is important to clarify here that even though the empirical documentation of labour that I do in Chapter 4 is central to my analysis of how a combination of material, political, economic and sociocultural aspects shape a mining network, the labour relations are not my main concern. This is a theme that can be followed up at some point. In the same vein, although I look at the human labour embedded in the processes of removing sand and stones, I do not do it through a labour theory of value or labour process approach in the dissertation.

In Chapter 5 I focus on local people and their agency to shape the behaviour of private and the state-owned mining firms which are key elements of the mining network in the Jeneberang. I examine locals’ active role in shaping the actions of mining companies towards them so that the current mining network is inclusive of them, directly or indirectly. Specifically, I focus on five categories of community actors and on the mechanisms they have employed to channel economic benefits to them: 1) former small-scale local miners who came together under an organization, 'negotiated' with the state-owned mining company and reached an agreement where former local miners receive a fixed amount of money for each sale of river materials the company makes; 2) former landowners whose former agricultural land is now within the mining site the state-owned company manages and continue to use

their former land during the dry season to cultivate certain crops (the company does not mine the spots where these people continue their agricultural practices); 3) local social organizations that charge a fee to dump trucks that leave mining sites loaded with river materials (dump trucks belong to either private mining companies operating in the area or their customers who go to mining sites to buy materials); 4) individuals who are owners of access roads (their land formerly had a different use but today it is used as an access road) and charge a fee to dump trucks; and 5) local land claimants whose land used to be by the riverside and has become part of the river channel due to the impacts of sediment and debris runoff.

Whereas in previous chapters I highlighted the ways in which the interactions between material and human processes shape mining networks, in this chapter I stress the important role that Parangloe people have played for the current form that the network has taken. Thus, as active participants in mining networks making and to benefit from mining, people from the locality have designed and implemented several strategies that are underpinned by what I see as locals' claims for a right to subsistence and/or for a right to derive economic benefits from mining. The implications of all this are that people in the surroundings have been able to mobilize their claims and achieve that some of the benefits from mining trickle down to them. More broadly, this has contributed to a lack of popular opposition to river sand and stone mining among the communities that have long lived around the Jeneberang. In the chapter I analyze the political and sociocultural aspects —such as the political opportunities available to local people and the commonsense locals, mining companies and local governments share— that have been central to Parangloe people's ability to shape the network. The chapter shows that local communities are not passive recipients of mining impacts and that mining networks can be better understood as procedural.

In Chapter 6 I explain the main contributions of my work and how these add to mainly the sand mining literature. I also present what I consider the practical utility of my study and identify areas of potential future research.

1.5. Clarification: framing & writing style

The empirical data on which I draw can be considered as “common” when compared to documented “spectacular” cases of sand mining that entail its massive extraction for vast domestic markets and for its global trade. For this reason, “drama” is not in the way in which I framed my ideas, nor it is the writing style I used. Sand and stone mining in the Jeneberang river is “ordinary” in the sense that it is undertaken to supply construction materials to the nearest cities for their further urbanization, and the estimated volumes extracted are in line with this demand. In this sense, the case I explore in the dissertation is representative of many other experiences with river sand and stone mining around the world (e.g. Gallardo Zavaleta et al., 2023). And it is precisely the ubiquity and the everyday nature of the phenomena what makes it necessary and pressing to be investigated. Apart from the “small scale and intensity” of operations when compared to other instances analyzed in the sand mining literature, so far, sand and stone mining in the Jeneberang has not been “spectacular” in terms of community opposition and/or resistance either. So, there was no way for my account to have “drama” in it without field research findings that showed “spectacular” situations.

Chapter 2. Research Design and Methods

In this chapter I provide a general overview of the research methods I employed. I also explain my decisions on the ways I proceeded in the field and my research process more broadly. Individual substantive chapters have their own section on research methods. There, I elaborate on specific data collection techniques relevant to the information discussed in each chapter.

2.1. Topic selection

I chose the topic of “sand mining” in conversation with my supervisor, Peter Vandergeest. He made me notice it was a theme that was increasingly gaining attention. I had come to York University with the idea of doing research on “mining” and sand mining seemed appropriate. My original interest in mining was partially driven by the links that my family history, through my mother’s side, had with it. In the early 20th century, my grandmother’s father worked as a miner in Asientos, Aguascalientes, Mexico. My grandmother’s stories about her dad sparked my interest in the life and work of miners. Other tales about my grandparents’ work histories as a housewife, an outsourced sewer for a garment company, a textile factory worker, and a railway worker motivated my interest in the working class: workplaces, workers, and the jobs they do.

In 2012, having completed my MA in Southeast Asian Studies, I visited Indonesia for the first time. During a journey to Kawah Ijen volcano in East Java, I was astonished by the scene of labour-intensive sulphur mining operations that take place around the crater lake. While speaking to some workers, I was told about the low prices they get paid for the sulphuric rocks, the risks this hard labour poses for their health, and the implications this has for their family and livelihoods. This brief but unforgettable experience strengthened still more my interest in the connections between mining and work.

The growing visibility of sand mining and the limited existing research on it from the perspective of the social sciences influenced my decision to investigate it. Recent research work on sand mining in other parts of the world inspired and encouraged me to focus my

research on such topic. The attention that Singapore had grabbed as the largest sand importer in the world further motivated me to focus my research on sand mining. Singapore is by far the only country in Southeast Asia that has relied on sea sand to develop new land area. Indonesia has also historically relied on sea sand for many land reclamation projects in small islands and coastal areas of all major islands, and I wanted to tell the histories of sand mining in this insular country.

2.2. Research site selection

After having decided to do research on sand mining in Indonesia, I proceeded to select a research site. Through an online search I mapped some potential case studies within the country. I identified three cases of sea sand mining related to three land reclamation projects: Benoa Bay in Bali, Jakarta Bay in Java, and Centre Point Indonesia (CPI) in Sulawesi.¹⁵ The places where sea sand was being sourced for these reclamation projects had received some media attention due to the opposition local communities and organizations raised against the removal of sand from the seabed.

In the end, I decided to focus my research on the sand mining operations linked to the construction of CPI off the coast of Makassar. My selection was based on my preliminary online findings which suggested that mining activities not only were being undertaken in the sea but also in the Jeneberang river which is a water body of major historical importance in South Sulawesi and in Indonesia more broadly.¹⁶ Thus, the possibility to be able to contrast the ways in which sand mining occurred in two different kinds of water bodies (rivers and the sea) made me to select South Sulawesi as my area of study. Only when I was in the field, I was able to realize that it was going to be impossible to do research on both river and sea sand mining.

¹⁵ Benoa Bay project in Bali was first introduced in 2013-14 and the resistance organized around it has been able to prevent it from being developed (“Can Bali’s new Governor”, 2018; Coconuts Bali, 2018). Regarding Jakarta Bay in Java, as October 2018, only 4 out of 17 planned artificial islands have been completed and permits to develop the remaining 13 islands have been revoked (Gokkon, 2018). Progress made regarding Centre Point Indonesia is detailed below.

¹⁶ At the beginning of my research, I only knew that river sand mining in Gowa seemed to have a longer history and that, at first sight, it did not seem to be exclusively linked to CPI project.

The creation of CPI started in 2017 and entailed the making of 157 ha land area off the coast of Makassar to create space for housing, businesses, public facilities, etc. The Dutch company Boskalis dredged the sea sand required to create the new land on which CPI has been built. Sea sand mining took place just a few kilometers south from where CPI was being created. Sand mining triggered strong and long-term resistance from local fishers.¹⁷ In the end, fishers' voices were not heard, sand continued to be dredged, land reclamation was completed, and CPI came into existence.

In 2019, I went to the field with the expectation that I would also find conflict, resistance, or/and opposition among locals towards sand mining in the Jeneberang. My expectation had been shaped by some of the scholarly work on mining —of gold, nickel, and coal, for example— and by many other sources of information more accessible to the public. Contrary to my presumption, I did not find any visible sign of collective resistance towards mining, although this does not necessarily mean that tensions were nonexistent. For instance, local news from the recent past shed light on complaints in the area about the dust created by the sector (Tempo, 2015) and the damages caused to the main road by the constant transit of dump trucks filled with river sand and stones (Tempo, 2014). Thus, my observations contrasted with the open, vocal, visible, and recognisable opposition movement against sea sand mining I mentioned above. Such a contrast intrigued me and prompted the question — what explains the apparent acceptance of sand and stone mining in the upper reaches of the Jeneberang river by people living near mining sites?. This broad question has been “behind the scenes” of my research and it took my research in the direction it went.

Prior to my arrival to the field in early 2019, I knew that sand from the seabed off the coast of Kabupaten Takalar had been key for the development of CPI. However, I did not know the exact location of sand mining operations in the Jeneberang river. To identify them I first explored some areas of the lower reaches, but I did not see any sand mining happening. I decided to approach South Sulawesi's Department of Energy and Mineral Resources (*ESDM*

¹⁷ According to news media and reports from environmental organizations, people in Takalar protested against sand mining (Hardiansya & Chandra, 2017; Kamaruddin, 2017; WALHI, 2017). For more details about the fisherfolk in Takalar against the mining of sand from the seabed see <https://ejatlas.org/conflict/takalar-fisherfolk-against-sea-sand-mining>.

Sulsel -Dinas Energi dan Sumber Daya Mineral Provinsi Sulawesi Selatan)¹⁸ to request official information about sand mining in the Jeneberang. I took such decision because I went to the field knowing that in other geographical spaces outside Indonesia the issue of river sand mining is a sensitive topic. Therefore, I was wary of the potential risks and the unwillingness, especially of companies, to participate. Thus, I thought that the best and safest way to proceed, for potential participants and myself, was to approach companies and other mining actors officially recorded by the relevant government authorities. ESDM shared a list of mining companies with valid permits to remove sand and stones from the Jeneberang river, among other relevant documents. Only then I learned both that sand was not the only river material mined in the Jeneberang and that Kecamatan Parangloe was the area where mining operations were concentrated. As mentioned in the Introduction chapter, the upstream area of the Jeneberang river is the site I chose for my research. Administratively, this area belongs to Kecamatan Parangloe. Thus, ESDM was key for the steps I decided to take during fieldwork.

I devoted the first month or so of my time in South Sulawesi in learning about mining in the Jeneberang. This distracted me from paying attention to sea sand mining off the coast of Takalar. The distance was one issue. Eventually, I quit my ambition of doing research on both sea and river sand mining when I saw the size of the research site I was about to investigate if I decided to study the mining operations in the river. Mining in the river channel increasingly grabbed my interest as I found it to be challenging research; I gradually developed a fascination for doing “detective” work. Moreover, in contrast to the temporary nature of sea sand mining in Takalar and its spectacularity in terms of the visibility and media coverage of fishers’ resistance, mining in the Jeberang was long-term and seemed to be more ordinary. This is something I found promising for my current and potential longitudinal future research. Initially, my field research was all confusion. Things became clearer as I spent more time in Gowa and talked to more and more people. My research assistants were key in my process of digesting all the information we received.

¹⁸ I use the acronym ESDM to refer to South Sulawesi’s Department of Energy and Mineral Resources throughout the dissertation.

Having identified Parangloe as the geographical area of my research I did a Google Maps search of mining activities in its riverine part. Then, we visited Parangloe to check the list of licensed mining companies provided by ESDM against reality. We went company by company in Parangloe to ask for their participation in this research. In that way I could know their names, count them, and determine whether all of them undertook mining activities. Our findings in the field revealed some differences with the information provided by ESDM. I elaborate on them in Chapter 3. Except for a few companies that implicitly refused to participate in the research, people were generally willing to talk to us and answer all our questions. To all of them I am infinitely grateful.

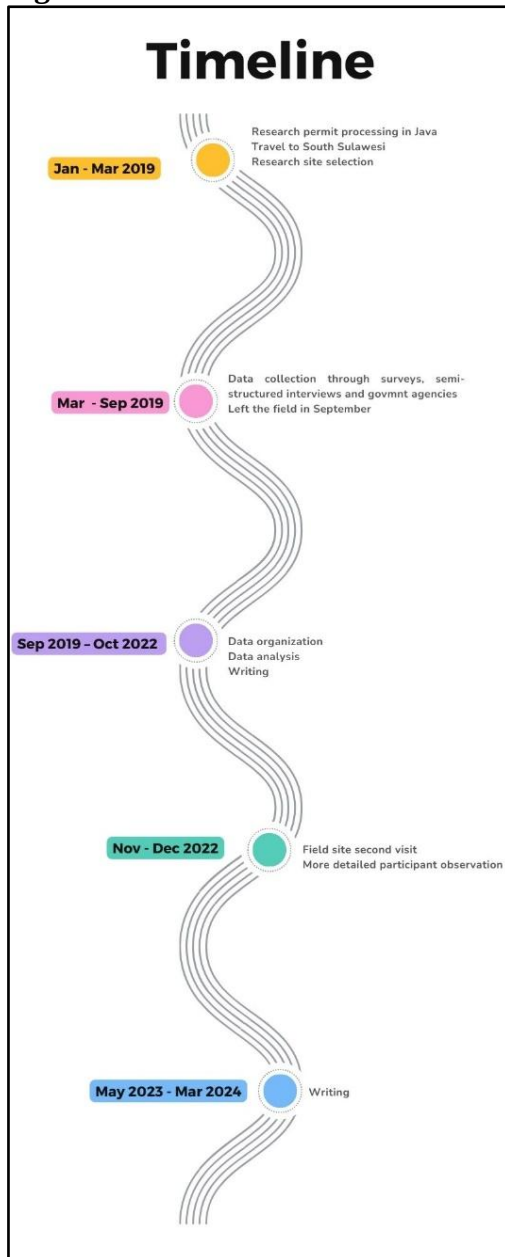
2.3. Fieldwork

I received approval from York University's ethics review committee prior to data gathering. I conducted fieldwork in Kecamatan Parangloe, Kabupaten Gowa, Provinsi South Sulawesi, Indonesia, from March to September 2019 and from November to December 2022. My field research got interrupted by the Covid-19 pandemic which prevented me from going back to the field in January 2020. In retrospective, not returning to the field immediately turned out to be useful for my processes of making sense of what I had seen and learned and figuring out how to frame my ideas. The timeline below summarizes the information I detail in the following paragraph.

I collected most of the information I found relevant for my dissertation during my field research in 2019. My short visit from November to December 2022 was mostly to see whether the state of things had changed after three years, to learn what happened to mining activities and workers during the Covid-19 pandemic, to see what the Jeneberang looked like during the rainy season and how it is to do mining during heavy rainfalls. The time between September 2019 and November 2022 gave me the opportunity to organize and analyze the data I had gathered. And, above all, it enabled me to identify gaps in my knowledge and understanding of things. My second visit to the field, although short, provided me with the opportunity to address some of those gaps and to make my study as updated as possible (considering my delay in completing my PhD). For instance, I paid more attention to the characteristics of the material world in the Jeneberang such as the river channel, the sand, the

stones, the uplands, the season, the rainfall, the mining equipment, the manoeuvres to operate excavators, the reservoir, the landslides, and so on. I also looked more closely at kinship relations, social interactions, and the uses of titles. I came to confirm, for example, that family relationships are highly present in mining activities. And I could corroborate that indeed there are women who work as manual miners. Some of my findings were the outcome of fortuitous rather than planned encounters or actions.

Figure 2.1. Timeline of research



My decision to return to Parangloe in late 2022 was highly motivated by my interest in letting people know that I did not forget about them, that I was still grateful for their help in making my research possible, and that I continued to be interested in Parangloe people. In other words, I wanted them to know that I did not just use them and abandon them. I wanted to show my most sincere and long-term commitment. I have met many people throughout my time in Parangloe who have always been very supportive. They have made me feel that they are happy to see me and that they hope to see me again. In 2019 and again in 2022 I was commonly asked “not to forget about them”. “When are you coming back?” was also a common question I got. In 2022 I met up with people I had met in 2019. So, my visit in 2022 was not only important for my ongoing learning process and my dissertation but also for demonstrating my serious long-term commitment. The experiences of two former Professors of mine (John Marston and Carlos Mondragón), of my PhD supervisor (Peter Vandergeest), and of renowned scholars whose research is focused on Indonesia (Nancy Peluso and Tania Li) have greatly inspired me to practice this way of community engagement and long-term commitment to the people and places they study. Moreover, the type of longitudinal research done by various scholars who study Southeast Asia (Rigg & Vandergeest, 2012) has also stimulated my eagerness in doing the same at some point in the mid- or long-term.

2.4. Geographical and temporal delimitation of research

Based on what I found in the field, I decided that the geographical delimitation of my research was the riverine part of Parangloe. It encompasses approximately 15 km of the river channel throughout which mining sites are distributed. This entailed that I engaged with government authorities, mining companies, farmers, workers of the mining sector and communities from Kelurahan Lanna, Desa Borisallo, Desa Bontokassi, and Desa Lonjoboko. I see strengths and weaknesses in my approach. On the one hand, I have been able to draw a general pattern of mining activities, work in mining and community interactions with mining at the Kecamatan level. This includes mapping the material differences of mining sites, according to the season. On the other hand, this approach has prevented me from engaging more deeply with the communities of each Kelurahan/Desa. Community members with whom I have interacted the most are workers of the mining sector and people whose livelihoods are connected to

mining activities (like the community members I elaborate on in Chapter 5). And although I have learned a lot about the interaction between mining and other livelihoods, I have not done extensive research on it, especially from the perspective of people who are more distanced from mining activities. Despite this, qualitative and quantitative data we collected has enabled me to have a grasp of it. This is a topic I believe has potential to be future research.

Prior to my fieldwork I had planned to examine mining activities from a historical perspective, with a special focus on current mining activities (as of 2019). As I learned more about the history of mining during and after my field research and saw the possibility of documenting it, I confirmed the temporal delimitation of my study. JICA's reports, which I draw on in Chapter 3, were key for the historical approach of my study as were people's stories about past mining activities. I extended the period to the year 2022 (instead of 2019) to make my study as updated as possible by the time I have my PhD oral defense. My decision to employ a historical perspective in my research has been motivated by the work of scholars who emphasize the importance of bringing to the fore the historical processes of access to, control over, use and exploitation of natural resources to better understand the ways in which these same resources are accessed, controlled, used, and exploited today (Peluso, 2016). Moreover, I wanted to record the history of what I would describe as ordinary real transformations taking place at the grassroots level.¹⁹ Especially in a moment where I was still able to find and talk to people who were in their 60s-80s and had memories to share. I would like younger generations in Gowa to remember that the upper reaches of the Jeneberang have not been always dotted with mining operations as we know them today. The conventional nature of the mining activities I study, when compared to other instances that have been given more visibility, put them at risk of going unnoticed and falling into oblivion.

¹⁹ I thank John Marston for his careful reading of a chapter draft on which he commented "this is the kind of history that should be recorded —the real transformations taking place at the grassroots". I have borrowed his expression.

2.5. Research Assistants & assistance

My field research benefited immensely from the work and assistance of two young local female research assistants who received their bachelor's degree in History from Hasanuddin University in Makassar (Unhas). Yuliana and Selvi not only helped me to gather information, but to better understand participants' responses and aspects of daily life in Parangloe and Gowa more generally.

I came to know Yuliana and Selvi through Professor Dias Pradadimara from Unhas, although Dr. Ilham Daeng Makkelo also had something to do with introducing me with Selvi. Yuliana worked with me during my first fieldwork period and Selvi did during my second visit. Both of them were born and raised in South Sulawesi: Yuliana is from Kecamatan Biringbulu, Kabupaten Gowa, and Selvi from Kabupaten Jeneponto. Both speak Makassarese, one of the main languages spoken in South Sulawesi.

That both of my research assistants were women is not coincidence. I explicitly let Prof. Dias know my interest and preference for finding a female research assistant. In 2019 I was somewhat nervous because it was my first time in the area, it was my first fieldwork experience, and I felt my Indonesian language skills were quite rusty (I learned Indonesian during my MA studies). Yuliana worked for me in 2019. The assistance she provided to me was very meaningful. She helped me to better understand meanings of words, idioms, and expressions, as well as social interactions. Not (yet) a motorbike driver myself, Yuliana also assumed the big responsibility of being our driver. She made easier my transportation to Parangloe and made possible our visits to mining sites.²⁰ Her cleverness and sharpness enriched my research work by noting things that I would otherwise have missed. Moreover, she boosted my confidence for navigating the field.

The nervousness I initially felt in the field was partially due to the temporary uneasiness that it produces to get to a new place. But it also was shaped by my condition of being a (still) young woman. Growing and living in Mexico have made me very aware of the vulnerability

²⁰ I settled down in Sungguminasa (Gowa's capital) and travelled almost every day to Parangloe. It is a 40–50-minute ride from Sungguminasa to Parangloe.

of my safety which, in turn, makes me to act very cautiously and to avoid any situation I deem risky. The male-dominated environment in mining sites caused me a lot of nervousness in the beginning too. Thus, having Yuliana with me was of great importance and help for feeling safe and gradually building trust with people in the field. It helped a lot that government officers, companies' staff, workers of the mining sector, and community members in general made us feel welcomed all the time. But just as my condition of being a young Mexican woman doing research on a male-dominated sector shaped my decision to approach ESDM, it also shaped my decision on what mining companies to approach to ask for their participation in my research.

At some point in 2019, Yuliana was not able to work for a week or so for personal reasons. By the time I had met Billy, a young man who worked as a motorbike driver. Billy kind of replaced Yuliana during the week that she needed to be absent. Billy is from Kabupaten Gowa and speaks Makassarese, despite having been born and raised at the core of a family who migrated many years ago from Manggarai, Flores Island. Later, my good friend Dr. Arianto Sangadji generously came to the field and assisted me for a week or so. Anto did his dissertation on political economy of mining in Indonesia with a fieldwork in Central Sulawesi. He is a well-known scholar and activist and has a long experience conducting fieldwork-based research. I thought that I could learn a lot from seeing him acting in the field and I accepted the help he offered to me. Anto accompanied me to conduct a few surveys and I still think he was key for my success in collecting some data from ESDM. Receiving assistance from Billy and Anto provided me with the opportunity to see and experience the differentiated gendered relationships more closely.

Selvi assisted me in 2022. I met her through Professor Dias Pradadimara and Dr. Ilham Daeng Makkelo from Unhas. Although by my second visit I felt more at home, I had enhanced my ability to navigate the field by myself, and my Indonesian language skills had improved by leaps and bounds, Selvi was of great help. She helped me to get a better understanding of what people meant, she made the trips to Parangloe easier, contributed to my feeling of safety while in the field, and helped me to translate what people said in Makassarese. In a way, Yuliana's and Selvi's presence emboldened me to conduct my field research, and I think that

their presence gave a touch of easiness to my interactions with people as it was common that people asked them about me.

2.6. Evolution of research questions and research focus

My original research project, prior to fieldwork, was very broad in scope. It was aimed at analyzing river and sea sand mining from a historical perspective, with a focus on changing market opportunities and multiscale political processes (including government regulations). It was also my plan to examine the ways in which sand mining could reshape resource access and agrarian livelihoods. My proposal evinces my presumption that I would find an anti sand mining struggle. Field research made evident many things, such as that it was a very ambitious plan. Initially I had defined that the temporary focus of my work would be the last 20 years or so because of the availability of statistical data from Statistics Indonesia at the Kabupaten level. I confirmed in the field that it was an appropriate time window to study due to the history of the current mining network dating back to the dawn of the 21st century. My initial research questions turned to a new direction when in the field I did not find any visible/discernible conflict around sand mining. This grabbed my attention and drove me to try to find reasons to explain the situation. The study by Marschke et al. (2021) was particularly relevant for triggering my curiosity about the relationship between differences in the physical environment and the organization of mining activities regarding mining work and workers. Since then, I endeavoured to pay close attention to site-specific material features and its relationship with the organization of mining activities, the corporate structure, existing labour arrangements, and so on.

2.7. Methods for data collection and for data analysis

I have drawn on surveys, semi-structured interviews, participant observation, and document-based research for my study. In the table below I summarize the type and total number of respondents who participated in surveys and semi-structured interviews.

Table 2.1. Data collection methods and participants.

Data collection method	Type and number of participants
Surveys	8 mining companies
Surveys	58 workers of river sand and stone mining
Surveys	16 farmers
Semi-structured interviews	7 mining companies
Semi-structured interviews	10 workers of river sand and stone mining
Semi-structured interviews	4 local government authorities: heads of Kecamatan Parangloe, Kelurahan Lanna, Desa Bontokassi and Desa Lonjoboko
Semi-structured interviews	13 community members who are directly involved in the mechanisms that I analyze in Chapter 5

The research I conducted is largely qualitative. I have drawn on semi-structured interviews, document-based research and participant observation for my analysis and interpretations. The study is mainly explanatory, although it is also descriptive. Descriptions are at the core as I considered it was crucial to provide rich details of the material aspects of the Jeneberang river and its basin (e.g. the river channel, mining sites, river sand and stones), of the material characteristics of mining (e.g. mining equipment), of physical processes (e.g. sediment production, accumulation and transportation), and of other processes (e.g. river sand and stone mining, stone crushing, the transformation of the mining network), among others. I prepared a list of questions for semi-structured interviews. Over time, we gradually resorted more and more to the natural development of the conversation than to the written questions which after a while became limiting.

I have also drawn on quantitative data that we collected with the goal of knowing the profile of mining companies that operate in Parangloe and the demographic profile of workers. We gathered this data through surveys. I elaborated a first draft of surveys in Indonesian and later modified them with Yuliana's help as my way of framing questions, although comprehensible, did not feel natural, as explained by her. Thus, Yuliana contributed to make the surveys relevant for the local setting.

We did surveys and semi-structured interviews with staff of around half the mining companies we found in the field and with workers of the river sand and stone mining sector. The selection of participating companies was done through purposive sampling techniques. The selection of workers was done through random sampling techniques, depending on who was both willing and available to participate. I resorted to surveys with mining companies and with workers with the intention of collecting data that could be managed statistically and, in turn, being able to profile them. I opted for semi-structured interviews as a way to supplement surveys. Semi-structured interviews enable an in-depth exploration of participants' past and current experiences with mining. And given that these data collection method consists in flexible questions, it enables to formulate follow-up questions as the interview is being conducted. Additionally, we conducted semi-structured interviews with the heads of Kecamatan Parangloe (*Camat*), Kelurahan Lanna (*Lurah*), Desa Bontokassi and Desa Lonjoboko (*Kepala Desa*), and with community members whose contributions and explanations were crucial for my arguments in Chapter 5. My selection of semi-structured interviews with government authorities and community members is due to their potential to collect in-depth information of participants' experiences with, understandings, perceptions and memories of issues surrounding river sand and stone mining.

Surveys and semi-structured interviews with companies and workers had the purpose of understanding how mining activities are organized today and how they have changed over time. Semi-structured interviews with government authorities had the additional goal of learning the ways in which government policies and different government levels have contributed to shape both mining activities and the relationships between mining companies and local people. Semi-structured interviews with community members had the purpose of an in-depth learning of the relationships that local people have established with mining companies and related actors. All semi-structured interviews had the goal of learning about the longer history of mining in the area and the material transformations of the river and their impacts on mining. In the research methods section of each chapter, I further explain all the data collection methods I have mentioned in this paragraph.

Surveys and interviews were conducted primarily in Indonesian, spoken by the interviewers. But there were times when participants preferred to respond either completely or partially in Makassarese. In these cases, the translation was mediated by the research assistants. They translated the answers from Makassarese into Indonesian for me. Sometimes, Yuliana also explained things to me in English. We audio recorded the interviews in my mobile and/or my iPad. I later shared them with Yuliana via Dropbox for her to transcribe them. Then, she would email me the transcriptions.

We had many informal individual and group conversations in the field. I do have a talkative personality and so far, all the people in Indonesia that I have met tended to be very chatty too. So, it was common that conversations developed very naturally with me curious about their lives and most of them also curious about mine. Conversations usually were very long and rich in detail. I learnt a lot from these conversations which, along with my observations, have greatly informed the ideas that I develop throughout the dissertation. I do not claim to know everything about sand and stone mining in the Jeneberang river, however. And I do not claim that my statements and interpretations are absolute truth either. I am aware that knowledge production is an ongoing process and due to that, I recognize the limitations of this research work which I consider my first approach to river sand and stone mining in the area.

My second visit to Parangloe, although short, boosted my understanding of many social, economic, and political dynamics at the local level. Among other things, I could corroborate that the mining situation I came to know in 2019 continued to be generally the same. Only a few minor changes were evident such as the closing of a private mining enterprise and the interruption of mining activities of the state-owned PD. Jasa Konstruksi company in one of the mining sites over which it had a valid permit in 2019.

In 2019 and in 2022 I recorded my daily experiences and events in field diaries. My notes not only detail my findings and impressions in Parangloe, but also my interactions with government officials of the many governments agencies that I visited in 2019.

Apart from ESDM, who not only facilitated data about licensed mining companies but information about the estimated reserves of several materials in South Sulawesi too, I also approached several other government agencies of South Sulawesi, Gowa and Makassar. I have listed them in the text box below. It was my goal to collect data about urban growth and sand and stone mining in the Jeneberang from a historical perspective. Not in all cases I successfully gathered all the information I expected or requested. When I did collect some data, it was common that they existed for only certain years, according to the explanation provided by government officers. All this influenced my inability to consistently gather data for the period 1970s to nowadays. Some of the official information that I was given is not directly related to my arguments here, but unquestionably enabled me to develop a better understanding of the topic.

Text box 2.1. Approached government offices.

- Office of the Pompengan-Jeneberang rivers' region (*Balai Besar Wilayah Sungai Pompengan-Jeneberang*).
- Gowa Department of Environment (*Dinas Lingkungan Hidup Kabupaten Gowa*).
- Gowa Public Works and Spatial Planning Department (*Dinas Pekerjaan Umum dan Penataan Ruang Kabupaten Gowa*).
- Gowa Department of Housing (*Dinas Perumahan dan Pemukiman Kabupaten Gowa*).
- Gowa Regional Development Planning Agency (*Badan Perencanaan Pembangunan Daerah Kabupaten Gowa*).
- Gowa Department of Investment and One-Stop Integrated Service (*Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kabupaten Gowa*).
- Makassar Spatial Planning and Building Department (*Dinas Tata Ruang dan Bangunan Kota Makassar*).

I went to the field with the interest in understanding the interactions between mining and agriculture. For that reason, we also did surveys with 16 farmers who we selected through non-probability sampling techniques. Gowa Agriculture Department (*Dinas Pertanian Gowa*) facilitated a list of groups of farmers (*kelompok tani*) from Parangloe that included the names of the heads of each group. During my fieldwork in Parangloe I have become close to some families who I got to know through the surveys and/or interviews we conducted with one of their family members (e.g., father, daughter, etc.). Once I mentioned to my “adoptive

father” my interest to survey farmers; he helped me to bring heads and members of farmer groups together in Borisallo and Lonjoboko. Later, through farmers from Lonjoboko we contacted farmers in Bontokassi. For surveys with farmers from Lanna, we just showed up *impromptu* and asked people about some of the names in the list.

I have also collected relevant information through document-based research. Along my journey, I have consulted a variety of government regulations some of which I have used for supporting my arguments and/or complementing my understanding of things. I have also consulted online local news, although not systematically. But Selvi helped me to do a more systematic search. As I mentioned above, the JICA reports have been an important historical source of information which I have complemented through oral history. Academic articles and undergraduate thesis written by local researchers and students have also been very valuable sources of information for my dissertation. Lukman Syam’ work (2016; 2021) and my personal online communication with him have been particularly useful.

I used Excel for organizing and processing the data we gathered through surveys. The surveys we conducted were not many and I managed to process and analyze them by using this basic Microsoft Office tool. My analysis of surveys with mining companies and the workforce of the mining sector helped me to profile them. My analysis of surveys with farmers helped me to get a grasp of agricultural life in Parangloe (e.g., crops, productivity, harvest seasons, land access, labour arrangements, irrigation) and its interaction with river sand and stone mining (e.g., changes in productivity, in land area, and in irrigation).

The research assistants transcribed all interviews without using any AI tool. For organizing the information that we collected through interviews I did not use any specialized qualitative data analysis software either. Instead, I used Excel. I divided interviews into various clusters of them and identified the main topics addressed in each set of interviews. Later, I entered the main points interviewees made for each topic in the Excel spreadsheet. I used a system of colours to highlight the various topics in transcriptions. In my outlines I specified I needed to include what person X said about topic X. For doing this, my abilities to remember people and to associate to them things they said were very useful. During the writing stage I would go back to the transcriptions many times. Thus, my continuous re-reading of transcriptions

accompanied my writing process. I am aware this was a time-consuming method, but it also enabled me to re-discover new insights as I paid close attention to a different topic every time that I consulted the transcriptions.

2.8. Maps and photos

Maps are an important part of my research. For creating them I gathered the spatial data by using Google maps and Whatsapp while in the field. I had two mobile phones with me so that every time I wanted to map a location, I shared my location with myself. In a few instances I collected spatial data from outside Indonesia. Two local GIS specialists helped me to create the maps. Amaliah Kartika elaborated one map and the remaining were elaborated by Ramlan Jamal. For the map-making process we worked together. I first drew in Paint 3D examples of the maps I had in mind so that it was easier for Amaliah and Ramlan to understand my needs and what I wanted the maps to look like. I added indications to my basic drawings. After that, we went back and forth changing things in the maps. My rationale behind my decision to include maps is threefold: to develop a graphic representation of places and locations I described with words, to make it easier for readers to follow my text, and to contribute to keep a historical record of the spatial distribution of mining sites, sand pockets, and fee collection posts in Parangloe. Tarmo Remmel from the Department of Geography at York University provided very useful guidance on how to improve the maps.

In the same way, I decided to include many photos as visual tools for readers and for triggering in them a sense of proximity to the place, the people, and the economic activity I study. But I also included photos for their long-term preservation, especially in our digital age where files are accumulated but not necessarily preserved. My interest in both maps and photos made me to often ask people if they had any photos depicting the past. Unfortunately, they did not have any.

2.9. Theoretical framework selection

I selected the literatures I draw on and engage with only after having my empirical findings. In this sense, I went to the field without any specific theoretical framework in mind. But I travelled with some ideas that predisposed me to look for some things and overlook others. The Political Ecology literature had shaped my interest in resource access dynamics. In the

field, this idea translated into paying attention to who in the Jeneberang had access to sand and stones and how.²¹ By the time I did my fieldwork, I had also developed an interest in historical processes. The work Peluso (2016) did analyzing the foundations of now widely used categories such as “customary” for claiming rights over land in West Kalimantan was key in triggering this curiosity in the early stages of my PhD. But my interest in historical perspectives also resulted from my now long relationship with my partner who is a Historian. Thus, since the very first moment in the field I endeavoured to collect historical data from sources that included official documents, government reports, news, and oral histories.

As I mentioned earlier, I also went to the field with the expectation of finding opposition to mining and/or some kind of socioenvironmental controversies. My presumption was informed by my knowledge of conflicts in other sand mining settings. Academic articles on sand mining in Southeast Asia countries that came out while I was in the field and in the post-fieldwork period contributed a lot to the direction that my framing took. Scholars (Lowe, 2018; Lamb et al., 2019; Lamb & Fung, 2022; Marschke et al., 2021; van Arragon, 2021) were studying perennial rivers such as the Mekong and the Salween which are around 4,000 km and 3,000 km long respectively. The Jeneberang is “only” 75 km in length and does not run through international borders. Scholars (Marschke et al., 2021; van Arragon, 2021) also described mining methods and equipment that I did not see in the Jeneberang and exclusively mentioned sand in their accounts. They (Lamb et al., 2019) also talked about riverbank agriculture and fishing, livelihoods that were not undertaken neither permanently nor throughout all the upper reaches of the Jeneberang. Thus, the differences between the physical environments we study, and the related socioeconomic outcomes, triggered my impetus to account for the material heterogeneity of our world. Later, as my supervisor, my committee members, and other very much appreciated colleagues read drafts of my chapters, I selected additional literatures and built my theoretical framework.

²¹ Here I use Ribot and Peluso’s (2003) definition of access, “the ability to benefit from things”.

2.10. Intersectionality

I approached my research through the lens of intersectionality. During fieldwork I learned some of the categories of social difference that are relevant in the area. These include gender, noble ancestry-based social status, wealth-based socioeconomic status, job-based social status, and family and political networks. I paid heed to them throughout my field research to the best of my capabilities as I continued (and continue) to learn more about them. I considered how these social, political, and economic inequalities, as well as the uneven power relations that sustain and reinforce them, have played out to both create differentiated experiences with mining in Parangloe and produce differentiated outcomes for (mainly) Parangloe people.

2.11. Positionality

In the field, I always introduced myself as a PhD student originally from Mexico who studies Human Geography at York University in Canada. I always perceived that my introduction caused, most of the time, a good impression. My privileged position is manifested through factors such as my educational attainment, my ability to speak both Indonesian and English, my possibility to study in Canada as an International Student and to travel to Indonesia, and my western origin. Most people I met in Gowa's capital and in Parangloe seemed to like my *bule*²² condition (as I was oftentimes called in the street); they also seemed to like to have me around. Most people had also assumed I had additional material privileges such as a good income, my own car, and my own house. I believe that my position as an employer—because I employed a research assistant—also contributed to strengthen the idea of my privileged class origins.

Several instances of expressions in my everyday interactions with people reminded me of my privileges associated to be an *orang barat*²³. Sometimes people expressed amazement for my ability to speak three languages, to which I always responded, “come on! you also speak

²² The adjective “bule” refers to a foreigner, but the word is more associated with foreigners whose skin colour is white.

²³ The noun “orang barat” refers to a Western person. Disclosure: I do not consider myself to be Western in terms of my origin. However, I do recognize that western ideas and ideals are strongly rooted in my thoughts, my academic and leisure interests, my actions, my tastes, and in my way of navigating the world more generally.

three languages: Makassarese, Buginese, and Indonesian” (or other languages). Many women expressed some kind of admiration for my nose which, for their standards, is beautiful because it is *mancung*²⁴. Every time I replied, “your nose is also beautiful” or “you also have a beautiful nose” they would do faces to express their disagreement. Experiences of this nature made evident that many situated me high in the social hierarchy, even though I tried to establish horizontal relationships all the time.

My Western-ness shaped my access to participants. In general, most people were willing to talk to us. But being a young female, being a foreigner, and being a PhD student/researcher also posed to be a challenge at times, despite that I explained that the information I wanted to collect was for writing my dissertation. I believe I looked suspicious. This was the case of my access to the relevant authorities in ESDM (at the Provinsi level) and to some information they ended up sharing in the end. However, as I mentioned above, it was given to me only when my friend Dr. Anto Sangadji (an older Indonesian male researcher and activist) came to the field and accompanied me to ESDM’s office. A few other encounters with government officers made evident how my position also shaped identities. But I must clarify that most government officers were very warm, supportive, and open to talking to me. Regarding potential respondents, there were times when my position either scared or intimidated them, particularly workers. I was told they were shy but not scared. This made me notice that nervousness is a feeling that both the researcher and the participant often share.

Just as a few government officers looked at me with suspicion at first, some staff members of mining companies also did. I have always believed that my foreign condition caused some initial mistrust. But it is also important to contextualize this. In 2019, by the time I was starting my fieldwork, the non-licensed mining of river materials in the upper reaches of the Jeneberang was being finger-pointed by government officers and environmental activists at the district and provincial level (not in the vicinity of mining sites) as one of the causes of the 2019 flood because of the damage done to the dam infrastructure (I could not confirm this) (Nurdin et al., 2019; Maryadi, 2019). This situation mattered for how I was perceived and the feelings I produced in potential participants. A company staff, for instance, thought

²⁴ The adjective “mancung” refers to having a pointed nose.

I was a journalist and treated me with some suspicion. The general pattern, however, was that we were well received by companies' staff, and they were open to talk to us.

Being aware of my position as a foreign scholar I wanted to act respectful of Indonesian rules on conducting research activities in the country. My rationale behind this decision was not only about the safety of potential participants, potential research assistants, and my own, but also about not acting imperialist. In 2019 I applied, and obtained a research permit which I believe facilitated my field research in terms of opening me the doors of government agencies and companies. I published a short reflection on this experience in CCSEAS Newsletter in 2022 (see Medina, 2022). The administrative processes that the permit entailed was time-consuming and tiring as it demanded I request letters repeatedly from different government offices at the distinct government levels, including the government at the national level in Java. But the long and tedious process also provided me with the opportunity to get to know firsthand the (dis)functioning of the Indonesian state apparatus.

In one instance my position as a foreign researcher (outsider) generated the expectation that my research could do for some people more than local research could. This assumption derived from the idea that as a western outsider my research would be more science-based and more neutral. In this sense, my privileges associated to my academic training outside Indonesia and my apparent distance from "the local" have caused some people to overvalue me, what I do, and my abilities to change the state of things. In the process I have also moved from being a data collector to a source of information and analysis, a huge responsibility which I try to manage from an anti-colonial, anti-imperialist, and horizontal perspective.

Earlier in the chapter I explained how my experience growing and living in Mexico for most of my lifetime have shaped my fears and cares. In the same way, my background has shaped my way of doing fieldwork and reporting on it. I am inclined to provide a lot of empirical details in my writing. I have been tempted to change that and I have tried to do so. However, I have come to realize that my way of framing and explaining things is not only a writing style. It is my way of thinking, and my way of understanding and navigating the world. Stop being meticulous in my descriptions is like stop seeing and explaining the world through my lens. My life in Mexico has shaped me in a way that leads me to pay attention to and

communicate tiny details. By saying this, I do not attempt to essentialize my geographical origins and the societies that live in the country. But I do recognize that the socializing ways I have learned and practiced for years have a huge impact on my research work.

2.12. Language

As part of my effort to decolonize my research work and the language that I used when writing, I decided to use the terms used in Indonesian for the political subdivisions of the country. Instead of the terms Province, Regency, Sub-district, and village commonly used in the literature on Indonesia, I use the terms *Provinsi*, *Kabupaten*, *Kecamatan* and *Kelurahan/Desa* to refer to them respectively.

Throughout the dissertation I also use the word “local” as an adjective and as a noun to refer to people who live in Parangloe, regardless of their place of birth. I do not use the adjective “indigenous” to refer to them. It is not a term I heard of or saw people in Parangloe using. Therefore, it does not represent an identity marker in the area. It was more common that people mentioned the ethnic group they identified with. We mainly met *orang Makassar* (Makassarese) among the people we interacted with, but we also met *orang Bugis* (Buginese). We asked the workers we surveyed both where they were born and where they lived. But in other cases, when we asked where they were originally from (*orang asli mana?*) they usually replied, “from here” (*asli sini*). The indicative “here” in some cases meant from Parangloe, in other cases people referred to a specific place in Parangloe, at a level below *Kelurahan/Desa*. When I use the adjective “regional” in the dissertation I refer to other places of *Kabupaten Gowa*, to Makassar and to other *Kabupaten* within *Provinsi South Sulawesi*.

2.13. Potential practical utility

I do not want to assign to my research a real-world utility bigger than it might have. The question “how to make this research helpful?” has haunted me since the very first moment I started to select the research topic and I still wonder about its uses. In 2019, a farmer who we surveyed posed the question to me which I tried to address to the best of my ability and with sincerity. An interviewee also expressed his hope in my research for helping their cause. I was always honest about the scope of my research and avoided generating false expectations.

With that background, I see (but above all I hope) that my research (rather than my findings) has the potential to grab the attention of government authorities in Gowa and South Sulawesi and encourage them to take (still more) notice of the upper reaches of the Jeneberang, particularly in relation to two main issues raised by Parangloe people.

One issue that came up in 2019 and again in 2022 is that sand pockets are in deplorable conditions. Either the flow of sediments or mining activities or the lack of maintenance or all the three reasons have severely damaged these concrete-made structures. Most or all the sand pockets are broken. In this state, they not only fail to fulfill their role in sediment control, but they block the flow of water for the irrigation of fields. In 2019, I had understood that sand pocket 2 had been broken earlier that year during the peak of the rainy season. I am not sure when it got broken, but to my surprise, in late 2022 it continued to be in the same condition. The repair of sand pockets is an urgent action that will ensure local farmers that they can cultivate and harvest their fields and have food access. It will also increase agricultural productivity in Parangloe and contribute to the well-being of Parangloe people. People reported that there have been cases where mining companies and/or individuals who own or rent excavators have helped to unblock irrigation channels by removing fragments of sand pockets from them. So, heavy equipment to clean irrigation channels is already in place to carry out the most urgent actions. The government rather than people can cover the costs. But the root of the problem needs to be addressed by re-building the sand pockets. Moreover, these structures were erected with the goal of guaranteeing the adequate functioning of Bili-Bili dam in terms of its storage capacity and its role in mitigating flood damaging effects in Makassar and surrounding areas. Not investing in re-building the sand pockets entails not guaranteeing the optimal functioning of Bili-Bili and exposing people to the so-called natural disasters.

Another issue that came up in the field is the evident/visible accumulation of sediments in Bili-Bili reservoir which local people had been pumping out. The problem is that they did not have a mining licence to do so. For local people, mining offers the opportunity to work and generate cash income. Mining activities in the reservoir stimulates a little localized mining economy. By the time of writing relevant government authorities have not addressed

locals' request for considering the possibility of issuing mining licences for them so that they can undertake mining activities in a legal way. Local people's demand also includes, above all, that relevant government authorities do a rigorous technical study of the potential impacts of mining in the reservoir to determine whether it is feasible to continue mining by pumps. I do believe the governments of Kecamatan Parangloe and Kabupaten Gowa are very good at listening to people and addressing their concerns. Moreover, I have seen the efficiency with which the governments of Parangloe and Gowa have helped people affected by landslides. However, in this case the relevant government authorities are at the Provinsi level which I know less. But I know that there are many individuals in Makassar and Gowa (in universities, civil society organizations, in the government, etc.) who are very well prepared in the natural and social sciences as to conduct (or continue conducting) interdisciplinary solid research on the socioeconomic, environmental, and infrastructural impacts of doing sand mining in the reservoir. I would be more than happy to join the research team.

2.14. Limits to the research

One aspect I consider that has limited my research has been that I have not developed Makassarese language skills. Thus, although I spent time in Parangloe and did participant observation, many times it was like I was actually absent as I could not understand what people talked about. In their interactions with me, people —participants and others— talked to me in Indonesian. But among them, they mainly used Makassarese. Then, my ignorance of the language prevented me from understanding aspects of daily life and social relationships in Parangloe more profoundly. I did learn some random words, but nothing systematic as to be able to have a basic conversation in Makassarese. This is a project I have yet to accomplish.

In my research I did not explore the relationships locals have and have had with the Jeneberang and all the “things” that the river provide them with such as water, fish, sand, stones, and others I am not even aware of. I did not examine how Parangloe people see and value all these “things” either. This makes that my research emphasizes one ontology over other possible existing ontologies and overlooks them.

Chapter 3. Dynamic Mining Networks: Sand and Stone Mining in the Jeneberang River, South Sulawesi, Indonesia

3.1. Introduction

It was the dry season when I saw the upper reaches of the Jeneberang river for the first time. I was astonished for their appearance. Water was not running throughout the river channel. My surprise partially derived from my imaginary of how a river “should” look like —quite ironic for someone who was born and raised in a semi-arid climate and is used to see rivers in their dry conditions. My shock also came from my then recent visit of the Jeneberang’s lower reaches where the water level was considerable. The contrasting recent news I had heard of greatly contributed to my astonishment too. I arrived in Gowa in the peak of the rainy season, in January 2019. The main news by then was the Jeneberang’s overflowing and its dramatic human and material impacts. All I could see in the river channel, however, were sand and stones of all sizes. Water was gone. These and other physical characteristics of the Jeneberang river and its basin, which I introduce in this chapter, are central to my analysis of both the constituent parts of mining networks and how these networks come together.

But what exactly do I mean by mining networks? A month or so after my arrival in Gowa, I gradually learned the exact location of river mining operations, the existence of companies and other actors who did mining, the abundant availability of large stones upstream the river channel, the primary use of excavators in mining operations, the existence of mining licenses, the existence of Bili-Bili dam and sand pockets, among other things. This interaction of material and human elements is what I refer to as “mining network”. Drawing on Actor Network Theory (Latour, 2005), I define mining networks as socio-material associations/processes that take provisional forms. My focus is a changing rooted mining network (Rocheleau & Roth, 2007) operating at the extraction phase, and I look at the ways in which the network operates within a place-based scale.

What I came to know in my first visit to the field in 2019 is the present form the mining network in the Jeneberang has taken. But rather than fixed and static across time and space, mining networks are dynamic. This means that the constituent parts of these networks change

over time, and so does the socio-material association I call mining network as a result. In the Jeneberang, this dynamism of mining networks can be seen through a set of changes that include the location of mining activities, the transformed geographical space, the mining equipment used, the main kind of mining businesses that get involved, the predominant type of river materials available, and so on. Then, the shifting mining network that I document shows that the form mining networks take over time fluctuates and that networks also vary across time and geographical locations even in one same research area. Based on this empirical evidence, I present mining networks as process/“in the making” rather than as end products. Attention to spatial and temporal dimensions enables us to see variation and, in turn, to imagine that change is a possibility which is useful for analytical and political purposes.

In this chapter I address the dissertation’s research question, namely, how have the material and human factors shaped the mining network in the Jeneberang and with what implications for local people and local mining businesses? I do so by answering the sub-questions that have guided my study: What and who have shaped the mining network that operates in the Jeneberang? How and why have they shaped the network? How has the mining network that operates in the Jeneberang changed over time? What have the changes in the mining network meant for local people and local mining businesses? By bringing material, political, economic, and sociocultural dimensions into the analysis of the shaping of mining networks I have developed a more holistic way to explain how, when and under what conditions networks are organized in ways more/less accessible for local people and/or for small-sized mining businesses.

In the chapter I examine the changes in the mining network that operates in the Jeneberang. More specifically, I document the organization of sand and stone mining activities in the Jeneberang river in two temporal contexts: one that roughly goes from the 1970s to the early 2000s, and the other from the early 2000s to 2022. I defined this periodization based on the empirical evidence that I gathered which shed light on the existence of two contrasting mining networks for each period. In this chapter I examine the characteristics of each of them. I focus on a variety of aspects such as mining businesses ownership, the location of mining

operations, the kind and estimated volume of mined materials, the mining methods and equipment, and the social relations of production of the current network.²⁵

My examination shows that the mining network in the Jeneberang has become less labour-intensive and more technology- and capital-intensive over time. In terms of mining equipment ownership, the past mining network can be characterized as more inclusive than the current network. Related to this, in terms of businesses ownership, the network has become less accessible to those not attached to capital. Regarding the scale of mining operations, the network has changed from predominantly small-scale mining to predominantly large-scale or industrial mining, although mining at small and very small scale continue to exist.

More broadly, I show that mining networks are constantly (re) shaped by the interaction between material features and political-economic processes operating at different scales. As it happens in the Jeneberang, my argument is that the interplay of the transformed materialities of the Jeneberang's upper reaches, the materialities of river sand and stones, the interest in increasing the supply of construction materials, and the politics of sand governance reshaped the 1970s-early 2000s mining network into the network that I came to know in 2019. In this chapter, I relate the politics of sand governance to the interactions between governments at different scales and political and economic interests around state-sanctioned access to mining sites.

My attempt to historicize mining activities in the area has been intended to add temporal depth to my analysis. Temporal depth enables us to simultaneously see nature's historical transformation (e.g., the Jeneberang river and its basin) and make the obvious still more evident: the non-existence of untouched nature. Still more important, it enables us to see the liveliness of the Earth which I recognize in a multitude of manifestations that I describe throughout the chapter. These include the movement of water, constant hillside collapses, the

²⁵ I elaborate on the social relations of production and labour arrangements of only the present mining network due to the lack of sources to historically document the topic and present a comparative analysis.

production of debris and sediments, the occurrence of landslides, debris runoff, and the flow of sediments.

The chapter is organized in the following way. I begin by explaining how I engage with the literatures on sand mining and materiality. Next, I explain the research methods I employed and introduce some specificities of the research site I deem relevant for this chapter. Then, I describe the two forms the river sand and stone mining network in the Jeneberang has taken in the two time periods mentioned above. I outline the features of both forms of the network which includes mapping those who have undertaken mining activities, the spatial distribution of mining operations and the mining methods. I show how the differences between the physical environment of the lower and upper reaches of the Jeneberang river, along with the politics of sand governance, the inequalities in socio-economic and political power, and an increasing demand for river sand and stones have influenced who gets to participate in mining activities and how.

3.2. Literatures

3.2.1. Sand mining

A central part of my analysis is the examination of the factors that contribute to shape how sand mining occurs and is organized. Within the sand mining literature, there is a growing strand aimed at unpacking the noun “sand mining” and understanding site-specific ways in which it occurs and is organized (van Arragon, 2021; Miller, 2022; Shitima & Suykens, 2022; Hougaard, 2023; Kauffer & Torres, 2023; Rahman & Suykens, 2023). I engage with, and seek to add to, this scholarly work by investigating a local sand (and stone) mining economy(ies).

Current knowledge about this has primarily focused on the increasing demand for construction materials, associated to urbanization processes, as an element that influences the size, intensity, and organization of sand mining operations (Kusumaningrum et al., 2021; Rahman & Suykens, 2023). I consider the urban growth of areas close to the Jeneberang as an important factor driving the development of a particular network that does mining at industrial scale. Within Indonesia, I document sand mining activities linked to the growth of Makassar, the fifth largest city in the country. By doing so, I add to a body of research

concerned with showing the local and regional aspects of sand mining and trade not only in terms of the scale of sand sources but sand markets (Kusumaningrum et al., 2021; Rahman & Suykens, 2023). Exposing the centrality of local and regional markets helps to emphasize the active role of the “local” scale in (re)shaping sand mining networks (Lamb & Fung, 2022; Miller, 2022). It also complicates the frequent portrayal of the local level only as a sand source and as the recipient of mining impacts, socially and environmentally (some of the sand mining studies that have highlighted the global character of sand trade have portrayed the local level in that way). By digging deep into the details of sand and stone materials mining in the Jeneberang river, this chapter (and the dissertation more broadly) also provides insights into the ubiquity of sand mining activities and contributes to broaden the geographical focus of the sand mining literature.

Scholars have also paid attention to political settlements, regulatory frameworks, and institutional set-ups in their explanations of the emergence and configuration of sand mining networks (Hougaard & Vélez-Torres, 2020; Miller, 2022; Ameziane & Suykens, 2023). In this regard, I take into consideration the politics of sand governance which, I argue, have influenced how and where mining activities take place and who gets to participate in them and how. The politics of sand governance in the Jeneberang materialize in the issuance of mining permits that shape access to mining sites. They also include government surveillance operations addressed to ensure compliance (e.g., that a permit holder does not do mining outside the permitted area) and eradicate non-licensed mining activities. In relation to the latter, I ignore the frequency of the raids that the government(s) have launched to disband non-licensed operations, but a revision of recent local news shed light on their occurrence. Government surveillance activities shape both who can/cannot (at least momentarily) continue participating in the mining economy(ies) and the allowed spatiality of mining activities. My focus on the politics of sand governance in this chapter, then, refers to the combination of regulatory frameworks and their implementation, uneven power relations between the actors involved in mining, the economic interests of government(s) and the interactions between political and economic actors (although it can be quite difficult to

separate the two realms). By doing so I provide insights into the political and economic forces that shape mining networks.

A body of work has characterized sand and gravel mining in developing countries as dominated by informal artisanal and small-scale mining activities (Franks, 2020; Magliocca et al., 2021, p. 57; Junior & Franks, 2022). I show other forms of organization that sand and gravel mining activities can take. More importantly, I show the current complex co-existence of various types and scales of mining operations. The importance of this finding is that it simultaneously points to the heterogeneity of sand mining and avoid its homogenization and suggests that various scales of mining have the possibility to coexist in a generally calm business environment when both measures are taken for potential overlapping between disparate scales of mining and corporate power engage in moral relationships with local people.

In line with what other scholars have remarked on the studied aspects and underexplored topics in the emerging sand mining research (Marschke & Rousseau, 2022), the illegalities and conflicts associated with sand mining have received a lot of attention (Rege, 2016; Zhu, 2020; Magliocca et al., 2021; Runeckles et al., 2023). Except for a few exceptions, the trend in this kind of studies has been to highlight legal/illegal or formal/informal dichotomies. These dualisms impede seeing possibilities for collaboration and agreement between actors officially recognized by government authorities to do mining and actors who have not received such official acknowledgement (e.g., through a mining permit issued by the relevant government authority) (Rege, 2016). I show that cooperation and partnerships between mining actors are possible. Uneven power relations, however, permeate these collaborations. Attention to the ways in which distinct mining actors come to work together sheds light on the agency of actors other than mining companies and the practices of some mining companies to work in partnerships. Such an approach to sand mining corporations exhibits their complexities, helps to expand our knowledge about them and helps avoiding their generalization.

Generally, the nonhuman aspects of sand mining have not been at the forefront of the social science analyses in the sand mining literature (for an exception see Gallardo Zavaleta et al.,

2023). While some researchers have provided detailed descriptions of material characteristics of the areas they study and the mining activities they focus on, others have not elaborated on these issues. I explicitly bring the material (specifically the non-living) dimension of sand mining —the geographical space, the river materials, the mining equipment— into the analysis, and argue that it matters for the specific ways in which mining networks come together. For this reason, I frame mining networks as place-based socio-material associations and processes. In accounting for mining networks' variation, I pay close attention to the heterogeneity of both the physical environment and the grain size of the materials present in the Jeneberang river channel. Regarding the latter, I look at sand but also at sediments of a bigger grain size such as a variety of stone materials that include natural occurring granules, pebbles, cobbles, and boulders. For the emerging sand mining literature, to foreground the material aspects of the spaces we study in an explicit manner can help to do comparative analysis and identify the material conditions that enable/constraint (or both) mining networks' configurations that are more inclusive of local people and can be enablers of social justice (in terms of a fair distribution of wealth and wealth generative opportunities).

3.2.2. Materiality

In this chapter, I employ a materiality approach that helps me consider the ways in which the non-living in the Jeneberang have contributed to shape the mining networks I examine. The material aspects I look at include the Jeneberang (a seasonal river), its basin, tectonic plates, climate conditions, rainfall, seasons, sediment producing mountainous areas, sand, different sizes of naturally occurring stones, debris, the temporalities of water flow, changing water levels, the river channel, the riverbed, a dam, sediment control structures, riverbanks, hillside collapses, landslides, the mining equipment, and so on.

As I said in the Introduction chapter, I operationalize the materiality framework through a relational understanding of agency to decenter how we understand it and account for the active role of the material. To explain the shaping of the mining networks that I document in this chapter I resort to the idea of “rooted networks” (Rocheleau & Roth, 2007). The concept mobilizes a relational understanding of agency in socio-ecological relations. Moreover, it “is explicitly place-based, emphasizing the ways in which particular territories situate and

ground socio-ecological relations” (Cantor et al., 2018, p. 964). This perspective enables me addressing how site-specific material, political, economic, and sociocultural factors interact and produce certain political economic and social outcomes. In this case, the outcomes are the two mining networks I unpack. As mentioned earlier, I frame mining networks as socio-material associations. Thus, I approach both the processes through which mining networks come together and the outcomes that result from such processes (certain mining networks) from a network-focused perspective.

I also work a materiality perspective through what I have termed “the liveliness of the Earth”. The expression resulted from combining Bakker & Bridge’s (2021) analysis of how materiality has been taken up since their 2006 intervention and Lehman’s (2016) examination of the politics of modern ocean observations. Lehman (2016) analyzes views of the ocean as a space of potentiality —the capacity to change in unforeseeable ways (p. 114). The potentiality of nonlife entities such as Earth systems to which Lehman (2016, p. 120) referred triggered my thoughts regarding a dynamic lithosphere with place-specific manifestations. “The liveliness of the Earth” points to geological processes and landforms. Repeated hillside collapses in the upper reaches of the Jeneberang river are clear evidence of the liveliness of Earth’s land (Sudradjat et al., 2013), for example. The emphasis is on a physical environment full of life. More specifically, the focus is on how lively physical environments shape the place-specific material conditions that simultaneously will facilitate (rather than challenge or constrain) the development of certain mining networks and will become part of socio-material associations and processes.

My use of a materiality approach through the idea of “the liveliness of the Earth” mobilizes a relational understanding of agency too. In the Jeneberang river and its basin, Earth’s land seems to assert its material agency not only through frequent hillside collapses but also through landslides during the rainy season.²⁶ These yearly landslides, framed as natural disasters (*bencana longsor*) every time they occur, show the dynamism and instability of the mountainous areas. These are yearly critical moments where the instability and uncertainty

²⁶ I follow Lehman claims that the ocean asserted its material agency at the beginning of the 20th century through events such as the Indian Ocean Tsunami, Hurricane Katrina, and sea level rise (2016, p. 115).

of Earth's land trigger the coming together of a socio-material association constituted by the slippage of earth, debris, damages in infrastructure and homes (human-built environments), buried agricultural land, death, injuries, local people, multiscale government help (in cash and kind), government officers, equipment, the media, information flows, measurements (toll of the landslide), and so on. That Earth's land seems to have agency also depends on these arrangements to appear to us as such (Lehman, 2016, p. 119). Approaching agency in relational terms, then, demands that we at once recognize that Earth's land manifest its liveliness through geological processes that shape social, political, and economic relations and that Earth's land appears full of life to us through the socio-material associations it encourages.

Finally, I also put a materiality perspective to work using the concept of "affordances" (Barua, 2016). The term "may be understood as what environments, organisms or things furnish for the purpose of a subject" (Barua, 2016, p. 730). Although originally employed by Barua (2016) to account for the commoditization processes of living beings (Asian lions and elephants), in this chapter I extrapolate the term to consider the ways in which the non-living in the case I examine has afforded different types of local mining businesses the possibility to remove and appropriate them. Just as Barua (2016) shows that the liveliness of animals makes the difference in their commoditization, in this chapter I show that the properties/characteristics of river sand and stones make the difference for the type of mining equipment used and the kind of businesses that are in the position to undertake mining activities. All this within a changing business environment and a tendency of an increased demand for river sand and stones. Rather than properties intrinsic to river sand and stones, the characteristics I analyze come to be only in the very moment when these materials and human labour meet (something like the interaction between perceiver and perceived that Barua calls "encounter"). These are place-based properties; they are rooted/anchored in space, and they are strongly shaped by their geographic location. Moreover, these are temporary and dynamic characteristics as they are contingent upon both changing geographies and changing interactions between humans and the non-living.

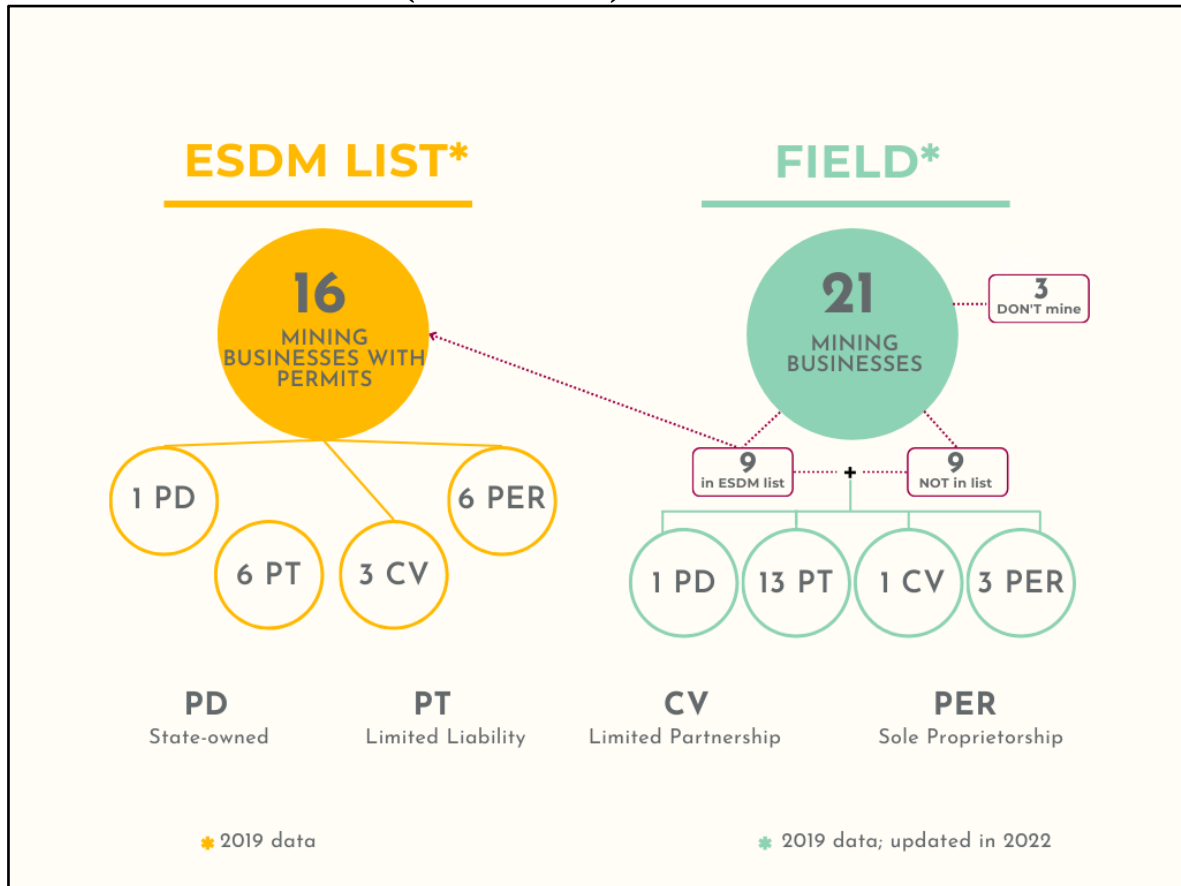
3.3. Research Methods

This chapter draws on information shared in 2019 by some government departments at the Provinsi and Kabupaten level. At the Kabupaten level, Gowa Revenue Agency (*Badan Pendapatan Daerah Kabupaten Gowa*) shared files of 2011-2018 tax breakdowns and relevant government regulations which I have not been able to find online.

At the Provinsi level, ESDM (South Sulawesi's Department of Energy and Mineral Resources) shared valuable information on mining actors with a valid mining license to remove sand and stone materials from the Jeneberang. However, as I mentioned in the introduction, our findings in the field revealed some differences with the information shared by ESDM. Figure 3.1 shows a comparison between what the list shared by ESDM indicated in terms of the total number of enterprises operating with mining licences in the Jeneberang in 2019 and the landscape of mining businesses we found in the field in 2019 (with a minor update done in 2022). According to ESDM, there were 16 mining businesses operating with a valid permit in the Jeneberang in 2019. We did not confirm whether all businesses we found in the field had a valid mining licence; we did not pose that question as we did not want to run the risk of alienating potential participants. Only when participants brought the topic up then we asked about it. We found 21 mining businesses, three of which said they did not conduct mining activities but only sold sand and crushed stones. Therefore, we found 18 businesses involved in **mining**. Figure 3.1 shows that only half of these were included in ESDM's list.

Figure 3.1 also lays out the corporate structure, according to ESDM's list (left) and our findings in the field (right). In general, such structure is made up of a variety of companies' business names that include State-owned (*PD -Perusahaan Daerah*), Limited Liability (*PT -Perseroan Terbatas*), Limited Partnership (*CV -Commanditaire Vennootschap*), and Sole Proprietorship (*Perusahaan Perseorangan*). Apart from the discrepancies between the total number of mining businesses reported by ESDM and our findings, we also found that two mining companies that appeared on ESDM's list as Sole Proprietorships identified themselves differently on the ground, one as PT (Limited Liability) and the other as CV (Limited Partnership).

Figure 3.1. Mining businesses in the Jeneberang according to both ESDM's list (2019) and our field reconnaissance (2019 and 2022).



Source: Figure created by author in Canva.

The 18 mining businesses that we found in the field are not the only mining actors we encountered in the area. As I explain later in the chapter (section 3.5.3), there are also manual miners and individuals who own or rent mining equipment and set it to work through the workers they employ. I refer to these individuals as “owners/renters of excavators” throughout the chapter.²⁷ The three sole proprietorships in Figure 3.1 refer to three individuals who run their own mining business and, on their own, they have access to a mining site, regardless of the status of that access (state-sanctioned through a mining permit, *de facto* acknowledgement of land rights, etc.). Owners/renters of excavators are local sole

²⁷ I use the noun “mining actors” in the dissertation to refer to the state-owned company PD. Jasa Konstruksi, to private mining companies, to manual miners, and to excavator owners/renters.

proprietorships too as they also run their own mining business, but they do not have access to a mining site on their own. Their way to navigate this absence has been to work in partnership with mining businesses who have mining rights over (or access to) a mining site and are willing to partner with them. Thus, excavator owners/renters, although sole proprietors themselves, have not been included in Figure 3.1.

The presence in the Jeneberang of the diversity of mining actors explained above show that sand and stones in this river can be (and indeed are) targeted by all of them because of both the way in which the sand and stones naturally occur in the area (Luning & Pijpers, 2017, p. 758) and the human-led enhancement of this through the construction of structures that retain the river materials in the upper reaches. In the Jeneberang, mining companies undertake large-scale or industrial operations, excavator owners/renters do small-scale mining, and manual miners remove materials at a very small scale. Estimates of the cubic meters each of them mine every day helps to ground this. Mining companies mine 200-1400 m³, excavator owners/renters mine 36-120 m³, and manual miners remove 21-35 m³ of mainly stones. Mining companies and excavator owners/renters remove both sand and stones.

The chapter also draws on surveys we conducted with eight out of the 18 mining companies we identified in the field, on semi-structured interviews we did with seven companies (six out of the eight surveyed companies and one non-surveyed), and on surveys and semi-structured interviews we conducted with workers (58 and 10 respectively) directly involved in the processes of river sand and stone mining, stone crushing, as well as the transportation and distribution of sand and both naturally occurring and crushed stones. Respondents included excavators' operators, stone crushers' operators, administrative personnel, security staff, supervisors, manual miners, dump trucks' drivers, mechanics, and welders. Additionally, the chapter draws on semi-structured interviews we conducted with Kecamatan Parangloe's head, and the heads of Kelurahan Lanna, Desa Bontokassi, and Desa Lonjoboko. Surveys with companies and workers were aimed at profiling them. All the semi-structured interviews focused on historical and current aspects of sand and stone mining such as its emergence, its organization, its governance, and its interaction with the season, with other rural livelihoods, with local people and with the government.

We conducted the surveys and interviews with companies in their offices, either in Parangloe or in Makassar. We conducted some of the surveys with workers in the food stalls (*warung*) located in mining sites and others were conducted in mining companies' facilities; the staff allowed us to pick whoever was available and willing to participate. Most of the semi-structured interviews with workers took place in mining sites, while sitting in the *warung* or walking around the site. Interviews with government representatives took place in their offices. We also held many informal individual and collective conversations, and I practiced participant observation. Mining sites were easy to access, particularly thanks to the strong driving skills of the research assistants. We were always welcome by people at mining sites.

I also draw on a variety of government regulations regarding the mining of sand and stones and on local news and local research. The latter includes scholarly articles and undergraduate and graduate thesis on both mining in the Jeneberang and its physical environment. Finally, some JICA's reports have been key sources of information for this chapter as they are reference historical points against which I have compared the information we collected during fieldwork. Thus, the historical approach I take in the chapter is supported by JICA's studies, oral history, local research, and digital local newspapers.

3.4. Research Site

As I mentioned in the Introduction, the Jeneberang river has historically been a key source of sand and stone materials for the urban development of Makassar which is the capital city of South Sulawesi and the main urban hub in Eastern Indonesia. The construction materials used for the rapid growth of urban spaces in Makassar's metropolitan area, which includes Kabupaten Gowa, have been sourced from the Jeneberang too. Mega projects in Makassar such as Center Point Indonesia, Trans Studio Makassar and more recently Pettarani toll road have also contributed to drive the demand for river sand and stones from the Jeneberang.²⁸ Thus, the mining of river sand and stone materials in Parangloe has been organized around the demands of the local/regional market.

²⁸ An interviewee explained that their company supplied stone materials from the Jeneberang for the railway track of Trans-Sulawesi Railway project, around four hours away from Parangloe. They supplied crushed stones of specific sizes; they produced them by crushing the large boulders they removed from the river channel.

As indicated in the Introduction of the dissertation, Makassar's and Gowa's built-up areas have increased by around 25 km² each since the late 1990s. Many square meters of concrete were required for such urban development. In average, 120,000 m³ of concrete are needed for building 1 km² of pavement that is 12 cm thick.²⁹ This means that around 6,000,000 m³ of concrete were needed in the last 20 years by the construction industry in Makassar and Gowa. Concrete is made up of water, cement, sand and gravel. A worker we interviewed explained that the production of 1 m³ of concrete needs 0.5 m³ of sand and 0.5 m³ of crushed stone. Therefore, 3,000,000 m³ of sand and 3,000,000 m³ of crushed stone were required for Makassar's built-up area to grow from 60 km² to 84 km² (1999-2019) and for Gowa's built up area to increase from 38 km² to 63 km² (1998-2016).

Later in the chapter I show a comparison between the estimated volume of river materials mined by former and current actors which suggests that mining activities in the Jeneberang have intensified. The larger volumes of river sand and stone materials mined today supply a growing demand that is related to the rapid urban growth of Makassar and its metropolitan area which includes Gowa. On its part, Parangloe, the study area of my research, has retained its rural characteristics, although there have been changes in the type of building materials used for housing, as told by local people. Concrete has increasingly gained popularity in the area.

3.5. Mining of Sand and Stones in the Jeneberang River

Mining activities in the Jeneberang river channel can be divided into two periods: a former phase that goes from at least the 1970s to the early 2000s, and a contemporary situation that started in the early 2000s and runs up to the present time. Each period is characterized by a particular mining network that emerged and developed. In this section I detail the features of both networks in terms of the geographical location of mining activities, the actors involved, the types and volume of mined river materials, and the mining methods and equipment.

²⁹ A worker of the mining and construction sector in Parangloe explained that the thickness/depth of concrete pavement varies. It is 12 cm thick for buildings, 15 cm thick for wire mesh roads, and 30 cm for roads with dowel bars.

I identify a former network geographically concentrated in the lower reaches of the river that mostly removed sand from the river channel and a current network geographically concentrated in the upper reaches of the Jeneberang that mines sand and stone materials in the active river channel. The prevalence of river stone materials mining in the current network suggests that they are more available in the present mining sites, and their importance is more pronounced for contemporary mining actors as most companies not only do mining but also do stone crushing. I identify the construction of Bili-Bili dam and reservoir as the main reason for the geographical relocation of mining sites from downstream to upstream the dam.

In the chapter I focus on the changes in businesses ownership. In the past, it was mainly sole proprietorship business entities who conducted mining activities primarily by pump and wooden boats. The mining network in the present is predominantly constituted by medium- and large-sized Limited Liability Companies (PT in Figure 3.1) who are local and regional in origin and operations. Except for the state-owned mining company PD. Jasa Konstruksi, which is owned and managed by the Indonesian government at the Kabupaten level (Kabupaten Gowa), the rest are private companies. Most of the mining today in the Jeneberang river is done with excavators, but there are still some people who do manual mining.

Both networks have been inclusive of local people, but the interaction of material, political, economic, and sociocultural elements have brought about changes in the ways in which locals engage in mining. Local small-scale mining businesses have participated in both networks, although to different degrees. The current network has opened job opportunities for local people. However, it is exclusive of individuals doing mining on their own account as they get to participate in mining activities only when they are incorporated by (some) mining companies through labour arrangements that require individuals to pay a fee to remove material from the mining sites over which companies have licenses. Regarding this last point, I do not have the certainty that in the past things were different as I do not know the specific details of access to mining sites and labour arrangements in the former network in the lower reaches.

The private medium- and large-sized companies that mine river sand and stones in the Jeneberang have their administrative offices in Makassar. And they also have operational offices in Parangloe. In our surveys with them, we asked about the location of their companies based either on the places registered in their Deed of Establishment or on their *de facto* locations in case they did not have a Deed of Establishment. All of them said to be in Makassar, except for one that is fully located in Parangloe. Three of them were established in the 1990s, three in the first decade of the 2000s and two in the second decade of the 2000s. Some of them did not have mining activities as part of their businesses' repertoire right from the beginning of their creation while others did. For instance, one of the companies started as a family company that sold bamboo, and later became engaged in the sale of paving block. Then, because of their friendship with someone from Parangloe, an opportunity came up for them to buy land by the river channel and become engaged in river sand and stone mining. Today, this family company not only mines but produces stones of different sizes by crushing them in their factory in Parangloe. And the company still is a block paving supplier. Other companies started as suppliers of construction materials such as ready-mix concrete and asphalt products and providers of construction services. Then in a later date, they became engaged in river sand and stone mining and stone crushing in Parangloe. Other companies became involved in river sand and stone mining in Parangloe right from their start.

Through interviews, people's stories and observations we learned more specific details about some of these private companies' owners. For instance, the owner of a mining firm that I classified as medium-sized is a former South Sulawesi police chief. A company that I categorized as large-sized is part of Kalla Group, one of the largest businesses groups in Eastern Indonesia with its Head Office located in Makassar and owned by Jusuf Kalla who has served as the vice president of Indonesia. Another mining business that I classified as large-sized is part of a group of companies with a Head Office in Makassar that offers construction services and is owned by a person who is considered to be one of the most successful entrepreneurs in the construction sector in Makassar. Another mining company, which we could not survey nor interview, is owned by the family of this entrepreneur.

Although in this chapter I focus on transformations in the mining network, it is relevant to note that there are some continuities too. These include that the Jeneberang river remains a major source of sand and stones in South Sulawesi and continues to supply materials for the sustained urban development of Makassar and its metropolitan areas. Continuities also include that the actors who undertake mining activities remain local in origin and operations.

In what follows I first provide details of the material features of the Jeneberang river and its basin. Next, I present my examination of the former and current mining networks. I start by describing the 1970s-early 2000s mining network. Later, I outline the characteristics of the current mining network (early 2000s-2022). Then, I analyze the interaction between the materialities of the Jeneberang, of its sand, of its stones and key political economic factors that help to explain the transformation of the mining network. I put emphasis on the physical environment of the Jeneberang and its basin to partially account for the changes that the former network underwent. The material aspects of the Jeneberang and its basin, which I turn to now, is a theme that runs through the chapter.

3.5.1. The physical environment of the Jeneberang river and its basin

The Jeneberang river, and Sulawesi Island in general, are in a highly active tectonic area. Tectonic activities are higher in the upper than in the lower basin area and result in both intensive land movement and high erosion rates (Sudradjat et al., 2013). The upper reaches of the Jeneberang are hilly areas of volcanic geology that form the foothills of Mt. Bawakaraeng and Mt. Lompobatang. “The morphology of Mt. Bawakaraeng is characterized by a high relief, extreme slopes, high degree of weathering [and] events related to erosion such as soil movement and landslides” (cited in Hasnawir et al., 2018). Intensive land movement—along with other features such as lithology, slope steepness, slope stability, and meteorological factors—causes repeated hillside collapses. These collapses and terrace scarp erosion due to the steep ground slope produce large quantities of sediment and debris runoff (JICA, 1980a, p. 7; JICA, 1982, pp. 8, 9; JICA, 2005b, p. 3-1) which results in high deposition of materials in the Jeneberang (Sudradjat et al., 2013).

Collapses in the upper reaches were found to be stable in the 1980s, but in 2004 there occurred a gigantic collapse of a caldera wall of Mt. Bawakaraeng that produced a large

volume of sediment runoff downstream (JICA, 1982, p. 10; JICA, 2005b, pp. 3-4, 3-5; JICA Urgent Survey Group, n.d.). This large-scale collapse produced around 230,000,000 m³ of debris (Hasnawir & Kubota, 2008, p. 52; Solle et al., 2013, p. 174). In 2008, four years after the collapse, the volume of sediments in Bili-Bili dam (60,959,000 m³) was almost eight-fold the volume in 2001 (8,376,000 m³) (Nenny et al., 2019, p. 31117). A geological report prepared by the government of Gowa in 1993 estimated that there were 9,000,000 m³ of cobbles and boulders and 3,000,000 m³ of sand (2012 Summary of South Sulawesi's Coal and Mineral Resources shared by ESDM in 2019). In addition to physical features and processes, humans have enhanced the production of sediments in the Jeneberang river basin through land use and cover changes. Deforestation, for example, has contributed to increase the erosion rate and the occurrence of landslides. It has been estimated that 36.67 ha have been deforested in the Jeneberang basin (Widodo et al., 2021, p.1).

Landslides occur in the Jeneberang watershed every year due to geologic and geomorphologic characteristics of the area (Solle et al., 2013, p. 174). The areas most susceptible for landslide occurrence are those composed by volcanic rocks (like the upper reaches), those that have more than 30° slope steepness, those less than 50 m away from the road network and those in areas close to the river channel (Solle et al., 2013, p. 178). Yearly heavy rainfalls can be the triggering factor for landslide activity and debris flow (Hasnawir & Kubota, 2008, p. 523). Thus, the monsoon-influenced climate conditions of the area exert an influence on the production of sediments. Every year, from October/November to April/May, there are heavy rainfall characteristic of the monsoon season; the average annual precipitation in this area of tropical humid climate varies between 2,700-5,007 mm, depending on the elevation (Solle et al., 2013, p. 175).

Yearly heavy rainfall also transports the sediments produced in the upper reaches and causes floods. Given that the action of running water deposits sediments along the river (Hack & Bryan, 2006, p. 1106), both downpours and floods move sediments of small and big grain size and deposit them along the Jeneberang. Water is not only effective at moving sediments of small grain size, but it is also very effective at moving big grains such as boulders (Welland, 2009, pp. 11,12). Sediments of bigger grain size are dropped out in the upper

reaches as water transports grains of smaller size through the river. Fluvial processes, then, play a key role in controlling the distribution and size of deposits of sand and stone materials in the Jeneberang (cited in Langer, 2006: 160). These fluvial processes include shifting water flows in the Jeneberang, associated to its seasonality, which shapes how sand and stones accumulate and remain in the upper reaches.

The construction in the 1990s of several sand pockets along the upper reaches of the river channel has also influenced the distribution of deposits along the river as these structures have simultaneously reduced the transport of sediments downstream and increased their accumulation behind them. As mentioned in the Introduction, the Indonesian government built the sand pockets as part of Bili-Bili multipurpose dam's construction project with the goal of holding the sediments upstream and reducing their transport to Bili-Bili reservoir. The first sand pocket is located around 15 km away from Bili-Bili dam and there are five of them. Some of them have been damaged by the velocity and force with which the water flow transports large quantities of sediments during heavy rainfalls and floodings. Specific details about one of the sand pockets are helpful to get a better sense of their size and storage capacity: sand pocket No. 3 is 336 m length, 7 m height and its storage capacity is 129,000 m³ (Lukman et al., 2016, p. 234).³⁰

The distance individual grains travel, and the forces involved in their transportation along the river, influence their size distribution in the river channel (Hack & Bryan, 2006, p. 1106). The further down the river stream sediments travel, the smaller their grain size, and vice versa. Thus, sediments of small grain size such as sand are naturally available in the lower reaches because of the long distance they travel down from the mountainous area where they are produced.

³⁰ Lukman et al. (2016) calculated that the volume of sediments flowing into sand pocket No. 3 was around 500,000 m³. They also estimated that 385,000 m³ were extracted via mining activities in the sand pocket. This analysis coincides with an idea I commonly heard in the field, that mining was useful and functional for reducing the volumes of sediment in the sand pockets and Bili-Bili reservoir. Keeping sediment volumes checked is particularly relevant because Bili-Bili reservoir had been suffering from silting since the 2004 large-scale collapse in Mt. Bawakaraeng (Nurdin et al., 2019). The last time the reservoir was dredged was in 2008, as told by an interviewee.

The lower reaches of the Jeneberang river are flat alluvium plains (JICA, 2005b, p. 3-1). Alluvial deposits —consisting of silt, fine sand of uniform grain size, and gravels— are distributed in the riverbed in this part of the river (JICA, 1980a, pp. 8, 30, 69; JICA, 1982, pp. 7, 9). By the 1980s, due to sediment discharge originating in the upper reaches, an alluvial fan had developed in the area downstream the current location of Bili-Bili dam and a sandbar had developed at the Jeneberang estuary (JICA, 1982, pp. 6, 9). Apart from sediment originating upstream, the river flow, the ocean waves, and the tides also exert influence on the distribution of sediments in the estuary (Arafat et al., 2015b).

The existence of Bili-Bili dam in the middle reaches and sediment control structures in the upper reaches has boosted the availability of sediments of small grain size in the lower reaches. As a result of the dam and the sand pockets, “finer sediments [such as] sand, silt, and clay are washed downstream and only the coarser gravels and cobbles remain” upstream from the dam (Arafat et al., 2015a, p. 260; Arafat et al., 2015b, p. 751). For instance, in their analysis of sediments in the Jeneberang estuary (approximately along the first 3.5 km from the south river mouth), Arafat et al. (2015b) found that riverbed sediments in this part of the lower reaches were dominated by sand particles of less than 0.5 mm.

The grain size of materials also influences how they move and where they congregate. Sediments of large grain size such as boulders do not travel very far from the mountainous area where they are produced. As such, the further up the river stream the bigger the grain size of sediments is. Thus, in addition to sand, sediments of bigger grain size such as gravels, cobbles and boulders are naturally available in the upper reaches. But the physical characteristics of the upper reaches that make it both a sediment producing area and a zone where sediments of large grain size concentrate have been boosted by the sand pockets. These sediment control structures, in combination with Bili-Bili dam, have not only influenced the distribution of sand and stone deposits throughout the Jeneberang but sediments’ size distribution too.

The Earth manifests its liveliness in the Jeneberang through a multitude of ways that include tectonic activity, intense land movement, erosion, repeated hillside collapses, landslides, shifting water flows, heavy rainfalls, floods, and so on.

3.5.2. Mining in the lower reaches: 1970s – early 2000s

In 1979, JICA sent a study team to Makassar to conduct a feasibility study on the *Lower Jeneberang River Flood Control Project* (1980a). This is the oldest written piece that provides some information about the recent history of mining activities in the Jeneberang that I have been able to trace. Later, in 1981 and in 2004-2005, JICA sent study teams to Indonesia again to conduct a feasibility study on the *Jeneberang River Flood Control Project (Phase II)* and a study on *Capacity Development for Jeneberang River Basin Management* respectively. In its 2005 report, the study team mapped the sand (and stone) mining activities in the Jeneberang that it could identify through field reconnaissance (JICA, 2005b). This makes the 2005 study very rich in detail and complements what I have learned about the recent history of sand and stone mining as recounted by people to whom we talked. For this reason, it is one of the main sources of information I use for this section. To better understand two mining methods mentioned—but not explained—in JICA’s 2005 report, I have drawn on knowledge shared with us in the field and on a master’s thesis on contemporary traditional sand mining in the lower reaches of the Jeneberang (Syam, 2021).

Based on both what people in Parangloe explained during fieldwork and what the survey team sent by JICA found in 1979, it can be stated that the mining of sand and stones in the Jeneberang river has been going on for at least 45 years (as I am writing in early 2024). The findings of the survey team reveal that by 1979 sand for selling was already being collected by the local population in the lower reaches of the river, mainly during the dry season (JICA, 1980a, pp. 10, 30). The team identified mining sites that were located approximately 9 km upstream from the river mouth, specifically in the lower reaches of a bridge then named Sungguminasa bridge—now called Gowa’s Twin Bridge (*Jembatan Kembar*) (JICA, 1980a, pp. 10, 30). It also estimated the yearly volumes of sand removed to be between 200,000 m³ and 300,000 m³ (JICA, 1980a, p. 30).

By 2004 sand mining was still being intensively practiced along the downstream area of the river, mainly around a dam located approximately 3.5 km upstream from the south river mouth (JICA, 2005a, p. ES-6; JICA, 2005b, pp. 2-8, T3-2, F3-7). Nevertheless, the study team remarked that “the number of active miners [had] decreased due to tighter control by

the local government, and mining activity [was] limited to traditional mining” (JICA, 2005b, p. 2-8), suggesting that there were probably more mining sites and miners prior to the elaboration of the report.

Although by the early 2000s almost all mining operations were still spatially concentrated in the lower reaches of the Jeneberang, there were also activities being conducted upstream in the river, as documented by the study team JICA sent to Indonesia between 2004 and 2005 and confirmed by participants during my fieldwork (JICA, 2005b, pp. 3-3, 3-4, T3-2, F3-7, F8-3; “Penambang pasir tradisional”, 2012). Despite this, the study team noted that most of the sand was being mined in the lower reaches. For instance, from 1995 to 2001, the estimated yearly average volumes of river sand removed in the lower and upper reaches amounted to 1,316 thousand m³ and 433 thousand m³ respectively (JICA, 2005b, pp. 3-3, 3-4).

Map 3.1 shows the location of mining sites in the Jeneberang river channel that the study team identified in 2004. Out of the 17 sites the team confirmed through field reconnaissance, 16 were in the lower reaches and only one in the upper reaches. A few sites in the downstream area were in the administrative territory of Makassar —called Ujung Pandang by then— and some others were in kecamatan of Kabupaten Gowa such as Somba Opu, Bontomarannu, and Barombong (JICA, 2005b, p. T3-2). The only mining site in the upper reaches was in Kecamatan Parangloe; the study team recorded that the state-owned company PD. Jasa Konstruksi operated in it.

Map 3.1. Geographical distribution of mining sites along the Jeneberang river channel in 2004.

Map 3.1. has been removed because of copyright restrictions. The map was a screenshot of Figure 3.7 “Distribution of Sand Minings in the Jeneberang River Basin”, found in JICA, 2005b, p. F3-7.

When mapping potential water pollution sources in the Jeneberang river basin, the study team also identified additional mining sites in the upper reaches, which are shown in Map 3.2. The red circles in the map indicate where in the upstream area of the Jeneberang the mining of river materials was taking place between 2004 and 2005. The brown oval corresponds to the section of the Jeneberang located in Parangloe, the area where mining takes place today. Drawing on local accounts in Parangloe regarding mining in the past, it is very possible that the operations shown in Map 3.2 corresponded to manual mining activities. The study team did not provide any information about the sites, or the kind of mining undertaken in them. Despite this, their work recording the existence of mining operations in the upper reaches by the early 2000s is very valuable and corroborates the stories we heard in the field about manual labour.

Map 3.2. Geographical distribution of mining sites in the upper reaches of the Jeneberang river in 2004-2005.

Map 3.2. has been removed because of copyright restrictions. The map was a cropped screenshot of Figure 8.3 “Potential Water Pollution Sources in the Jeneberang River Basin” found in JICA, 2005b, p. F8-3.

But the study team did meticulously record information about mining businesses, mining equipment, location, and estimated daily mined volumes for the 17 mining sites shown in Map 3.1. I draw on this information for explaining, in the following section, the constitutive parts of the former mining network that operated in the lower reaches.

The mining network in the lower reaches: river materials, mining equipment, and actors in the period 1970s – early 2000s

By 2004, what people predominantly removed in the lower reaches of the river was sand. The study team commissioned by JICA documented that sand was being extracted in all 16 mining sites that it identified in the downstream area; 14 out of these 16 mining sites exclusively had sand as their objective of mining (JICA, 2005b, p. T3-2). In only two out of the 16 mining sites stones and gravel were extracted in addition to sand (JICA, 2005b, p. T3-2).³¹ The study team estimated that in 2004, in all 16 mining sites, 740 m³ of river materials were removed daily, primarily sand (JICA, 2005b, p. T3-2).

As I had noted above, Bili-Bili dam and the sand pockets have altered the water flow and the volume of sediments transported from the upper to the lower reaches over the years as the sediments the river carries from its watershed are trapped behind them (Arafat et al., 2015a, pp. 258, 260). Despite these changing conditions, sand is still available in the lower reaches (Arafat et al., 2015b). Sustained mining activities of this river material downstream from Bili-Bili dam is indicative of its continuous availability (Syam, 2021; conversations).

Sand materialities and the physical features of the lower reaches of the Jeneberang that make this section of the river channel to have a continuous flow of water throughout the year shaped the mining network in that they influenced the kind of equipment actors had to use. The findings of the study team JICA commissioned reveal that by 2004 sand in the lower reaches was mainly extracted by pumps (ten out of the 16 mining sites) (JICA, 2005b, p. T3-2). Sand mining was also done in a so-called traditional way, by boats (four out of the 16 mining sites). Sand was also removed by excavators (three out of the 16 mining sites). In one of these three sites, the use of excavators was additional to the use of pumps (JICA, 2005b, p. T3-2). Gravel and stones were exclusively removed by excavators as recorded by the study team.

In JICA's report (2005b) there is no explanation of any of the mining methods mentioned above. However, based on what we saw, and we were told in the field, I assume that mining by pumps consists in miners using a wooden raft (*pontong*) equipped with a pump and a

³¹ The grain size of these stone materials was not specified in the report.

diesel engine (Walsh, 2008, p. 148) (see Photo 3.1).³² The raft relies on polystyrene buoys to stay afloat. From there, sand is pumped out through a 200 m-long bamboo pipe that transports the sand from the river to its edges. The sand transported by the pipe is either loaded directly into a dump truck as it is being sucked out or it is piled up by the riverside to have a stock. One worker operates the pump, and two workers manage to keep the end of the pipe in place. In this case, the continuous presence of both water and water-saturated sand in the lower reaches made sand in the riverbed to have fluid-like qualities and flow through the bamboo pipe.

Photo 3.1. Current sand mining by pump in Bili-Bili reservoir (rainy season, 2022).



Photo credit: Wendy Alejandra Medina de Loera.

³² Sand mining by pumps has been going on for the last few years in the reservoir area which administratively belongs to Kelurahan Bontoporang, Kecamatan Parangloe. By late 2022 the government of South Sulawesi had closed down these sand mining activities. People in the area have been demanding that the government both conducts a technical evaluation to determine the feasibility and impacts of mining sand in that location and considers issuing mining permits to them on the grounds that sand has accumulated in the reservoir. “See it as maintenance service for the reservoir, if you will, not as mining” our interviewee said to government authorities, as he recounted to us.

In the same way, based on the description provided by Syam (2021), I assume that by “traditional [mining] by boat” the study team referred to a mining technique that consists of miners diving into the river as many times as necessary to collect sand from the riverbed with a cone-shaped iron bucket tied with a rope (called *corong*).³³ Miners dive as deep as 5-10 m but do not wear any oxygen tank or diving mask. A miner waits on the surface, on the small wooden boat (*perahu*) that transports them; the boat is equipped with a diesel engine (see Photo 3.2). When the bucket has been filled with sand, the miner on the surface pulls it out and pours the sand in the boat. On the boat, miners clean the sand by removing all kinds of rubbish from it such as sticks, twigs, leaves and plastics. Sometimes, when the sand is mixed with silt, miners return to the river part of the sand they had collected. Once the boat is full, the miners bring the sand to the riverbank where they stack it up. From there, they will load dump trucks by shovel. In this case, the watery conditions in the lower reaches enabled miners to dive in and collect water-saturated sand. However, the continuous presence of water also posed challenges, especially during the rainy season. Heavy rainfall altered (and still alters) the river flow and had an impact (and still has) on whether mining activities could be conducted at their maximum or if they had to be completely stopped (Syam, 2021, p. 111).

Photo 3.2. Current sand mining by boat in the lower reaches (dry season, 2023).



Photo credit: Courtesy of Lukman Syam.

³³ Walsh (2008) also mentions this mining method (p. 148).

The equipment required to do mining in the lower reaches of the Jeneberang contributed to shape a past mining network that I characterize as more inclusive (when compared to the current network) in terms of mining equipment ownership. What the study team commissioned by JICA documented in 2004 suggests the predominance of technologically unsophisticated machinery such as pumps and boats which mining actors/owners could access more easily as heavy financial investment was not necessary. To illustrate this, the current price of a wooden boat with a diesel engine can be up to Rp. \$15 million (USD \$980) while the approximate cost of a wooden raft equipped with a pump and a diesel engine is Rp. \$80 million (USD \$5,300). Both are low-cost when compared to the current price of a brand-new excavator which is around Rp. \$1.3 billion (USD \$87,000).³⁴ The findings of the study team also suggest that access to more technologically sophisticated and more expensive equipment such as excavators was very limited. Thus, the mining network in the lower reaches was non-technologically- and non-capital—intensive. It was labour-intensive, however.

In terms of who was able to do the mining in 2004, the study team registered the name of 22 different firms operating in the 16 mining sites that it inventoried in the Jeneberang's lower reaches (JICA, 2005b, p. T3-2). The recorded names shed light on the ownership of mining businesses. Out of the 22 documented mining firms, only two were identified as Limited Partnership Companies (CV). The remaining 20 were business entities in the form of Sole Proprietorship as the study team identified them with their personal names (JICA, 2005b, p. T3-2). In Indonesia, there is not, and there was not in 2004 either, a minimum of capital legally required for establishing CV companies nor to conduct business as Sole Proprietorship. This supports the idea that the network operating in the lower reaches between the 1970s and early 2000s was non-capital intensive.

That most mining businesses were owned by individual proprietors also suggests that in 2004, the mining of river materials was accessible and affordable for many. Despite this, it still implied exclusion for those who could not afford these costs, although they could work as paid labourers and have indirect access to mining in this way. The prevalence of Sole

³⁴ Approximate prices as told by people to whom we talked. Exchange rates as of June 21, 2023.

Proprietorship businesses also suggests that, when compared to the current situation, mining was more accessible for local small businesses in terms of either receiving a mining permit or being let to operate without requiring one.

The predominance of the use of pumps and boats also speaks to both how the accessibility of mining in the Jeneberang meant that people did not need either technical knowledge or specialized and expensive exploration methods. It also suggests that river materials in the active channel were easy to identify and that the process to remove them was cheap and simple. This opened wide possibilities for many to participate in mining activities, regardless of their differentiated capabilities for using certain mining equipment over others.

The contemporary sand mining done by boat in the lower reaches that Syam documented recently (2021) exemplifies the inexpensive and accessible nature of exploration methods in this mining sector. The exploration phase in sand mining by boat entails finding the location of sandbanks in the riverbed. Miners do so by using a bamboo that is around 7 m long; they determine the location when they feel the bamboo rubs the sandbar. In this case, the way to confirm sand's availability in the riverbed is neither costly nor complicated, although it might be time consuming.

The remarks of an interviewee in Parangloe further illustrate how simple and zero cost it can be to confirm sand's existence in the milieu, especially when water levels in the river are low. Standing in the riverbank in Bili-Bili reservoir area, the participant pointed at a "greened" mound inside the reservoir—which had been planted with rice and towered over the water level. He indicated that such a 10 m deep mound was still part of the sediments originated from the big landslide that occurred in 2004 because of the collapse of a caldera of Mt. Bawakaraeng. So, in some cases it is evident that sand has accumulated, and it is visible to the naked eye.

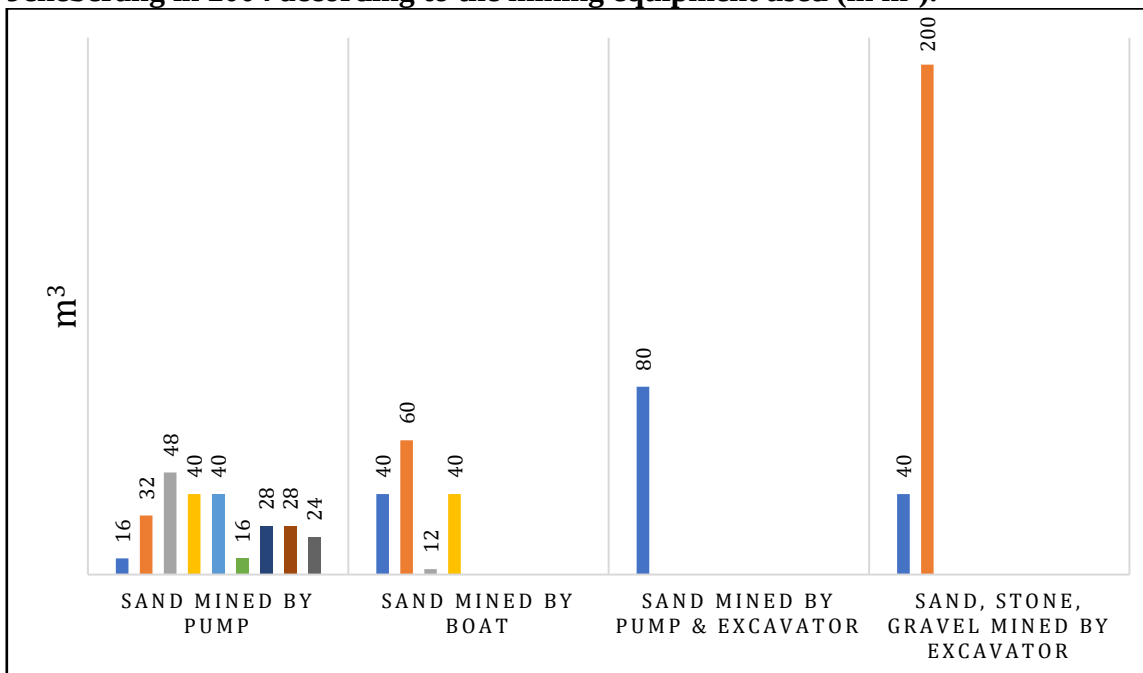
Thus, the physical characteristics of the Jeneberang and its basin make it a sediment producing area. They also make the lower reaches to have continuous water flow and make sediments of small grain size widely available in their lower reaches. All these features and sand materialities—associated to its accessibility in terms of the simplicity and low-cost of

its tracking and removal— contributed to shaping the participation of individuals who owned and ran their local mining businesses in the 1970-2000 network. In 2004, Sole Proprietorships business entities were the rule rather than the exception. The politics of sand governance that let these local small companies to operate have to do with state-governed access to mining sites that let them to operate.

While the study team that JICA sent recorded the name of mining firms, it did not provide details about their workforce. In the case of the 20 registered individual proprietors, I cannot assume that businesses owners did sand mining themselves or that all businesses owners employed workers. Based on how sand mining by boats and pumps takes place today, it is very likely that in the past there were owners of boats and pumps and a few workers hired by them (Syam, 2021; interviews). However, it could be that their stories were more complex than what this binary entails as business owners might have done sand mining themselves in the beginning and then might have moved on to have workers.

Regarding the approximate volume of mined river materials, the study team estimated that between 16-48 m³ of sand were daily mined by pumps and between 12-60 m³ of sand were daily mined by boats. Figure 3.2 below shows the estimate daily volume of river materials mined in each of the 16 mining sites the team documented in 2004 and specifies the mining equipment used.

Figure 3.2. Estimated daily volume of river materials mined in the lower reaches of the Jeneberang in 2004 according to the mining equipment used (in m³).

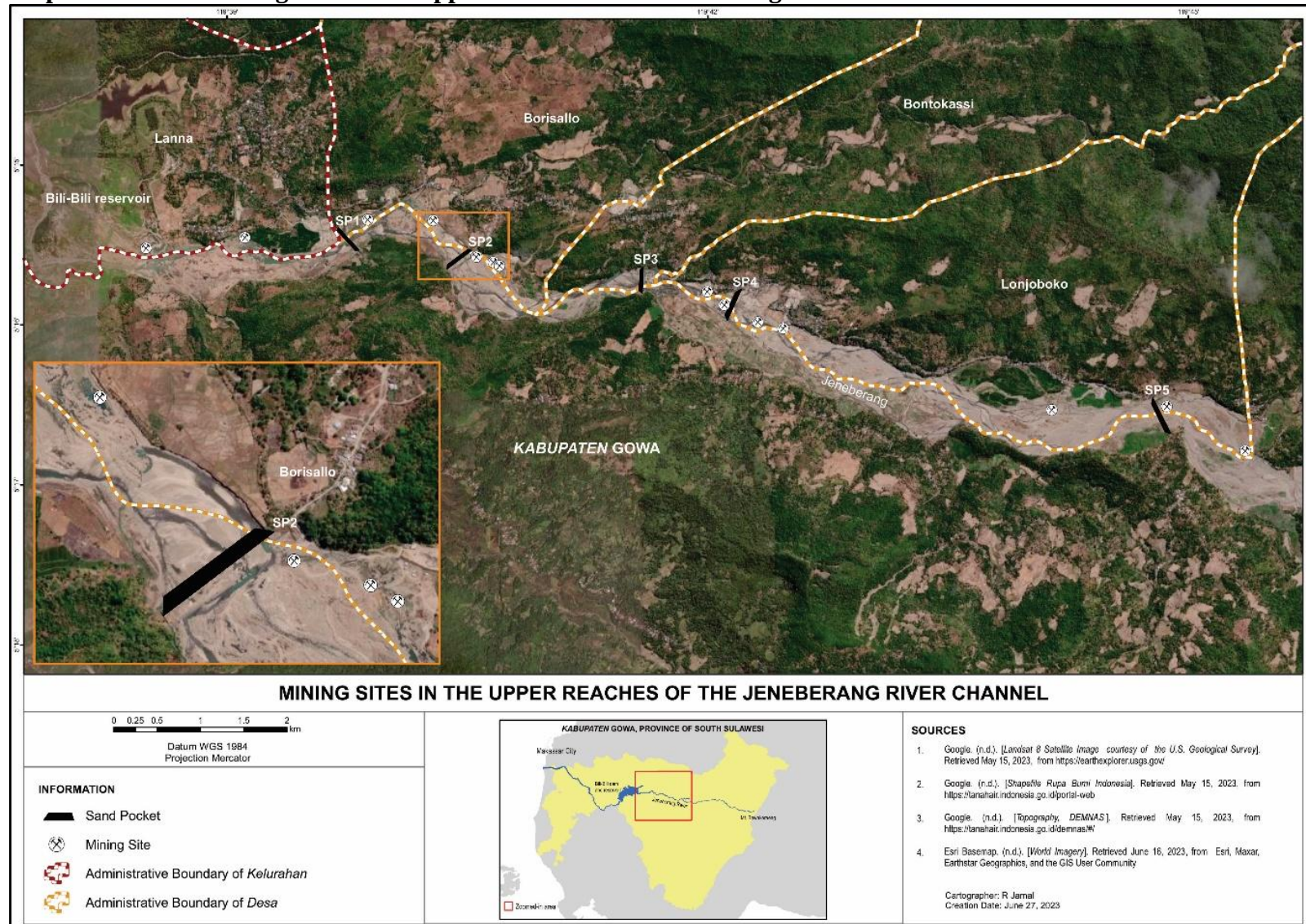


Source: Figure created by author with information drawn from JICA, 2005b, p. T3-2.

3.5.3. Mining in the upper reaches: early 2000s – 2022

As mentioned in the Introduction, today, mining activities in the Jeneberang river are geographically concentrated in its upper reaches. Within this area, mining sites are distributed along approximately 15 km, following the distribution of the five sand pockets that the Indonesian government built in the river channel. Most of the area where mining sites are located administratively belongs to Kecamatan Parangloe. Specifically, to the four kelurahan/desa mentioned in the Introduction: Kelurahan Lanna, Desa Borisallo, Desa Bontokassi, and Desa Lonjoboko. Map 3.3 shows mining sites and sand pockets according to the kelurahan or desa in which they are located. Manuju, another Kecamatan of Kabupaten Gowa, is across the river in front of Parangloe. According to the list shared by ESDM, a few of the allocated mining areas in the river channel extended from Parangloe into Manuju. But the companies that held a license over these mining sites had their offices and facilities in Parangloe.

Map 3.3. Current mining sites in the upper reaches of the Jeneberang river channel.



The mining of river sand and stones has been a source of jobs and cash for some people in Parangloe since at least the 1960s, as told in interviews and informal conversations. Throughout the 1970s to the 1990s, around 1000 men and women from the area were already mining sand and stones in the part of the river channel where Bili-Bili reservoir is located today (in Kelurahan Bontoparang which is part of Parangloe), as recounted by an interviewee. Men removed materials manually and loaded them into the trucks whereas women processed the stones collected by cutting them by hand with a hammer. Participants reported that by the 1980s mining by excavators had started, although there were not that many as today. In the 1990s, once the reservoir was filled with water, people stopped conducting these labour-intensive mining activities in the reservoir area.

Upstream from the present location of the reservoir local people removed sand and stone materials manually since the late 1960s and continued to do so until private mining enterprises and the state-owned company PD. Jasa Konstruksi —owned and managed by the government of Kabupaten Gowa— arrived in the area and started their operations in the first decade of the 2000s. As of 2022, there continued to be around 100 people who manually removed sand and stones from the river channel, including women. Photo 3.3 and Photo 3.4 show manual miners working during the 2022 rainy season in two different locations in the upper reaches. These people accessed mining sites through permit holders (mining companies, including sole proprietorship mining businesses) and/or landowners whose former land is now part of the Jeneberang river channel. These landowners also run their mining business; I categorize them as sole proprietors in Figure 3.1 (in the Research Methods section above).³⁵ In most cases, manual miners paid a fee to permit holders or landowners for each dump truck they load (mainly with stone materials), in return for removing them from the mining sites which permit holders and landowners controlled. In this partnership situation, manual miners put in their labour power while mining businesses (landowners included) put in the mining sites they control.

³⁵ Further research is needed on the current and historical relationship to the land in Parangloe. It was frequent to learn in the field about claims of ownership over land that has been “naturally” lost to the river channel, as people explained. These claims seem to be acknowledged and respected by others, as shown by the fee manual miners (and others) pay to landowners, for instance.

Photo 3.3. Manual mining further up the stream of the Jeneberang river during the rainy season (in Desa Lonjoboko, Parangloe, Dec. 2022).



Photo credit: Wendy Alejandra Medina de Loera

Photo 3.4. Manual mining further down the stream of the Jeneberang river during the rainy season (in Kelurahan Lanna, Parangloe, Dec. 2022).

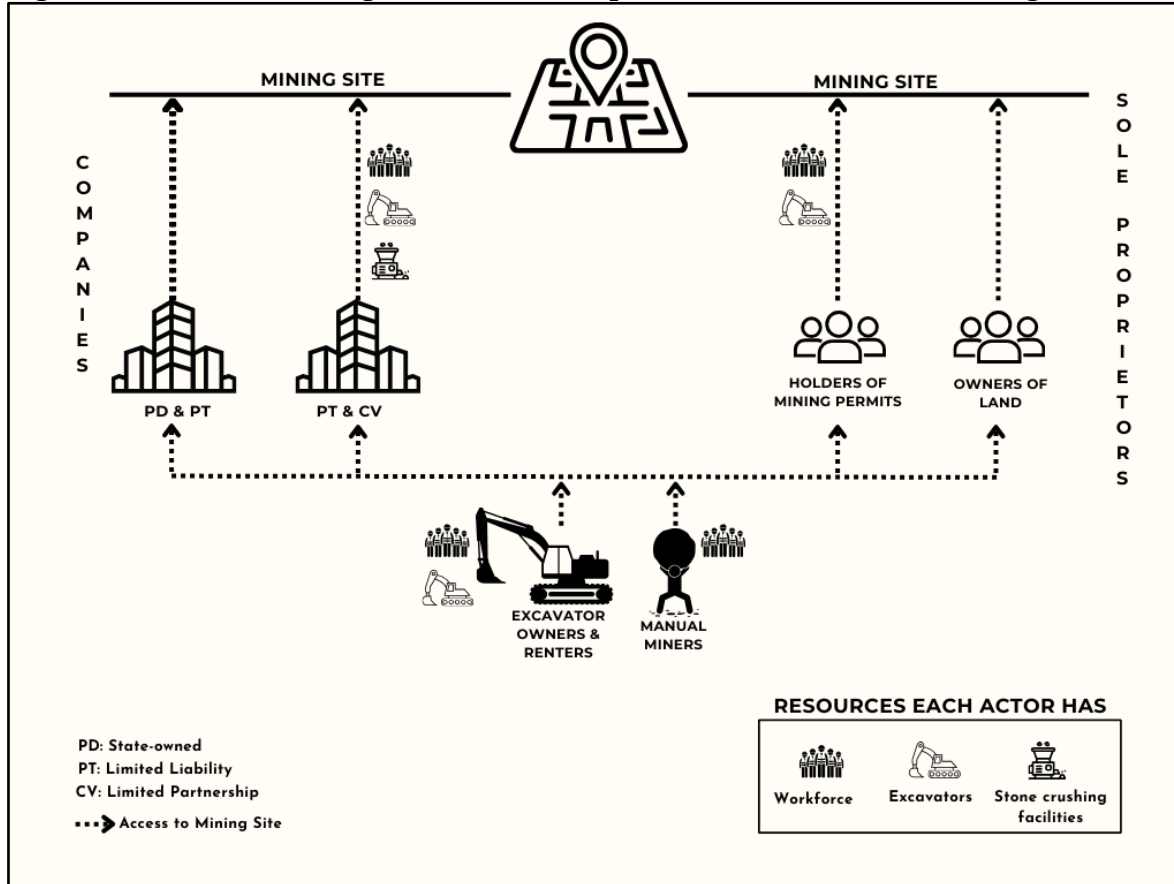


Photo credit: Wendy Alejandra Medina de Loera

When mining companies started their operations in Parangloe in the early 2000s, they obtained mining permits from the government of Kabupaten Gowa. This continued to be the case until 2016, when the authority for issuing permits was transferred to the provincial level. In their initial stages, some private companies bought from local people either former agricultural or barren land in the edges of the river to build their offices and their processing and storage facilities, as told by companies' staff. In some cases, the former agricultural land companies bought from local people was land that had been affected by landslides that converted it into non-arable land as it got buried in debris. The state-owned company PD. Jasa Konstruksi does not have either an office in Parangloe nor processing and storage facilities.

In the current river sand and stone mining network that operates in the Jeneberang only mining companies —be it PD (state-owned), PT (Limited Liability), CV (Limited Partnership), or Sole Proprietorship— and some individuals who own land (or claim to own it) in what is now part of the river channel have access to mining sites. Manual miners get access to mining sites through mining companies and landowners, as explained above. As I had mentioned in the Research Methods section, there are also individuals who have only excavators —either their own or rented. These excavator owners/renters get access to mining sites by working in collaboration with landowners or with mining companies —either companies that do not have their own workforce nor their own mining equipment or with companies that have it all but allow these individuals to mine in the sites they control. In both cases, excavator owners and renters get access to mining sites in exchange for a fixed fee for each dump truck loaded. In the partnership they establish, mining companies and landowners put in the mining sites while excavator owners/renters put in the mining equipment and the workers who operate it, and they also do the supervision. Figure 3.3 below shows the current mining network in terms of the actors and their relationships as they refer to both access to mining sites and the supplementary collaborations in which some of them engage based on the resources they have, lack, or wish to enhance.

Figure 3.3. Current mining network in the upstream area of the Jeneberang.



Source: Figure created by author in Canva.

Access to mining sites is different between private companies and the state-owned PD. Jasa Konstruksi. In terms of the number of sites over which companies have mining licenses, in 2019, all private enterprises we talked to had permits over only one mining site³⁶ and PD. Jasa Konstruksi had permits over three sites.³⁷ Regarding the land area of the mining sites over which companies have mining permits, mining sites of the state-owned PD. Jasa Konstruksi were larger than the mining sites of private enterprises. In total, the land area allocated as mining sites in the Jeneberang river channel in 2019 amounted to 274.46 ha, according to the information shared by ESDM. Figure 3.4 below shows that most of the private mining companies included in ESDM's list (11 out of 16 in the list) had been allocated

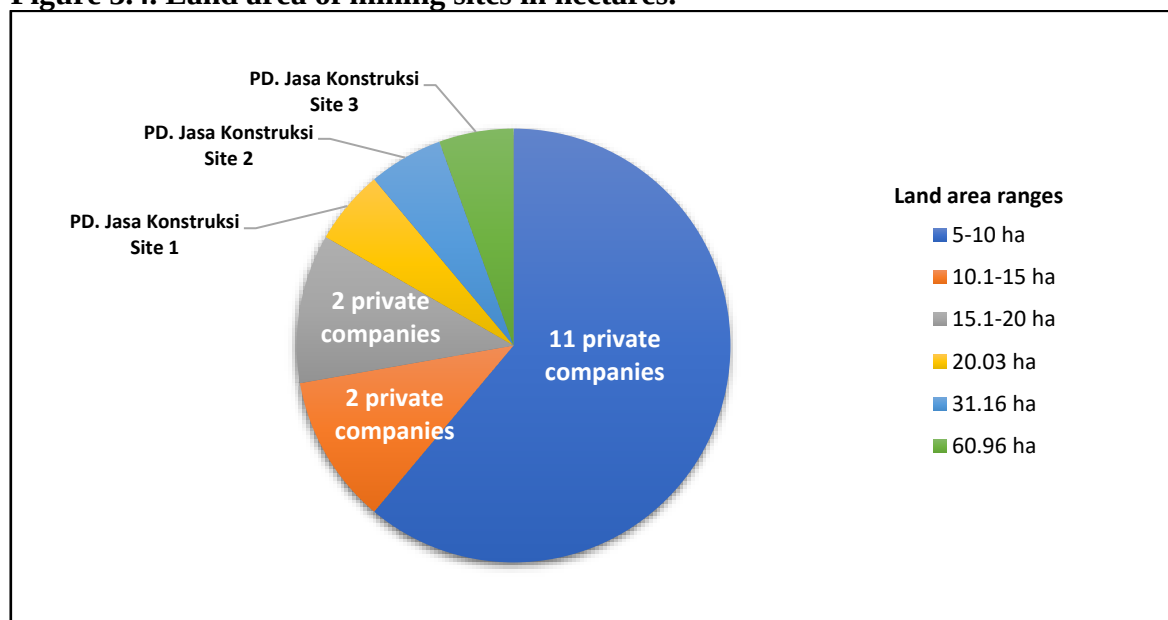
³⁶ The same is true for all private companies included in the list provided by ESDM, as recorded in the list.

³⁷ By December 2022 the state-owned PD. Jasa Konstruksi was actively operating only in two sites (in the site with a land area of 60.96 ha and the site of 20.03 ha).

mining rights in sites of between 5 and 10 ha and that the state-owned PD. Jasa Konstruksi had the largest mining sites. I indicated separately the specific land areas of the three PD. Jasa Konstruksi's mining sites in the figure.

The access of the state-owned company to the largest mining sites—which are a few kilometers away from each other—has been significant for incorporating manual miners and excavator owners/renters into the mining network across Parangloe. On the one hand, given that the state-owned PD. Jasa Konstruksi does not have either its own workforce nor its own mining equipment, the company has depended on manual miners and excavator owners/renters to make its mining sites productive and has integrated them directly, by collaborating³⁸ with them. On the other hand, PD. Jasa Konstruksi's way of doing businesses has been replicated by some private companies and landowners, which opens more spaces and creates more opportunities for manual miners and excavator owners/renters to participate in the local mining economy.

Figure 3.4. Land area of mining sites in hectares.



Source: Figure created by author with information drawn from the list of operation-production permits for mining companies in the Jeneberang river, Kabupaten Gowa, provided by ESDM, 2019.

³⁸ *Mitra* (partner) was the term most frequently used by PD. Jasa Konstruksi' staff and excavator owners/renters to refer to the type of relationship they have.

The mining network in the upper reaches: river materials, mining equipment, and actors in the period early 2000s – 2022

The availability in the upper reaches of sediments of big grain size, in addition to those of small grain size, has entailed the broadening of the variety of river materials that can be removed from the active river channel. Within these conditions, companies and individuals currently mine sand and stone materials that include cobbles/boulders of between 15-50 cm in diameter (river rocks that are called *batu kali* in Indonesian) and a mix of sand and rocks of up to approximately 10 cm in diameter (a mix that is called *sirtu* in Indonesian) (interviews and conversations).

Interviewees explained that large stones from the Jeneberang are used to build waterworks and foundations for houses in Makassar, Gowa, and surroundings. In this case, these large boulders are used without going through any crushing; they are used as found in nature. They are also used for obtaining crushed stones of different sizes which are later used in the preparation of concrete and asphalt, and the production of block paving bricks. Stone materials of smaller grain size are also crushed. The sizes of crushed stones include 1-2 cm, 2-3 cm, 0.9 cm, 0.5 cm. Regarding their uses, crushed stones of sizes 1-2 cm and 2-3 cm are widely used together for concrete mixture to build structures, concrete bridges and for road works. Crushed stones of 0.5 and 0.9 cm are widely used in the production of paving blocks and hot mix asphalt.

The mix called *sirtu* can be used for levelling ground; I saw it being used to level the earth of what became a short road for small vehicles and motorbikes. Then *sirtu* can be used in structural work as backfill which is then compacted before installing paving blocks on the top. A worker we interviewed explained that roads made exclusively with *sirtu* are not very good at withstanding heavy loads. In this case the, *sirtu* can only be used for roads that are not so travelled. But in general, the same worker said that *sirtu* has no specific use, that it is only screened to separate sand and stones.

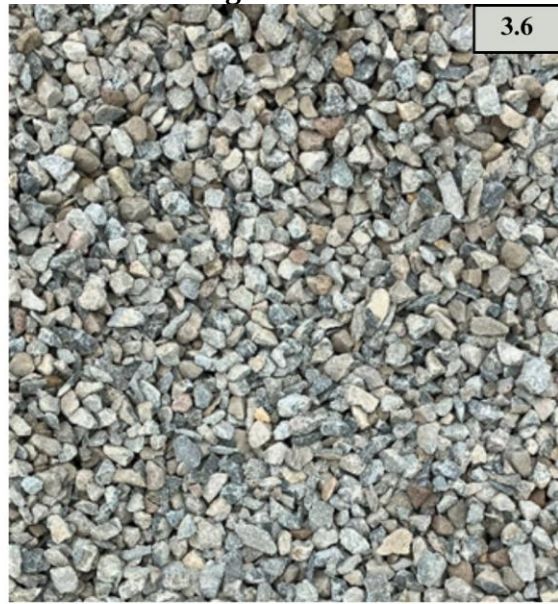
River sand is used for the preparation of concrete and mortar mixes which are made up of cement, water, and sand (and gravel in the case of concrete). These mixes are then used for house construction. Concrete is used for structural building and mortar is used as an adhesive

for bricks in walls and to plaster walls. Coarse sand is used for foundation work while fine sand is used in mortar mixes for works such as plastering and flooring. In the area, river sand is also used in households to roast peanuts, but this use does not drive a significant demand of it. Photos 3.5-3.12 below show some of these materials and their uses.

Photos 3.5-3.12. Sand and stone materials from the Jeneberang and their uses.



3.5



3.6



3.7



3.8

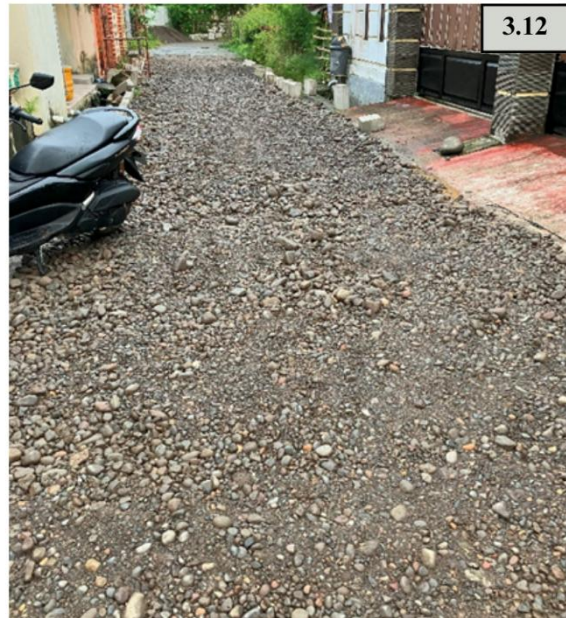


Photo 3.5: *Batu kali* in excavator bucket; **Photo 3.6:** Crushed stones (chipping chips ½’); **Photo 3.7:** *Batu kali* in the Jeneberang (rainy season, 2022); **Photo 3.8:** *Sirtu* stock; **Photo 3.9:** *Batu kali* used in house foundations (Desa Suggumanai, Kecamatan Pattalassang, Gowa); **Photo 3.10:** *Batu kali* used in a fence (Kelurahan Lanna, Kecamatan Parangloe, Gowa); **Photo 3.11:** Roasting recently harvested peanuts with river sand; **Photo 3.12:** *Sirtu* being used in road making (Sungguminasa). Photos credit: Wendy Alejandra Medina de Loera.

Stone materials have been important for mining actors upstream the river since at least the 1960s. Nowadays, they are particularly relevant for mining companies that add value to them by producing crushed stones in the facilities they have in Parangloe (see Photo 3.13 and Photo 3.14). The specific location of mining sites shapes both the availability of certain materials over others and the materials companies mine the most, although the latter is also influenced by the nature of their business as not all companies do stone crushing. Most private mining companies have stone crushing machines (*pabrik batu*); they produce crushed stones of different sizes which some of them sell to the public—including to the governments of Provinsi South Sulawesi and Kabupaten Gowa—and some others use for their own construction projects. I observed that the only ones in Parangloe who sold unprocessed boulders to the public were manual miners, excavator owners/renters, and the three Sole Proprietorship mining enterprises.

Photo 3.13. Stone crusher in Desa Borisallo, Parangloe, 2022.



Photo credit: Wendy Alejandra Medina de Loera

Photo 3.14. Stone crusher in Desa Lonjoboko, Parangloe, 2019.



Photo credit: Wendy Alejandra Medina de Loera

Mining in the upper reaches takes place all year round, as told by the companies' staff. However, the interactions between changes in the season and water level fluctuations in the river channel cause variations in the availability of materials and the total volumes that are removed. Participants reported that sediments of bigger grain size such as gravel, cobbles and boulders are more abundant during the dry season, and that the rainy season is the busiest one for sand since annual floodings make sand more abundant, more readily available, and finer.

Seasonality also shapes work in mining and the intensity and velocity of mining operations. The dry season—which goes from around May to October—makes it easier and faster for dump trucks and excavators to go into the river channel and work there as the water level decreases to a great extent. The dry conditions of the river facilitate the removal of materials

and their transportation as excavators and trucks can freely move from location to location on the channel. The rainy season makes mining activities more unpredictable as the water in the river might suddenly increase to a level that poses difficulties for mining safely. Heavy rain, rising water levels and floods might cause the halt on mining activities for the day or even for a few days. The rainy season can be more disruptive for companies and individuals who sell unprocessed stone materials as they usually remove sand and stones only when a dump truck arrives in the mining site and do not store them. Photo 3.15 and Photo 3.16 show the contrasting mining landscape according to the season.

Photo 3.15. Mining during the dry season (Desa Borisallo, Parangloe, 2022)



Photo credit: Wendy Alejandra Medina de Loera.

Photo 3.16. Mining during the rainy season (Kelurahan Lanna, Parangloe, 2022)



Photo credit: Wendy Alejandra Medina de Loera.

The specific location of mining sites along the river —further down or further up in the upstream area— also exerts an influence on the availability of materials. Therefore, depending on the specific location of the mining sites on the river channel, companies and individuals find more availability of sediments of certain grain size than of another, especially during the dry season (Asrib et al., 2019). Differences in the predominant grain size of sediments available in two areas of the Jeneberang’s upper reaches can be seen in Photo 3.17 and Photo 3.18, both taken during the dry season. The first one shows a mining site further down the stream where sand was more abundant while the latter shows a mining site further up the stream where there was more availability of sediments of bigger grain size.

Photo 3.17. Mining site further down the stream of the Jeneberang river during the dry season (in Kelurahan Lanna, Parangloe, Sept. 2019).



Photo credit: Wendy Alejandra Medina de Loera.

Photo 3.18. Mining site further up the stream of the Jeneberang river during the dry season (in Desa Borisallo, Parangloe, Jul. 2019).



Photo credit: Wendy Alejandra Medina de Loera.

The mining of sand, gravel and boulders in the upper reaches is done almost entirely with excavators like the one shown in Photo 3.19. Their bucket capacity is usually around 1 m^3 . Excavators dig the river channel to obtain these materials. Some brands include Komat'su (PC 200), Hyundai (220-9SH), Kobelco (SK200) and Caterpillar. However, as mentioned above, there is also some mining done manually. Excavators load trucks of all sizes common in the area: $\pm 7 \text{ m}^3$, $\pm 12 \text{ m}^3$, and $\pm 22 \text{ m}^3$. Out of the eight surveyed mining companies, six had their own excavators and two partnered with excavator owners/renters. The predominant use of excavators as mining equipment suggests that the mining network in the Jeneberang has become less labour-intensive and more technology-intensive over time. It has also diversified as some companies undertake processing activities to produce crushed stones. Some companies sell the (raw) river materials they mine to the public, including some of the stone

crushers in Parangloe such as the companies we approached but said they did not do mining themselves. Other companies instead use the sand and stones they mine for their own construction projects and for the manufacture of construction materials such as ready-mix concrete, lightweight bricks, paving blocks, precast concrete wall panels, etc. This points to the transition of some actors from suppliers of raw river materials to suppliers of both processed river materials and construction services.

Photo 3.19. A Komat'su excavator removing sand and stone materials from the Jeneberang River Channel during the Dry Season in 2019.



Photo credit: Wendy Alejandra Medina de Loera.

Most of the actors doing the mining in the upper reaches in 2019 —thirteen out of the 18 mining companies we identified in the field— were Limited Liability Companies (PT). Out of the remaining five, one was a Limited Partnership Company (CV), one was the state-owned company PD. Jasa Konstruksi, and three were Sole Proprietorships (see Figure 3.1 in Research Methods section). For classifying the eight surveyed companies according to their

business name (PT, CV, Sole Proprietorship) I relied on the name they told us. Regarding the non-surveyed companies, I based my classification on either the name we identified while doing field reconnaissance or their names as they appear in the list shared by ESDM. The predominance of PT companies in the current mining network speaks to differentiations in the capital owned by past and present mining businesses' owners.

Unlike the prevailing type of mining businesses in 2004 who legally did not need a minimum of capital to conduct business as Sole Proprietorships (or for establishing a CV company), current actors were legally required to have a minimum of either Rp. \$20 million (around USD \$1,300) or Rp. \$50 million (around USD \$3,500) as authorized capital for creating their PT company.³⁹ So, the type of business entity of most current mining actors (PT) suggests that they are in the position of making relevant investments of money.

The findings from the surveys we conducted with companies further support this. We asked companies about their net worth, exclusive of land and buildings for the company's premises, and about their annual sales. Both are the two criteria considered in Law No. 20/2008 on micro, small and medium-sized enterprises to categorize businesses (Undang-Undang Nomor 20 Tahun 2008). We found that out of eight companies we surveyed, five can be classified as large-sized enterprises which means that their net worth is over Rp. \$10 billion (USD \$650,000) and their annual sales amount to more than Rp. \$2.5 billion (USD \$160,000). Their approximate fixed capital and the volume of their sales shed light on their financial possibilities to invest in more technologically sophisticated equipment. The dominant use of excavators and the stone crushing facilities of some companies are indicative of this. As a result, the transition towards the use of more technologically sophisticated mining equipment

³⁹ The required minimum authorized capital for establishing a PT company in the 1990s was Rp. \$20 million, according to Law No. 1/1995 Limited Liability Companies (Undang-Undang Nomor 1 Tahun 1995). For establishing a PT in the early 2000s, the required minimum authorized capital was Rp. \$50 million, according to Law No. 40/2007 on Limited Liability Companies (Undang-Undang Nomor 40 Tahun 2007). Therefore, depending on their establishment dates, PT mining companies in Parangloe were required to have any of these two minimum amounts of capital. Since Government Regulation No. 29 on Changes in the Authorized Capital of Limited Liability Companies came into effect in 2016, Rp. \$50 million is no longer the minimum amount required as authorized capital; it now depends on the agreement between the founders of the company (Peraturan Pemerintah Nomor 29 Tahun 2016). However, all eight surveyed companies claimed to have been active long before this regulation became effective.

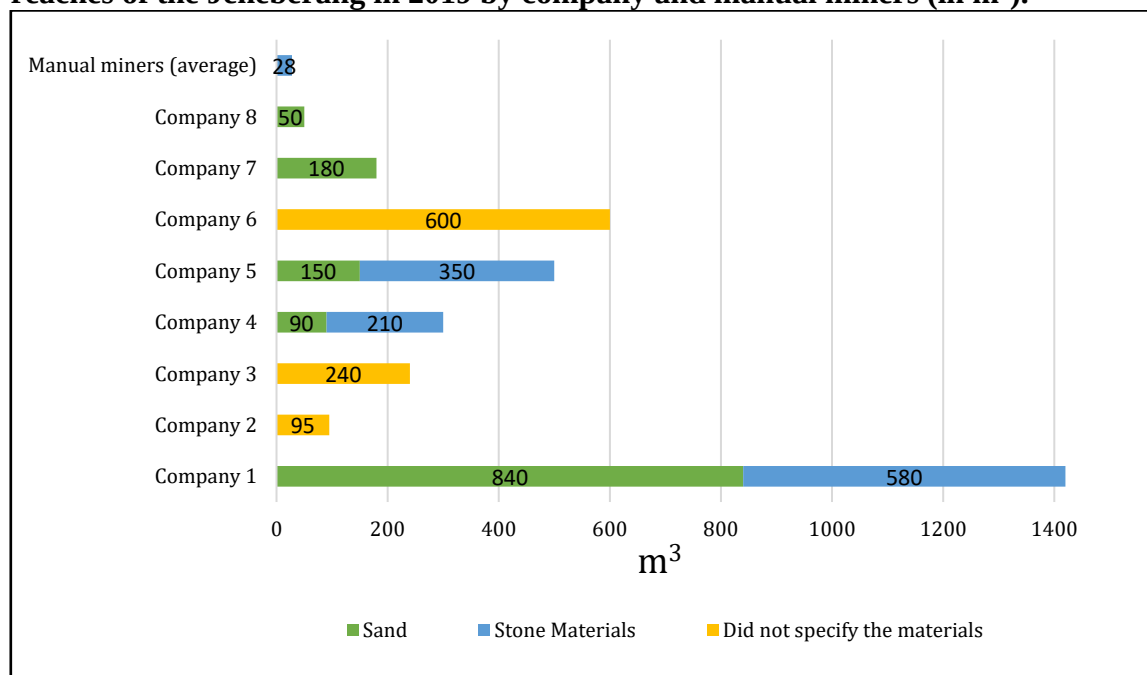
has come with changes in the predominant type of actors who own mining businesses and remove sand and stone materials in the Jeneberang river nowadays.

Furthermore, the predominance of PT companies as the main type of business entity mining sand and stones in the Jeneberang today suggests that the mining network has acquired a more exclusive character over time. Nowadays, only those with huge financial resources are the key actors —such as mining companies and individuals who own mining equipment, although landowners and local entrepreneurs who rent excavators are also important players of the mining network. Technologically sophisticated mining equipment is thus unevenly distributed between social groups and this inequality entails that it is beyond the financial capacity of the vast majority of people in Parangloe.

As shown in Figure 3.3 above, only mining companies (PD, PT, CV) and a few individuals (Sole Proprietors) have access to mining sites. In such circumstances, many of the people in the area can only enter into an employment relationship with either capital intensive companies, landowners, and the owners/renters of mining equipment. The current organization of the network and its dynamics contrasts with the earlier period where the ownership of mining businesses was distributed among small-scale local entrepreneurs rather than among capital intensive companies, because the investment required was much less.

The current approximate daily volume of river materials mined also contrasts with the estimated volumes mined in the former network. Figure 3.5 shows the daily volumes mined that surveyed companies and manual miners reported to us. The numbers displayed in the figure indicate that mining activities in the Jeneberang have intensified and that companies in the current network do mining at industrial levels, especially when compared with the approximate volumes mined in the past network (see Figure 3.2 above) and the current volumes removed by manual miners.

Figure 3.5. Estimated daily volume of sand and stone materials mined in the upper reaches of the Jeneberang in 2019 by company and manual miners (in m³).



Note 1: Company 8 also mines stone materials, but I am missing such information because it shared data about the volume of crushed stones produced by size instead of the estimate volume of stone materials it removes from the river channel. The staff explained that stones are the main river material they mine.

Note 2: Manual miners normally load between 3-4 trucks of ± 7 m³ load capacity with stone materials. When there are many trucks, they might load up to 5 trucks in a day, it all depends on the number of trucks willing to buy materials from them.

The differences in the estimated volumes of mined materials and the nature of former and current actors also suggest that those doing the mining in the past can be hardly expected to have accumulated enough capital to enable them to become proprietors of several excavators, some dump trucks, land in the edges of the river and stone crushing facilities. A former trader of river sand and stone materials who used to source them from what today is Bili-Bili reservoir explained that manual miners and himself —as a trader who owned some dump trucks and rented others when necessary— were not in position to compete with the (PT) mining companies that arrived in the area as they owned technologically-sophisticated mining equipment, stone crushers and dump trucks. These enterprises monopolized all the stages involved in mining, offered a larger supply of materials, and supplied them more rapidly and efficiently. Former actors could make a living out of sand and stone materials mining, either complementary to or in lieu of whatever livelihood they led. Mining

companies today are not only able to survive, but it is evident that they also thrive, although in a differentiated way.

3.5.4. The shaping of mining networks: the interaction between material, political, and economic elements

So, what helps to explain how a former mining network spatially concentrated in the lower reaches and primarily focused on the removal of sand transformed into a network based in the upper reaches and for which stone mining has become common rather than exceptional? How did individual small-scale mining businesses that were majority in the former network become a minority in the current network? How did medium- and large-sized Limited Liability Companies come to be the main mining actors in the current network? In this section I address these questions by analyzing the interplay between some material, political, and economic aspects which, I argue, have interacted to shape the two contrasting mining networks I outlined in the previous sections. The importance of documenting past and present mining operations in the Jeneberang and their organization lies first in the potential usefulness it might have for conducting longitudinal research in the area. The details that I record here provide a rich source of firsthand information that enables us to see variation in a source site of river sand and stones. But to document these transformations in mining is also relevant to help us to understand that mining networks have changed in the past and they have the potential to be transformed in the future. And that will keep changing every time that even only one of its constitutive parts varies.

The local, regional, and national material, political and economic dimensions I examine here are not exhaustive, though. But this first attempt to scrutinize the factors operating at different scales that contribute to shape mining networks does open potential lines of enquiry that I hope colleagues in Indonesia and other parts of the world, and myself, will continue to investigate. I situate the changes that the former mining network underwent within a growing demand for river sand and stones associated to the increasing need of construction materials required for the urban development of Makassar and Kabupaten Gowa.

The (altered) materialities of spaces set the physical conditions under which mining is conducted. The geological features of the lower reaches of the Jeneberang facilitated the

accessibility to alluvial deposits such as sand while the features of the upper reaches make rocks more readily available, especially during the dry season. Moreover, the sand pockets have enhanced the accumulation of sediments in the area upstream from Bili-Bili dam and reservoir which, in turn, has been a driving force behind mining activities.

In contrast to the limited mining of stone materials that the study team commissioned by JICA identified in the lower reaches in the early 2000s, today all actors in the upper reaches mine stone materials in addition to sand. This was already the case even before the arrival of mining companies to the area, although back then it was small-scale. A greater availability of stone materials has had implications as for who can do the mining in a way that meets the daily demand of the hundreds of dump trucks that go to Parangloe to buy river sand and stones.

The options of mining methods in the material conditions of the upper reaches are limited to manual removal and by excavators. Given the high demand of river sand and stones, mining actors who possess excavators are the ones who at present have the technical capacity to supply the demanded materials. A comparison of the time it takes for manual miners and excavators to fill trucks with river sand and stones helps to explain why this is the case.

When it comes to stones, it takes between one and two hours for a small group of miners to manually load small dump trucks —of approximately 7 m³ load capacity— with boulders the size requested by buyers⁴⁰, whereas it only takes between 15-20 minutes for an excavator to do the same.⁴¹ The time it takes to manual miners varies depending on the total number of workers who get involved. Usually, between three and five people participate, including young and adult men and women (although women are concentrated in a specific area further up the river channel). The manual mining of stones demands that miners look for and select stones of similar size which makes longer the process of loading dump trucks, apart from the

⁴⁰ Participants reported that dump trucks' drivers, who buy materials from manual workers, specify the approximate size of the stones they need (e.g., stones the size of a human head). They also explained to us that some drivers prefer to buy stone materials manually removed than mined by excavators because the stones manual workers pick are more uniform in size.

⁴¹ When doing stone mining, excavators not only remove stones from the river channel; they remove the mix of sand and rocks called *sirtu* mentioned above.

time and effort it takes to arrange them within the dump box. Manual miners start collecting and piling up stones at the very moment when the truck driver arrives in the mining site and specify the approximate size of stones needed. Manual miners only load small trucks whereas excavators load small and large trucks. So, the materiality of stones matter for how work is organized in terms of labour, time and methods.

Regarding sand, the current options for doing sand mining in the upper reaches are by shovels and by excavators. It takes between one and two hours for a few workers to fill a small dump truck with unsifted sand by shovel while for an excavator it takes between 40-60 minutes to fill it with sifted sand, as told in interviews and informal conversations. For both manual miners and excavators, it takes longer to load sand when the conditions of the river channel are drier and, in turn, sand is more difficult to obtain. I did not witness any sand mining being done manually in Parangloe, but I was told it does happen that manual miners load trucks with sand when truck drivers request it. According to an interviewee, it is not common that truck drivers buy sand from manual miners as they usually want sieved sand. I witnessed that only excavators loaded sieved sand into small and big dump trucks. To get such quality, excavators filtered the sand through a giant iron sieve excavator operators placed on top of the truck's dump box (see Photo 3.20 and Photo 3.21). The use of a sieve entails an additional cost companies and owners of excavators must incur; approximately its price is Rp. \$30 million (around USD \$2,000), as told by interviewees. Buyers' preference for sifted sand poses an additional challenge for manual miners, especially during the dry season, because sand in the upper reaches is coarser than it is in the lower reaches due to the proximity to the sediment producing area.

Photo 3.20. Sieving Sand in the Jeneberang River Channel during the rainy season (Kelurahan Lanna, Parangloe, 2022).



Photo credit: Wendy Alejandra Medina de Loera

Photo 3.21. Sieving Sand during the rainy season (Desa Lonjoboko, Parangloe, 2022).



Photo credit: Wendy Alejandra Medina de Loera

In the former mining network in the lower reaches, water levels enabled miners to do sand mining by pumps and by boats. Today, the only low-tech and non-capital-intensive option miners have in the upper reaches is manual mining. When compared to pumps and boats, manual mining is less competitive in terms of speed and efficiency for loading trucks, especially in a business environment dominated by the use of excavators. From this perspective, pumps and boats, although low-tech and non-capital-intensive too, are faster and more efficient mining methods than manual mining. A comparison of the time it takes to load small dump trucks —of 7 m³ load capacity— by the three methods illustrates this. As mentioned above, it takes between one and two hours for a small group of miners to manually load small trucks with stones or with unsifted sand. For miners to load small trucks with sand by pump it takes them only around 45 minutes, as explained by an interviewee. When using pumps or boats, if there is sand in stock, it takes 2-4 miners between 30-60 minutes to load a

small truck. Today's manual mining of stones also contrasts with former sand mining by pumps and by boats as the first one demands time for selecting stones and does not keep a stock.

Therefore, the physical characteristics of both the geographical space and the river materials matter for how effective the mining methods employed are in terms of supplying river sand and stones efficiently (trucks loaded per time unit). During fieldwork, we did not speak with any person formerly involved in mining in the lower reaches, but what people in Parangloe shared regarding the mining of river materials in the upper reaches prior to the building and functioning of Bili-Bili dam and reservoir suggest that the materialities of the Jeneberang and the sand and stones in its river channel made the geographical space and the materials very accessible for many and that they were either able to meet the demands of costumers or there were no other options for consumers to buy materials from. In this sense, the materialities of both the geographical space (lower/upper reaches) and the river materials (sand/stones), in combination with the characteristics of the business environment (in terms of the demand and the number and kind of competitors), enable or constraint the participation of some actors over others.

I did not explore whether the mining sites in the lower reaches that the study team commissioned by JICA mapped in the early 2000s had mining licenses.⁴² However, that the study team consulted a license list (of the now defunct Gowa's Department for Mining and Energy) and noted in the report that non-licenced mining activities existed leads me to think that the mapped mining sites probably had permits to operate (JICA, 2005b, p. 3-4). If this was the case, I assume that the government of Kabupaten Gowa had issued those licences. I assume so because in Parangloe we came to learn that since before Bili-Bili existed, individuals in the upper reaches used to be the holders of mining permits, particularly in the area that is now part of the reservoir (in Kelurahan Bontoparang) and its adjacent area (Kelurahan Lanna). In the early 2000s those permits were being issued by Kabupaten Gowa. The valid mining law (Undang-Undang Nomor 11 Tahun 1967) by then, as the one that

⁴² Related to my uncertainty about the nature of the mining activities the study team sent by JICA documented in 2004-5 (whether licensed or not licensed), it is not clear how mining businesses accessed mining sites.

followed (Undang-Undang Nomor 4 Tahun 2009), included the possibility for communities from the locality to have a permit for doing small-scale mining, by using simple equipment, for their own livelihoods (IPR —*Izin Pertambangan Rakyat*). It also remains to be confirmed whether the mining actors that the study team recorded had this type of permits.

All this matters because nowadays most of the permit holders are Limited Liability (PT) mining firms, in addition to the state-owned PD. Jasa Konstruksi, as revealed by the list ESDM shared and our fieldwork.⁴³ This change in the predominant type of permit holders suggests a transformation in the preference of the government of Kabupaten Gowa for PT mining companies over Sole Proprietorship enterprises (small-scale local entrepreneurs). My interpretation is supported by *de facto* predominance of Limited Liability (PT) mining companies on the ground which I see as a manifestation of the government of Kabupaten Gowa's interest in prioritizing mining activities at an industrial level.⁴⁴ This speaks to the politics of sand governance where strategic moves and political power come into play to shape access to river sand and stones in the Jeneberang. There are other aspects of the politics of access to mining sites that I did not explore during fieldwork but that open an avenue for potential future enquiry. These have to do with the processes through which different actors (such as mining companies, manual miners, and excavator owners/renters) came to establish partnerships that grant access to mining sites for those who, by themselves, do not have access to any because either they are not permit holders or landowners.

This 'bias' for Limited Liability (PT) mining companies can be partially explained by their significance as taxpayers and by Kabupaten Gowa's broader concern for raising its local revenue. Taxes on non-metallic minerals and rocks are collected by the Kabupaten, according

⁴³ While it is true that PT companies and Sole Proprietorships enterprises were equally benefited with a mining license according to ESDM's list, the number of PT companies reported by ESDM increases to seven if we consider that one mining business ESDM recorded as a Sole Proprietorship identified itself as a PT. In the same way, the number of CV companies in ESDM's list increases to four if we consider that one mining business identified itself as a CV and not as a Sole Proprietorship. In this situation, the total number of Sole Proprietorship businesses who were granted a mining license would decrease to four.

⁴⁴ PT companies are the main business type on the ground. These companies and their operations are quite visible and easily identifiable; I can assume that government authorities know of their existence.

to Law No. 28/2009 on Local Taxes (Undang-Undang Nomor 28 Tahun 2009).⁴⁵ According to Gowa's Regulation No. 12/2011 both natural and legal persons must pay a tax of 25% on the sale value of the total volume of materials extracted (Peraturan Daerah Kabupaten Gowa Nomor 12 Tahun 2011). The evidence of the former and current networks that we collected suggests that today's PT companies mine and sell larger volumes of river materials than what individuals who owned and ran their local mining businesses (Sole Proprietorship) used to mine and sell in the past. Therefore, from the perspective of Kabupaten Gowa as tax collector, for tax purposes PT companies are more profitable than Sole Proprietorships. However, this is a topic that needs further research to be able to compare current volumes of materials mined and their sale value between different types of mining actors (PT companies, CV enterprises, Sole Proprietorships). The data we collected in 2019 referred only to the situation of PT companies and manual miners, we have yet to add the information of sole proprietorships. Moreover, the issue of tax filing by PT companies has yet to be investigated as it cannot be assumed that, by the mere fact of producing and selling larger volumes, they are indeed contributing more to the government coffers. It remains to be seen if they are actually filling their taxes and/or reporting the total volume of materials removed and their sale value. The 2011-2018 taxes report shared by Gowa Revenue Agency in 2019 suggests that the government of Kabupaten Gowa has been close to meeting—and in some cases it has met—the tax collection target set for sand, *sirtu*, and *batu kali* (all of which I assume were mainly removed from the Jeneberang, although this is not specified in the report). It is also my view that mining companies that do stone crushing in addition to mining have been particularly important because they are also supposed to pay taxes for crushed stones, at least during the 2011-2018 period.

Kabupaten Gowa's prioritization of PT mining companies can also be explained by the (differentiated) privileged position these firms hold when it comes to their relationship with the local government, as opposed to Sole Proprietorships enterprises and ordinary individuals in the area more broadly. Power asymmetries between PT companies and Sole

⁴⁵ Law No. 28/2009 has been revoked but it was applicable for what I am describing. Today, the applicable regulation is Law No. 1/ 2022 on Financial Relations between the Central Government and Local Governments (Undang-Undang Nomor 1 Tahun 2022).

Proprietorships businesses are evident in PT's predominant access to mining permits and existence in the ground. The high profile some of the companies' owners have as businesspeople at the local, regional, and even national level, as well as their proximity to Gowa's political elites (and beyond) also speaks to the uneven power relations that shape the mining network. For instance, some PT mining companies in Parangloe are owned by some of the main entrepreneurs in South Sulawesi (for examples see Arfah, 2020; Mirsan, 2020; Kalla Beton, n.d.) and some are owned by individuals who belong or have been part of the state apparatus (interviews and informal conversations).

I identify the construction of Bili-Bili dam and reservoir and the sand pockets as the event that triggered the interest of the government of Kabupaten in large-scale mining in the Jeneberang. Since Bili-Bili dam was being planned, the study team commissioned by JICA identified sediment runoff and accumulation as potential problems for Bili-Bili's optimal functioning (JICA, 1980a; JICA, 1980b). Large amounts of sediment discharge, coming from collapse areas in the upper reaches, would flow into the reservoir and could compromise its adequate functioning in terms of its storage capacity and its role in mitigating flood effects in Makassar and surrounding areas. The study team recommended to build sand pockets near to the area where sediments are produced on the grounds of these structures' capacity to control sediment transportation (JICA, 1980a, pp. 18, 43; JICA, 1980b, pp. III-6, III-7; JICA, 1982, pp. 24, 25).

The technical recommendations of the study team sought to guarantee the optimal functioning of Bili-Bili, and to keep low the costs of dam maintenance and operation. The study team also recommended to simultaneously stop renewing mining licenses for the area downstream Bili-Bili dam and start promoting mining sites upstream the dam to prevent further degradation of the downstream riverbed below Bili-Bili dam due to excessive sand mining activities (JICA, 2005b, pp. S-9; 3-4; 7-28). In the end, the existence of a mining network in the upper reaches shows that Kabupaten Gowa has followed the recommendations from the study team. Moreover, the location of mining sites near the sand pockets that was proposed by the study team has somewhat been followed (JICA, 2005b, p. F7-14). This helps to explain the spatial reorganization of mining sites along the Jeneberang.

On March 26, 2004, a large-scale landslide occurred at about 40 km upstream of Bili-Bili dam, at Mt. Bawakaraeng (JICA, 2005b, pp. S-3; 3-4; 3-5; JICA Urgent Survey Group, n.d.). As a result, “an enormous amount of earth and debris ran down the slope” (JICA Urgent Survey Group, n.d., p. 3) and “accumulated for a length of about 7 km and a width of 500~800 m along the valley” (JICA Urgent Survey Group, n.d., p. 4). The volume of the collapsed soil was estimated at 235 million m³ (JICA Urgent Survey Group, n.d., p. 3) “of which about 27 million m³ [were] expected to accumulate in Bili-Bili dam reservoir in the next five years [after the landslide]” (JICA, 2005b, p. S-3). The sand pockets located between Bili-Bili dam and the site of the collapse were filled up with sediment (JICA Urgent Survey Group, n.d., p. 6). This sharpened the concern for the potential ways in which huge volumes of sediments flowing into Bili-Bili dam reservoir could compromise its adequate functioning (JICA, 2005b, pp. 3-4, 3-5, 3-6). At the request of the Indonesian government, JICA sent a team of experts to investigate sediments behavior. As an immediate measure, the team proposed to remove the sediment that had accumulated in the sand pockets (JICA Urgent Survey Group, n.d., p. 7).

I interpret that the recommendations the study team made regarding the promotion of mining activities upstream from the dam and the transformed physical characteristics of the river channel in the upper reaches—which facilitated the accumulation and concentration of sediments—prompted the interest of the government of Kabupaten Gowa in both supporting large-scale mining operations (and the associated PT companies) and participating directly in the mining economy through its company PD. Jasa Konstruksi. These two interests of the government of Kabupaten Gowa were motivated by the possibility of generating local revenue. Here the interaction between the transformed material conditions and the politics of sand governance can be seen again. The profits the state-owned company PD. Jasa Konstruksi generates are crucial for Gowa’s local revenue (PAD -*Pendapatan Asli Daerah*). The company is a subsidiary of *Holding Company Gowa Mandiri* which was formed in 2007 (Perusda Gowa, n.d. -a; Perusda Gowa Mandiri Holding Company, 2010a). Economic sectors of its other subsidiary companies include agriculture, livestock, and printing (Perusda Gowa, n.d. -a.; interviews). As of 2019, PD. Jasa Konstruksi generated 90% of the Holding

Company's revenue, as told by staff we interviewed. The Holding Company perceives itself as an agent of development that does not forget its social role, even if its subsidiaries are profit oriented (Perusda Gowa Mandiri Holding Company, 2010b). Its goals include encouraging people's economic growth in Gowa and developing partnerships with communities/micro enterprises (like the collaborations it has established with excavator owners/renters in Parangloe) (Sejarah Singkat, n.d. -b).

The transition from a network in the early 2000s characterized by the predominant participation of Sole Proprietorship mining enterprises to a network two decades later where the main actors are PT companies can also be partially explained by the changes in the demand for river sand and stone materials over the last 20 years. The construction materials used for the development of Makassar's and Gowa's urban areas have been sourced from the Jeneberang river, according to participants, and only technological intensive mining methods have been able to supply the large volumes of materials required. As explained earlier in the Research Site section of this chapter, I estimate that at least around 6,000,000 m³ of concrete have been needed in the last 20 years or so by the construction industry in both areas. This means that approximately 3,000,000 m³ of sand and 3,000,000 m³ of crushed stone were required for the expansion of Makassar's and Gowa's built-up areas since the late 1990s.

More recently, Makassar's urbanization has been boosted by the prioritization of infrastructure development by President Jokowi whose administration started in 2014. Projects in Makassar include the construction of two ports (Makassar New Port and Port Soekarno Hatta) and around 140 km railway connecting Makassar with Pare-Pare (another city in South Sulawesi), as part of Trans-Sulawesi railway that is expected to connect all Sulawesi Island by 2030. These are some of the so-called National Strategic Projects addressed to improve the connectivity within and between islands and support a growing economic activity.

The politics of sand governance in the Jeneberang are at work at multiple scales. As such, there is an entanglement of regulations that govern the mining of river sand and stones and shape the institutional design that defines the government levels and agencies who will issue recommendations, approve mining licences, supervise mining operations, collect taxes and

so on. The regulatory framework is designed at different scales and operationalized and territorialized in Parangloe. JICA's technical and financial support, local-regional-national projects for consolidating Makassar as the gate to Eastern Indonesia, global urbanization and related "modernization" trends, and real estate development all are multiscalar factors shaping the politics of sand governance in the Jeneberang.

3.6. Conclusions

In this chapter I have documented two different forms the sand and stone mining network in the Jeneberang river has taken in two time periods, and I have unpacked the constitutive parts of these networks. Thus, partially my focus has been what mining networks are. But my focus has also been the transition from a small-scale, low-tech, labour-intensive and non-capital-intensive mining network—as it existed before the building of Bili-Bili dam and before the JICA study—to an industrial and capital-intensive network that relies more and more on heavy technologically sophisticated mining equipment. The transformations in the network that I documented also include the movement of mining operations from the lower to the upper reaches of the river and the change towards a bigger focus on stone mining. Through this historical examination of the displacement and replacement of one mining network by other, I have shown how the mining network that operates in the Jeneberang has changed over time and that mining networks are transformed. The current mining network in the Jeneberang has been operating for around 20 years. This opens what I consider a relevant follow up question for future research—what makes mining networks hold together?

What have the changes in the mining network meant for local mining businesses? From the perspective of mining businesses' ownership, the implication of the transition has been the displacement of small-scale local entrepreneurs (sole proprietorships) by capital-intensive local/regional mining companies. This transition has meant that mining businesses and mining equipment have become less affordable and accessible to those not attached to capital; namely, to the vast majority of people in the locality. Based on this, I characterize the former network as more inclusive. Today, in financial terms, the most accessible way of doing mining is manual mining. And although there is no way for it to compete with the efficiency

of excavators in terms of time per truck loaded, manual mining remains a specialized niche market because of the homogeneity in stone size it offers.

The shaping of a network in which large-scale mining companies came to predominate not only has had implications for sole proprietorship businesses, but for manual workers in Parangloe. As I mentioned earlier in the chapter, an interviewee in Parangloe who used to trade river sand and stones before Bili-Bili dam was constructed in 1999 indicated that around 1000 men and women from Parangloe were already manually mining sand and stones in the part of the river channel where Bili-Bili reservoir is located today (in Kelurahan Bontoparang). I do not know exactly the total number of people who did manual mining upstream from the present location of the reservoir since at least the 1960s, but a common response we got from interviewees and other people we interacted with was that in the past mining in the area was done manually. These accounts suggest that manual mining was a widespread practice in the upper reaches of the Jeneberang prior to the dominant role that private large-scale mining companies and the state-owned PD. Jasa Konstruksi came to gradually play starting in the early 2000s. However, according to a manual miner, today there are only around 100 people who manually remove sand and stones from the river channel, including women. Thus, for manual mining, the changes in the network have entailed that the size of manual workforce mining in the upper reaches has shrunk. Some mining is still labour-intensive, but it is limited in terms of the people involved and the mining sites where it is undertaken.

In the current conditions where only a few local small-scale entrepreneurs have access to a mining site, manual miners and excavator owners/renters, as local small-scale entrepreneurs themselves, are left with the option of working in partnerships if they are to be part of the mining economy. The implication of this is that part of the money they make out of mining in a site controlled by someone else must be paid to the entity who controls the site. There have been instances, however, when manual miners and excavator operators have not been required to pay the agreed fee. What would be the implications of granting mining permits to manual miners and excavator owners/renters over a site that they can control by themselves? This is an open question that future studies might address as to find out if

becoming permit holders is an expectation of small-scale local entrepreneurs in the first place. Later in Chapter 4, I mention the example of a local individual who is a former permit holder. My interpretation is that, although working in partnerships has meant less profitability for them, not to be permit holders has also relieved them from the annoyances and difficulties of the administrative processes.

What and who shapes mining networks, and how? In the chapter I have shown that the mining network in the Jeneberang has become less inclusive due to the interaction of things that include the transformed materialities of the Jeneberang upstream, a growing demand of river sand and stones coming from the construction sector in Makassar and surrounding areas, the major availability of stones whose extraction requires heavy mining equipment to meet such a growing demand, political decisions that have shaped the predominant participation of Limited Liability Companies, and the key role the government of Kabupaten Gowa has decided to assign to the state-owned PD. Jasa Konstruksi in the mining economy. Moreover, I have argued that the construction of Bili-Bili dam and the sand pockets was the factor that triggered that the past network felt apart, and a different network came together. Would the transition to more capital-intensive mining and more stone-oriented have happened if Bili-Bili dam and the sand pockets had not been constructed? It would probably have, but gradually rather than abruptly, at the pace dictated by the growing demand for construction materials.

More broadly, in the chapter I have highlighted that the material aspects of our socioeconomic processes matter for how humans (including workers, companies, governments, knowledge, expertise, power), and non-humans (e.g. technologies, tectonic plates, rivers, erosion, weathering, sand, volcanic rocks, mountains, slopes, dams, sediment control structures) interact with each other as the material world shapes our decisions (on the equipment to be employed, the nature of work and its organization). I have also emphasized how the form mining networks take is closely linked to the political realm (the politics of sand governance) and to political economic and sociocultural processes such as urban growth and the associated construction boom.

In explaining the dominant presence of PT companies in the ground, further research is necessary to investigate whether small-scale local entrepreneurs have even tried to apply for a mining permit from the relevant government authority. The “on paper” requirements to apply for a mining permit suggest that some requirements might be more complicated to meet for individuals than for companies such as the proof of funds and capital. An interviewee reported that in the past it was easier for local small-scale businesses to obtain mining licenses because they were only required to pay the administrative costs. Other people we spoke to more generally also tended to recall that it was easier to process a mining license in the past, when mining permits were issued by the government of Kabupaten Gowa.

Issues related to the belief that PT companies are in a better position than small-scale sole proprietorship businesses to undertake mining activities constitute a line of enquiry this research opens too. Once in a conversation my interlocutor said that companies act more carefully in their operations than local excavator owners/renters and that the latter do not follow any rules regarding the distance that needs to be kept from agricultural land when doing mining. A company’s staff from the locality himself, his remarks suggest a higher appreciation for and trust in mining companies than in local individuals. Thus, further research could enrich our understanding of how knowledge claims and perceptions of knowledgeability also contribute to shape mining networks.

Finally, I have not addressed in detail the process through which river sand and stones have become resources. But I do recognize that the processes by which we have come to highlight certain attributes of sand and stones, to position them as useful and valuable for certain uses (construction materials), and to assign a monetary value to them (bulky materials as opposed to metallic minerals such as gold) cannot be disassociated from the processes of shaping mining networks as the mined materials are framed in such terms.

Chapter 4. River sand and stone mining in Indonesia: Work and workers⁴⁶

4.1. Introduction

Work and workers are a constitutive part of mining networks. It is workers who, through their labour, make what we usually call “resources” out of the “things” we endeavour to find in the physical environment for our use. The emerging sand mining literature has documented that in some mining areas the workforce is local (Syam, 2016; Farahani & Bayazidi, 2018). In other cases, research has shown, the workforce is constituted by migrant workers (Lamb et al., 2019). How do we account for these differences?

The workers in the current sand and stone mining network in the Jeneberang river are local women and men. Mining activities in the Jeneberang have intensified and industrialized in the last 20 years. Moreover, mining operations have been monopolized by medium- and large-sized private enterprises and one state-owned company. Despite this, it is mainly people from the surroundings of mining sites who are employed, through different labour arrangements, by mining companies. How do we explain this?

In this chapter, I focus on the workers of the current mining network. I approach them as key components of the place-based socio-material associations I study. I see the contemporary work opportunities for locals in sand and stone mining in the Jeneberang as a dimension of the way in which the present mining network has come together. Thus, my focus in this chapter is not the present mining network as a whole, but one central aspect of it: the workers.

In the chapter I document who the workers of the river sand and stone mining network are and the work they do. I also describe various labour arrangements that exist around river sand and stone mining. In doing this, I identify different categories of workers. Namely, workers of private mining companies, workers of excavator owners/renters, manual miners, and local former small-scale miners.

In this chapter I address most of the research sub-questions that have guided my study, namely, what and who have shaped the mining network that operates in the Jeneberang? How

⁴⁶ In this chapter I have picked up some initial ideas I shared in May 2022 through a research spotlight I prepared for York University’s Faculty of Environmental and Urban Change. See: Medina de Loera, 2022.

and why have they shaped the network? What are the implications of this for local people? My answer is that the interactions between material, political, and sociocultural aspects of the area I study have shaped a mining network in which the workforce is mainly local. Specifically, I show that the interplay between the materialities of the mined river materials and the geographical area from where they are removed, the mining equipment used, the type of mining actors, personal relationships, and the politics of sand governance has shaped who can work in mining and in what ways. In this chapter, the politics of sand governance refer to pro local workers' actions encouraged by the government at different scales (Kecamatan Parangloe, Kabupaten Gowa, and Provinsi South Sulawesi). The main implication is that the workforce is mainly local. A broader implication, I argue, is that this has contributed to a lack of popular opposition to river sand and stone mining among the communities that have long lived around the Jeneberang.

I begin the chapter by explaining how I engage with the literatures on sand mining, materiality and artisanal and small-scale mining as they relate to their coexistence with large-scale mining. I briefly explain the information on which I draw for this chapter and the ways in which my research assistants and I collected it. Next, I provide additional details about the research site to supplement the information in previous chapters. This includes information about the workers in the current mining network, their work, and the labour arrangements. In the last section I examine the material, political, and sociocultural factors I deem relevant for explaining why people from the surroundings of mining sites have come to constitute the main workforce in the network.

4.2. Literatures

4.2.1. Sand mining

The emerging sand mining literature has identified a general pattern of transitions from small-scale sand mining activities to operations undertaken at industrial levels across geographies (Khan & Sugie, 2015; Narváez González & González Reyes, 2015; Athukorala, 2009; Hougaard & Vélez-Torres, 2020). Research has documented how the lives of local small-scale miners have taken different trajectories regarding their sand-mining based livelihoods: some have continued working in mining (Shitima & Suykens, 2022) while others have been

temporarily or completely displaced from mining activities. However, the reasons that help to understand the different experiences of small-scale miners is still an underexamined aspect of this research, except for a few studies that address the issue (Hougaard & Vélez-Torres, 2020; Miller, 2022) or that give insights into it (Khan & Sugie, 2015). I engage with those studies that have paid attention to the experiences of small-scale miners when mining activities become industrial. I show that in a present situation of large-scale river sand and stone mining, former small-scale manual miners continue to be part of the mining network through labour arrangements (partnerships) with companies.

In the same way, a growing body of sand mining research has shed light on the experiences of people living in the areas surrounding mining sites in terms of their employment in (or exclusion from) mining work, especially in areas that have gone through an intensification of mining activities (Syam, 2016; Marschke et al., 2021; van Arragon, 2021). Despite documenting this, the reasons that help to explain why in some geographies local people have been able to work in mining and in others they have not are an underexplored aspect of sand mining research. I build on this strand of sand mining scholarship and show that in the Jeneberang river, where mining is undertaken at industrial levels, it is mainly local people who work in mining, through a variety of labour arrangements such as employees of companies, employees of companies' partners, and companies' partners.

What was consistent across former small-scale manual miners and local people more broadly in the Jeneberang river basin is that their incorporation in the current mining network flow from the combination of “favorable” geology, “auspicious” (transformed) physical environment, “noble” river materials, accessible mining technologies, the politics of sand governance, and sociocultural dynamics.

4.2.2. Materiality

In this chapter, I also employ a materiality approach to explain the mainly local composition of the workforce of the current mining network in Parangloe. I operationalize the materiality perspective through the term “rooted networks” (Rocheleau & Roth, 2007). The concept helps mobilizing a relational understanding of agency and seeing the local composition of the workforce in mining in Parangloe as an outcome of the interaction between material,

political, and sociocultural aspects. Regarding the material dimension, the term is particularly useful for highlighting how the territories used as mining sites in the upper reaches of the Jeneberang river channel are anchored in space and grounded in socio-ecological relations (Cantor et al., 2018, p. 964). I see mining sites' fixity in space as an enabler of work opportunities for locals. As an explicitly place-based term, the idea of "rooted networks" encourages reflection on the heterogeneity of our material world. In this sense, the concept helps put in perspective the areas we study because of the situatedness of socio-ecological relations as attached to a territory.

River sand and stones are only a few of the vast diversity of materials that are mined around the globe. And the Jeneberang river is only one of the many physical environments with deposits of these sediments as these materials constitute one of the most ubiquitous in the world. As such the political economic outcomes of mining activities, and the social relationships they shape, are as varied as the diversity of both the materials that are extracted worldwide and the physical environments where they occur. Attention to the heterogeneity of physical environments enables scholars to explain variation between networks in the same mining sector and between political economic outcomes across geographies and temporalities. For instance, Marschke et al. (2021) found that the sand mining in the Mekong employs men who migrate from rural areas to pursue this work (p.6). Their findings also show that work opportunities are short-term, transient and mobile, in response to fluctuating sand resource availability along the river (pp. 6, 8). This is in contrast with my findings in the upper reaches of the Jeneberang where mining has created long-term work opportunities for some people in the vicinity. The fixed nature of the mining sites and the continuity of mining activities throughout the year have contributed to the character of these work opportunities. Both are derived from the constant availability of sand and stones due to their accumulation behind sediment control structures upstream the river channel. With this in mind, I believe that working a materiality perspective through the concept "rooted networks" can be useful to explain how in some geographies and time periods local people secure job opportunities and in other cases it is non-locals who get the jobs, although apparently mining the same "thing".

I also work a materiality framework through the concept of “affordances” (Barua, 2016). In this chapter I use the term to direct our attention to the ways in which the non-living has “afforded” local people the possibility to work in river sand and stone mining. I show that the properties/characteristics of the Jeneberang’s upper reaches, and of river sand and stones make the difference for locals to find work and/or being employed in mining. Rather than properties intrinsic to the river, the sand and the stones, the characteristics I analyze are those relevant to the skills, knowledges, and technologies required for work in mining. As noted in Chapter 3, these properties are originated in the very moment of the interaction between the non-living and human labour.

4.2.3. Artisanal and small-scale mining

In this chapter I engage with and seek to add to a strand of the literature on artisanal and small-scale mining (ASM) that has analyzed the interactions between this type of mining activities and large-scale mining (LSM) within a shared physical environment. This body of work has documented a general pattern of conflicts, tensions, competition and uneasy relationships between LSM and ASM (Hilson, 2002; Aubynn, 2009; Pedersen et al., 2019; Hougaard & Vélez-Torres, 2020; Lahiri-Dutt et al., 2021; Libassi, 2024), something that contrasts with my findings in the area I study. Scholars have pointed out that ASM miners have less recognition and rights (Lahiri-Dutt et al., 2021, p.4), are largely disadvantaged, and face many challenges when it comes to the process of formalizing and legalizing their activities (Hougaard & Vélez-Torres, 2020 p. 84). Large-scale mining has been favoured, by different government levels (Hilson, 2002; Luning & Pijpers, 2017; Hougaard & Vélez-Torres, 2020; Lahiri-Dutt et al., 2021), although not homogeneously. Where large-scale mining has been favoured, LSM and ASM have worked out arrangements that have improved relations between them (Hilson, 2002), have secured access to ASM miners (Luning & Pijpers, 2017), and have accommodated ASM on LSM concessions (Aubynn, 2009). These arrangements take diverse forms and are shaped by both politics at various scales and geological conditions that make certain deposits suitable for small-scale mining. Examples of these arrangements include that LSM and ASM are located within a shared physical environment but target different deposits (Hilson, 2002; Luning & Pijpers, 2017), ASM are

awarded certain areas of the concession and become suppliers for LSM (Hilson, 2002), ASM are absorbed by LSM and experience proletarianization or LSM adopts a “live and let live” approach (Aubynn, 2009).

The ASM literature helps me think of reasons that explain that in the Jeneberang the relationship between ASM and LSM does not seem to be conflictual. Researchers have shown that conflicts between ASM and LSM develop because of reasons that include divergent views of land ownership in a mining site area (Aubynn, 2009); legislation that favours LSM and displaces ASM (Hougaard & Vélez-Torres, 2020); legislation that favours ASM but without political will to enforce this legal framework (Aubynn, 2009); or the eviction and dispossession by LSM. The literature has also identified that when ASM and LSM have been able to coexist or have attempted to do so, this has involved ASM’s legalization (Lahiri-Dutt et al., 2021) or that LSM accepts presence of ASM (Aubynn, 2009). I draw on all these ideas to identify the material, political economic, and sociocultural reasons that help to understand why in the Jeneberang there does not seem to be any confrontation between ASM and LSM. I explain below the main reasons behind this. But first I will revisit some characteristics of ASM and LSM in river sand and stone mining in the Jeneberang.

As I mentioned earlier in the dissertation, in the Jeneberang there are very small, small and large-scale mining operations. Very small-scale mining (artisanal mining from now onwards) is undertaken by manual miners. Small-scale mining is conducted by excavator owners/renters, and large-scale mining is done by private mining companies. The state-owned company is also engaged in LSM despite not owning any mining equipment. It partners with several excavator owners/renters in all the three mining sites it controls. Due to this, the state-owned company mines large volumes of sand and stones. In this sense, its operations can also be considered as LSM. But the state-owned company’s LSM activities are made possible only because of its partnerships.

ASM refers to low-tech, labour-intensive mining. But here I distinguish between artisanal miners (manual miners in Parangloe) and small-scale miners (workers of excavator owners/renters) based on both their mining method (manual/non-mechanized versus excavator/mechanized) and the average cubic meters they reported mining per day (21-35 m³

removed manually and 36-120 m³ by excavator owners/renters). I also distinguish between small-scale mining (undertaken by the workers of excavator owners/renters) and large-scale mining (conducted by the private companies and the state-owned one) based on the scale of extraction they reported (36-120 m³ removed by excavator owners/renters and 200-1400 m³ by companies), and not on the type of mining equipment used, as they both rely on excavators. There are differences, however, in the total number of excavators they own and put to work and the size of the workforce they employ. Moreover, most of the companies do stone crushing.

Just as the case that Luning & Pijpers (2017) documented in Ghana where gold ore bodies were suitable for different scales of mining, the sand and the river in the Jeneberang are suitable for ASM and LSM. My empirical findings show that ASM and LSM in the Jeneberang coexist. They have been able to coexist in a generally calm and non-conflictual environment for three reasons: 1) mining actors that have access to a mining site but do not have their own mining equipment and workforce have absorbed most of the ASM miners such as excavator owners/renters and manual miners. Most of them would have otherwise been displaced from mining or would have potentially overlapped with areas where companies conduct LSM; 2) the large and even availability of sand and stones along approximately 15 km upstream the river channel make the mining sites controlled by ASM's partners not distinct from mining sites controlled by LSM companies; 3) site-specific dynamics between corporate power and communities in the Jeneberang facilitate artisanal miners can continue to make a living and/or to obtain material benefits from mining. The existence of divergent views of land ownership is an area for potential further research that would strengthen the ideas that I develop below, but my field observations for now lead me to think that it is not the case in the Jeneberang.

Regarding the first reason, manual miners (artisanal miners) and excavator owners/renters (small-scale miners) in the Jeneberang partner with the state-owned mining company, or with a private Limited Liability company, or with two out of the three private mining businesses that I classified as sole proprietorship in Figure 3.1 in Chapter 3. These three mining actors count on their access to a mining site and require workforce and mining equipment to exploit

it. The form that their partnership takes is one where ASM pay a fee to the companies because these firms are the ones who officially control the mining sites as materialized in a mining license or in their *de facto* control of the mining site, regardless of whether they have been officially granted mining rights or not. The existence of these partnerships has resulted in the employment of ASM in specific mining sites. I conclude that the existence of mining actors with access to a mining site but without workforce and equipment has contributed to a situation where ASM miners do not mine within the sites of LSM private companies, except for those which they partner with. During fieldwork, I did not explore the process through which partnerships with ASM were established but I witnessed that they seemed to work smoothly. I perceived collaboration and complementarity in these partnerships, which has also served to discourage ASM overlap with the land area used by LSM private companies. A couple of questions that remain to be examined are why the state-owned company does not have its own mining equipment and employ personnel to operate them and if the state-owned was deliberately designed to function through partnerships with local workers.

In relation to the second reason, the (transformed) material features of the river channel have contributed to the availability of large amounts of sand and stones somewhat evenly distributed along the river channel. This means that the mining sites that ASM's partners control are not distinct from mining sites controlled by LSM companies. For this reason, there is neither a preference for accessing one site over other nor competition for access to one specific site. The geographical distribution of mining sites along the river channel also contributes to this. In this regard, the state-owned company, which controls the largest mining sites in Parangloe, has a presence in three different sections of the river channel--the upper, middle, and lower sections. This has spread opportunities for ASM throughout the river and has discouraged them from mining in sites controlled by LSM private mining companies.

The third reason is specific to manual miners who remove stones in mining sites controlled by two private mining companies (LSM) that also do stone crushing. My ideas about this are based on what I saw happening with two companies. I witnessed that the access of manual miners to these sites is not conditioned upon payment of a fee in exchange for manually exploiting the sites. Through these cases I see that artisanal miners and LSM coexist.

Thinking economically, a group of manual miners does not pose a serious threat to these companies as the volumes a single group mines is very small. However, there are several groups of manual miners constantly removing materials in a single day. Going beyond this economic rationale, I see signs of a moral engagement between these LSM companies and artisanal miners. However, this moral relationship does not seem to extend to small-scale miners (excavator operators/owners) as suggested by a billboard hanging outside one of this companies to remind excavator operators that they were banned from operating there. Later in the chapter I elaborate on this and in Chapter 5 I examine what I see as moral relationships between companies and local people.

4.3. Research Methods

For this chapter, I mainly draw on the surveys we conducted with eight out of the 18 mining companies we identified in the field, and on the surveys that we conducted with 58 workers directly involved in the processes of river sand and stone mining, stone crushing, and the transportation and distribution of sand and both naturally occurring and crushed stones.

The surveys with companies addressed the topic of their workforce. Specifically, we asked about the total number of workers they employed, the different job positions available, the gendered composition of their workforce, the required skills for workers, the type of labour relationship the company offers to workers in terms of temporality (permanent or temporary), and the geographical origin of their workforce.

The surveys with workers added more detailed information to the general picture companies gave us. The surveys with workers focused on demographic aspects (age, origin, religion, ethnic group, level of education, etc.) and on issues related to their current work situation (job history, job position, income, working conditions, family connections, etc.).

The chapter also draws on the semi-structured interviews we did with seven mining companies (six out of the eight surveyed companies and one non-surveyed), and on the semi-structured interviews we conducted with 10 workers. The interviews with companies enabled us to better understand their relationships with workers and explore the reasons behind their decisions to employ local people, either from the surroundings of mining sites or from

Parangloe in general or from Kabupaten Gowa and other parts of Provinsi South Sulawesi more broadly. The workers we interviewed included people who worked for the state-owned company, people who were employed by private companies, female and male manual miners, and excavator owners. We also had conversations with workers employed by excavator owners/renters. Interviews with workers shed light on their work histories and their work conditions.

I also draw on the semi-structured interviews we conducted with Kecamatan Parangloe's head, Kelurahan Lanna's head, Desa Bontokassi's head, and Desa Lonjoboko's head. These interviews revealed important information about the role of the Indonesian government at the local level in shaping the participation of local people in river sand and stone mining in the Jeneberang. In the field, we were able to see a few mining licences which shed light on the written obligations of permit holders towards the local people in terms of employment.

Finally, the chapter also draws considerably on participant observation and on the many informal individual and collective conversations my research assistants and I had with people in Parangloe, which took place in or around mining sites.

4.4. Research Site

As mentioned before, Parangloe is a hilly rural area, and the main livelihood people lead is agriculture. As of 2023, approximately 20,000 people lived in Parangloe. By the time of my field work in 2019 I collected information that showed that 17,500 people lived in Parangloe in 2018. Out of 10,500 people actively working (it is 60% of the total population), around 4,000 worked in agriculture (it is 38% of the people actively working). People cultivated rice, corn, cassava, peanuts and a variety of vegetables and fruits, including cocoa. A few people led fishing livelihoods (around 100), some were traders (700), others were entrepreneurs (1,500) and others made a living as casual labourers (2,200).⁴⁷ Many people combined different livelihood strategies, so that the approximately 4,600 households residing in

⁴⁷ I gathered this demographic data from a wall journal displayed in Kecamatan Parangloe government office in 2019. The information corresponds to 2017-2018. Due to the logo printed on the wall journal, I deduce it was demographic information that the National Population and Family Planning Board (BKKBN for its initials in Indonesian) asked the government of Kecamatan Parangloe to collect.

Parangloe in 2019 produced a complex social environment that involved a variety of economic activities (Badan Pusat Statistik Kabupaten Gowa, 2021). This continued to be the case by late 2022.

As mentioned in previous chapters, the mining of river sand and stones has been a source of jobs and cash for some people in Parangloe since at least the 1960s. But the mining network my research assistants and I came to know in 2019 —and whose continuity I confirmed in 2022— started to emerge in the early 2000s.⁴⁸ In the present network, the state-owned company PD. Jasa Konstruksi, several private mining companies —13 Limited Liability (PT), 1 Limited Partnership (CV), 3 Sole Proprietorships— excavator owners and renters, and manual female and male miners remove sand and stones from the active channel of the Jeneberang. However, as shown in Figure 3.3 in Chapter 3, only the state-owned and the many private mining businesses have access to mining sites. Manual miners and excavator owners/renters —who employ their own workforce— partner with the companies or individuals to access the mining sites they control. The corporate structure and the dynamics of access to mining sites are key for understanding how local people work in mining through different labour arrangements.

4.5. Workers of the river sand and stone mining network and their work

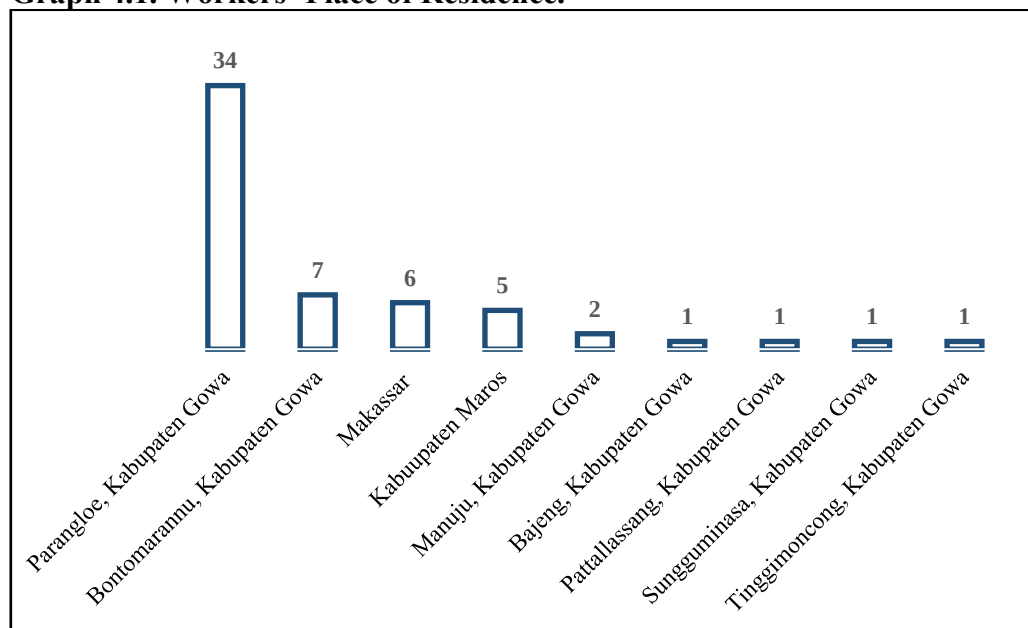
I estimate that as of 2019 sand and stone mining in the Jeneberang employed at least around 720 people. My calculation is based on the surveys and interviews we conducted with mining companies and on what people told us about manual miners. Who are these people? The workforce of the current mining network in the Jeneberang is constituted by local people. By local I mean that workers live mostly in Parangloe, but also in other parts of Gowa or in different kabupaten within South Sulawesi. Mining in Parangloe has not attracted a foreign workforce.

Graph 4.1 below shows that 34 workers, out of 58 we surveyed, said they lived in Parangloe. Out of the remaining 24 surveyed workers 13 lived in other parts of Kabupaten Gowa, 6 lived

⁴⁸ Surveys with mining companies revealed that one out of the eight surveyed companies started mining operations in the upper reaches in the late 1990s, four companies started to operate in the area in the first decade of 2000s, and the remaining three companies started operations in the second decade of 2000s.

in Makassar, and 5 lived in neighbouring Kabupaten Maros. All of them had homes within the area of Provinsi South Sulawesi and close to Parangloe. From the perspective of workers, the proximity of their homes to their workplace was important in their decision to work in mining, especially for those living in Parangloe. Several of the workers (12) we surveyed mentioned this as their reason to work in their current job.⁴⁹

Graph 4.1. Workers' Place of Residence.



Source: Figure created by author.

The workers of the river sand and stone mining network in the Jeneberang are mostly men who are between 20 and 60 years old. But there are women too. For instance, it was mainly women who in 2019 did administrative work in the companies' offices located in the mining sites. Several mining companies had their headquarters in Makassar and, based on what I observed, workers in the headquarters were mostly women too. Some women also work as manual miners.

The workforce of the mining sector in the Jeneberang is quite homogenous in terms of ethnicity and religion. The majority (47) of the workers we surveyed identified themselves as Makassarese, and all of them said their religion is Islam. When it comes to the highest

⁴⁹ This was the second most mentioned reason.

level of education completed, the workforce is more diverse. Most of the workers we surveyed (29) had completed High School. Educational attainment is a relevant demographic feature of the workforce as it sheds some light on whether workers have received specialized training for their jobs in the mining sector. Table 4.1 shows a summary of the profile of workers that surveys shed light on.

Table 4.1. Profile of the workforce

GENDER	Female	4
	Male	54
	Total	58
AGE	<20 years	5
	20-29 years	12
	30-39 years	16
	40-49 years	11
	50-59 years	11
	60 years and above	3
	Total	58
ETHNIC GROUP	Bugis	7
	Makassar	47
	Bugis-Makassar	3
	East Nusa Tenggara	1
	Total	58
RELIGION	Islam	58
SCHOOLING	No schooling	3
	Elementary School	7
	Junior High School	11
	High School	29
	Vocational School	4
	Bachelor Degree	4
	Total	58

Source: Table created by author.

People who work in mining in Parangloe work as manual miners, excavator operators, loader operators, stone crusher operators, drivers⁵⁰, supervisors, mechanics, administrative staff,

⁵⁰ There were drivers who worked for mining companies; they took the material from the mining site in the river channel to the storage/processing site that was close by. In the case of two companies their divers also took the material to Makassar or other areas where they did construction work. There were other drivers who

and watchmen. In no way is this list exhaustive, but it does provide a general sense of the diversity of work people do. Moreover, the broad spectrum of job positions shows that locals are not exclusively employed for removing sand and stones from the river channel.

Some workers are employed directly by the private mining companies that started to arrive in the area in the early 2000s and mostly undertake large-scale mining. Other workers are employed by excavator owners/renters who are engaged in small-scale mining. In both cases, workers are paid by their respective employers. As I mentioned in Chapter 3, excavator owners/renters partner mainly with the state-owned mining company PD. Jasa Konstruksi or with private individuals who have access to a mining site (which I refer to as landowners in Chapter 3). Thus, mining in the Jeneberang has created livelihood opportunities not only for those directly employed by private mining enterprises, but also for excavator owners/renters, and the excavator operators and watchmen who work for them. Excavator owners/renters employ an operator and a watchman for each excavator. Watchmen register the total number of trucks that excavators load with materials. In 2019, there were approximately 20 excavator owners/renters who partnered with PD. Jasa Konstruksi, as told by a PD. Jasa Konstruksi's employee: 11 operating in the company's largest mining site, five in its second largest site, and four in the smallest.

In the same way that the mining sector in Parangloe has encouraged people in the area to acquire and rent excavators (interviews and conversations), it has also encouraged them to buy or rent dump trucks and participate in the transportation of river sand and stone materials (Sari, 2014; conversations).⁵¹

Although the state-owned PD. Jasa Konstruksi does not own excavators and does not employ the workforce to operate them, it does employ people from Parangloe to supervise mining operations and record the total daily production. In addition to this, the company has its own employees who visit mining sites everyday.

went directly to mining sites to buy river sand and stones and transported them somewhere else in Makassar and surroundings. Some of these drivers owned the dump trucks they drove.

⁵¹ By 2013, there were around 20 people in Parangloe who had bought a dump truck; there were around 26 trucks, most of them Toyota Dyna but there were also Mitsubishi Colt (Sari, 2014, pp. 68-69).

The workforce of the mining network in the Jeneberang is also constituted by manual miners, including women and their entire families. As I explained in Chapter 3, manual miners partner with companies and individuals who have access to mining sites. This relationship entails that most of the time manual miners pay a fee to them. Manual miners get their income out of the money they get paid by their customers. In some cases, a group of manual miners waits in mining sites for potential customers. In other cases, customers call them by phone in advance and either pick them up or meet them in the mining site. In other cases, customers *impromptu* show up at miners' homes on their way to mining sites.

Workers of river sand and stone mining in the Jeneberang also include a group of local former small-scale miners (*ex penambang*). I elaborate more on them in Chapter 5. For now, suffice it to say that they are a group of individuals who used to do sand and stone mining in an area of the today river channel where their former land was located. Today, their former land is part of the mining area that the state-owned PD. Jasa Konstruksi controls. These individuals used to use their former land as mining sites before the state-owned PD. Jasa Konstruksi started its operations in the early 2000s. Due to Bili-Bili dam's construction in the 1990s, their former land was submerged. The company provides them with cash income on each sale it generates which I see as a sign that PD. Jasa Konstruksi has recognized this group of individuals' former access rights. Thus, although former miners are not longer an active part of the workforce, I do consider them as workers of the sector because they both take turns supervising mining operations and keep receiving an income from it.

Thus, the workforce of the mining network includes workers mining companies employ, workers excavator owners/renters employ, manual miners, and former small-scale miners. I present a summary of these categories of workers and their characteristics in Table 4.2 below.

Table 4.2. Current labour arrangements in river sand and stone mining in Parangloe

Worker category	Type of labour arrangement	Description	Type of relationship as it refers to income/salaries	Scale of mining
Workers of private mining companies	Wage labour: Direct labour relationship with a private mining company	Private mining companies employ workers who operate excavators and stone crushing machines (in some cases), bring the materials from the river channel to their premises (in some cases), do administrative work, and so on	Workers receive a monthly income from private companies	Large-scale or industrial mining
Workers of excavator owners/renters	Wage labour: Direct labour relationship with excavator owners/renters	Excavator owners/renters employ workers who operate the excavators and workers who register the number of trucks that excavators load with materials everyday	Excavator operators receive a daily income from excavator owners/renters based on the total number of trucks operators can load with materials in a day	Small-scale mechanized mining
Excavator owners/renters	Self-employed	Excavator renters pay a fixed amount of money to excavator owners for each sale they make (per truck loaded)	Excavator renters make a profit for each truck loaded, and after subtracting costs incurred such as the labour of excavator operators, the rent of the equipment, and operational expenses such as diesel.	Small-scale mechanized mining
Manual miners	Self-employed	Manual miners partner with companies and individuals who have access to mining sites. The partnerships entails that most of the time manual miners pay a fixed fee to companies and	Manual miners make money for each truck they manually load with materials Manual miners receive money from trucks' drivers who are the buyers of river sand and stones	Very small-scale manual mining or artisanal mining

		individuals who have control over mining sites		
A group of local former small-scale miners	Redistributive relationship: Direct relationship with the state-owned company based upon an agreement according to which the state-owned company channels economic benefits to them	Based on an agreement with the state-owned company, this group of local former small-scale miners receives a fixed proportion of each sale the state-owned company makes from its mining operations in the largest mining site it controls in Parangloe. In a way, this suggests that the state-owned company has recognized and enshrined these individuals' former access rights in the agreement.	A group of local former small-scale miners receives a fixed proportion of each sale the state-owned company makes	No mining is necessary for them to engage in a redistributive relationship with the state-owned company

Source: Table created by author.

But mining in Parangloe has also created livelihood opportunities for others who work in the mining sector indirectly. This is the case, for example, for the women who work in some mining sites running their own food stalls. Outside mining sites, there are also countless food stalls owned and operated by women. They are located along the main road (Poros Sungguminasa-Malino road) that connects Parangloe to Sungguminasa (Gowa's capital) and to Makassar. Other people in the vicinity of mining sites derive material benefits from each dump truck that passes through what in the past used to be their land and currently is part of the unmade road that connects the mining site to Poros Sungguminasa-Malino road. I elaborate more on them and on their participation in the mining network in Chapter 5.

The information we gathered about the seniority of surveyed workers revealed that work in mining has tended to be long-term. This suggests that employment in the sector — in any of its forms— has been stable. Table 4.3 below shows that half of the workers had worked in

the sector for between 5 and 14 years. Long-term and apparently stable labour relationships also suggest that workers did not have a predetermined end date to their employment. However, they did not have any guarantee that they would be permanently employed either, although some surveyed workers commented that they will be working in the industry as long as there is work for them to do.

The time that workers have been working in mining also suggest that the livelihood opportunities in the sector seem to offer certainty in terms of a continuous access to them. The case of excavator operators who work for excavator owners/renters helps to illustrate this continuity, despite the small variations they experience. Some excavator operators to whom we talked mentioned that they have worked for various excavator owners/renters and that they have changed employers because it has happened that excavator owners sell their excavators, or that the excavators are broken and need repair, or that owners/renters abandoned the business.

Table. 4.3. Seniority of workers

Seniority	Num. of workers
<1 year	13
1-4 years	12
5-9 years	15
10-14 years	15
15-19 years	2
30-34 years	1
Total	58

Source: Table created by author.

It also was common to hear that workers worked in the sector years ago and they had recently re-joined or that they stop working if another job opportunity comes up and eventually, they go back to mining. Some responses in the surveys also shed light on this flexibility of work in mining, in terms of mixing periods when workers stop working and periods when they are reabsorbed by mining activities. Out of the surveyed workers, for those who were engaged in labour arrangements other than a direct labour relationship with a mining company, work in river sand and stone mining was more likely to be either seasonal or occasional as it was

mixed with work in agriculture. Agricultural activities were a source of cash income for some, a food source for others, and for others they were both. Thus, for many workers, mining is not the only economic activity they undertake.

The livelihood opportunities mining in Parangloe has created are at the intersection with the socioeconomic inequalities that existed in the area. For instance, access to owning an excavator is limited to those who, in Parangloe and in Gowa more broadly, can afford it or have access to credit to buy it. The price of a brand-new excavator is around USD\$ 88,000 (conversations).⁵² Access to a rented excavator is more contingent on people's social networks.

There are also inequalities in the material benefits people in Parangloe derive from mining. This is true across categories of workers and types of labour arrangements. For instance, manual miners receive around USD\$ 14.00 per dump truck they load, and they distribute this amount among the total number of workers who participate (conversations). Their daily income depends on the number of trucks they load which is usually between three and four or between five and seven if there are many. In contrast, the highest monthly income two participants reported in surveys was around USD\$ 1,400; one of them owned two excavators and the other owned a dump truck which he also operated.

These income differences also show that there are some for whom work in mining meant earning a monthly wage and others for whom the cash income they derived depended on how much river materials they sold. The surveys also suggest that people who worked for excavator owners/renters had higher monthly incomes than workers in other labour arrangements, including those who worked directly for a mining company. Among workers hired by mining companies, those who worked as managers or administration received the highest incomes, when compared to other job positions in the same type of labour arrangement. Wages were also differentiated across gender. Women earned lower wages than men who had the same job positions (admin).

⁵² Exchange rate as of April 2023.

For almost all the surveyed workers (52) their job in river sand and stone mining was their main source of cash income, but for almost half (23) it was not their only source. Among these, for almost half of them (10) their additional source of income was agriculture, showing the still predominant role agricultural activities have in the area. And four out of the 23 obtained additional cash income from activities related to mining (three from selling river materials and one from doing manual mining when not working in his job). Many (15) of the surveyed workers explained that the reason why they joined the mining sector was “to meet daily needs”/ “to make ends meet”/ “to increase income”. This was the reason mentioned the most by respondents.

In the following section I identify and analyze the material, political, and sociocultural factors that help to explain that local people work in mining in the Jeneberang. In other words, that local people are a constitutive part of the current mining network. Attention to the interactions of all these dimensions can be helpful to more holistically explain why mining networks come together in particular ways, enabling the participation of locals in the case of Parangloe.

4.6. The shaping of a key component of the current mining network in the Jeneberang: the workforce

4.6.1. Material aspects

The material features of the mining network in Parangloe that have contributed to shape the participation of locals in mining include the “natural”, although human-enhanced, traits of the Jeneberang river and its basin, and human-made transformations in the river channel. Regarding the first, the combination of tectonic activity, meteorological factors, and slope stability and steepness, dislodges rocks from the hilly areas of the Jeneberang basin. As I explained in Chapter 3, the upper reaches of Jeneberang produce sediments and debris runoff by hillside collapses and terrace scarp erosion. As a result, there is a high deposition of materials in the river. This can be seen as “favourable” geology for the development of a mining network. Moreover, sediments of large grain size such as boulders and stones of different sizes congregate in the upper reaches because of their proximity to the mountainous area where they are produced. These rocks are weathered and eroded by the powerful force of water which turns them to sediments of smaller grain size like sand. Parangloe is located

in the hilly areas that are the foothills of the mountains where the Jeneberang river originates. Parangloe people thus live in an area where there are sediment deposits.

On their part, human interventions in the river channel, in the form of Bili-Bili dam and the sand pockets, have enhanced the processes of sediment accumulation in the riverine part of Parangloe. As I explained in the previous chapter, the sand pockets trap many of the sediments produced upstream in the river basin. By retaining sediments behind them, these structures have boosted the availability of sediments deposits in the upper reaches and have facilitated their concentration in a few locations distributed along this section of the river channel.⁵³ Due to this, the sand pockets have made possible the establishment of mining sites that are geographically concentrated, immovable, and enduring. The fixed qualities of sites have made that mining activities are strongly localized geographically. This, I argue, has driven the need for having a local workforce. Thus, mining in Parangloe is not only localized in terms of the geographical space, but also in terms of the workers employed. Moreover, it is also strongly localized as it refers to the mining companies that operate there and the mechanisms to both prevent and resolve tensions when they arise.

The material dimensions of the mining network in Parangloe also include the sediments of different grain size that congregate in the upper reaches. How have the characteristics of the sand and stones from the Jeneberang contributed to shape that the workforce in the mining sector is local? I focus on the features of naturally occurring river sand and stones that are relevant for their identification, for their removal from the active channel of the Jeneberang river, and for their sale in the local market. These are properties that impact the technologies, knowledges, skills, and workforce required to find them, to remove them from their milieu, and for transporting and distributing them to neighbouring areas of Parangloe. These properties are characteristics that are defined in the river materials' relationships with humans, their labour, their needs and their wants.

The visibility of sand and stones in the Jeneberang has shaped who can work in mining. By the formation of sediments deposits, sand and stones are easily identifiable. In the case of

⁵³ The present damaged/broken conditions of sand pockets, however, challenge the retention and concentration of sediments behind them.

stones, their large size further enhances their visibility. Sand and stones' perceptibility cannot be disassociated from the "natural" and human-induced characteristics of the river and its basin. The river seasonality makes the visibility of materials in the active channel to fluctuate. During the dry season sand and stones can be seen with the naked eye. This is also true for most of the rainy season as water levels are constantly changing. I witnessed a high variance in the water levels during my visit in November-December 2022, but the water level remained generally shallow enough that materials are visible. I have not been to the area in the peak of the rainy season (January), but people reported both that mining activities are undertaken all year round and that they occasionally stop during this month of maximum rainfall. This means that even in January there are times when the water level is shallow enough for trucks and excavators to be in the river channel. The shallowness of the water is favorable for the visibility and identification of sand and stones. The sand pockets have come to enhance their visibility as these structures have favoured that the materials congregate behind the structures.

That sand and stones are visible to the naked eye in the Jeneberang has meant that no specialized knowledge and technique are required to find them. More importantly, exploration and detection technologies are not necessary either. According to a company's staff whom we interviewed, no one conducts a special study for assessing sand and stone resources in the river, they only figure out where sediments have accumulated through visual examination. This contrasts with gold mining, for example, where extractability is assessed by calculating if ore deposits can be mined in a feasible way and how (Luning & Pijpers, 2017, p. 764). All this has made the localization of river sand and stones very accessible for Parangloe people (as it is for companies). For those who are self-employed such as manual miners and excavator owners/renters, it also means that the process of locating the materials is accessible in terms of not needing any financial investment to find them.

Sand and stones' availability in the Jeneberang is another characteristic of these materials that has influenced that the workforce is local. This feature is manifested in several ways. One has to do with their naturally occurring provision. By the time workers see them in the river channel, rocks have already been dislodged, weathered, and turned to sediments of

smaller grain size. Sand and stones have already been transported from the source area to the locations where workers see them settled and congregated. This aspect of their availability refers to the liveliness of the Earth; the processes by which sand and stones are naturally supplied. The implication is that no human labour is needed to separate or remove rocks from their source sites (as it happens in some instances of metallic minerals mining where minerals are removed from a natural ore). Human labour is not needed to cut stones and give them a rounded form either.

Sand and stones are also readily available in another sense. By their contact with the force of water, they have been naturally cleaned and freed from organic matter, clay, and silt. Thus, almost no human labour is necessary to ensure their cleanliness. This means that no purification processes for obtaining the to-be-sold materials is necessary. The “almost” above refers to the fact that sand is washed during the process of removing it from the river channel as water is used for the excavator bucket to scoop the sand out from the riverbed and place it in the truck. The riverbed is not a flat uniform surface; puddles and dry areas dot the uneven bed. I witnessed how excavators work in and around puddles to first loosen the compacted sediments of small grain size (sand) that lie in the riverbed. Once loosened, the excavator bucket pushes the sediment to the puddle from where the excavator will grab them.

In a very simplistic way, mining in the Jeneberang consists of going into the river channel, picking a location and loading trucks with the materials requested by customers. This means that mining work does not demand specialized knowledges and qualifications from workers which shapes that job opportunities are accessible for low-skilled local people. Certainly, the use of excavators demands specific abilities to operate them. But manual work and other activities that revolve around mining (e.g. supervisory, administrative) can be undertaken by unskilled workers.⁵⁴ Mining in the Jeneberang is thus characterized by a certain degree of

⁵⁴ Surveys showed that some local people have developed the required specialized skills —such as the ones to operate an excavator— by their previous work experience in similar jobs, others have been able to acquire specific abilities as they worked in the industry as helpers, and others are employed by the industry without having developed any specific skills at all.

flexibility in terms of required skills of its workforce. This includes that the sector also can absorb entry-level workers.

Mining in the Jeneberang, however, does demand the knowledges that Parangloe people have developed over time. These are not limited to the know-hows of sand and stone removal, but include knowledges associated to the temporalities of mining, meteorological factors, the seasons, the river channel, the riverbed, the market (e.g., prices, costumers, excavator owners/renters), and so on. In the case of manual miners, mining also demands physical strength, good physical condition, and strenuous physical exertion from them.

Another way in which sand and stones' availability is manifested has to do with how sand and stones settle and congregate in the upper reaches. As mentioned in the previous chapter, sediments of big grain size do not travel very far from the source where they are originated. Moreover, the sand pockets have contributed to retain the materials in the riverine part of Parangloe. They have also facilitated that the materials remain in the area. This makes river sand and stones readily available in the sense of the existence of human-enhanced sediment deposits that are geographically fixed, although not immovable and permanent due to the combination of a dynamic Earth and human processes that alter sediment flows.⁵⁵ So far, these sediment deposits have been long-lasting (20-25 years) through cycles of a constant "natural" production of sediments and their transportation throughout the river channel. Thus, there has been a constant availability of sand and stones in Parangloe. Together, the fixity of sediment deposits in the upper reaches and their enduring characteristics have shaped mining sites that have the very same qualities. The continuity of industrial mining activities in Parangloe since they first started in the early 21st century evinces the fixed and persisting features of mining sites in Parangloe. The qualities of mining sites have strongly influenced that the workforce of the mining sector is mainly local in composition.

Parangloe and its (mainly agricultural) communities did not result from the development of mining activities in the area. It is not a mining town, in that sense. Parangloe people already lived there by the time mining activities at an industrial scale started in the area. More

⁵⁵ Other human-led processes, like deforestation in the mountainous area, have contributed to the availability of the materials in the river. Deforestation increases sediment deposition in the river.

importantly, local people were already doing mining by then. For companies that launched their industrial mining businesses in the area in the early 2000s, this meant that just as there were river materials readily available, there were also people (potential workers) readily available. In addition, there have not been many livelihood opportunities outside the agrarian sector, so that surplus labour was available when industrial mining started to develop in Parangloe.

In the case of workers with private mining companies that undertake what I consider large-scale/industrial mining, the combination of three main things partially explains what has shaped the decision of these firms to employ Parangloe people. These are first, the availability of workers; second, the type of workforce needed by these mining businesses; and third, the accessibility of the sector to Parangloe people, as most positions do not require training and specialized skills. When it comes to workers with excavator owners/renters and those who are manual miners who undertake small-scale and artisanal mining respectively, the accessibility of river sand and stone mining in skills and financial terms also helps to partially explain that the workforce in the present mining network is local. But to offer a more site-specific and comprehensive picture of this it is necessary to add to this explanation some sociocultural and political factors that have mattered and which I explain later in the chapter.

The material aspects of the mining network also include the technologies used. In the case of the activities to remove materials from the riverbed, the equipment used are excavators. Their selection and use in the Jeneberang have been shaped by the material features of the (transformed) geographical space and the river materials people in Parangloe are interested in removing. In the case of transportation technologies, there are some companies that own the trucks they use to transport the mined materials from mining sites in the river channel to their (processing and storage) facilities in Parangloe. For processing technologies, there are some companies that have stone crusher machines. The material features of these technologies, as they relate to the skills and knowledges workers need to possess (or not) to operate them, have contributed to how the workers in the sand and stone mining sector are mainly Parangloe people.

Workers do require certain abilities to operate excavators and stone crushers. However, the development of the necessary skills is quite accessible as workers can learn them in Parangloe through fellow workers. The pre-existent social relationships with which workers come to the workplace and continue to develop in the workplace facilitate coworkers to teach each other. Moreover, companies have developed corporate mechanisms to train future mining equipment operators and mechanics, and so on. For instance, we learned that some companies not only employed excavator operators, stone crusher operators, and mechanics, but also their respective helpers. This is a way for current helpers to learn the know-how and get professional experience. Furthermore, the technologies used in Parangloe require a set of skills that are ordinary in the sense that, for example, current operators of excavators worked as drivers before. Their driving skills facilitated this transition. Table 4.4 below displays the present and previous jobs of some of the workers we surveyed. The table includes only respondents who said their current job position involves the operation of any of the technologies I mentioned above. It shows that skills and abilities required to operate the equipment used in Parangloe are very accessible to local people, including to entry-level workers.

The material aspects of the mining network in Parangloe, however, have not only influenced the local composition of the workforce. They have also shaped the coexistence of both different labour arrangements and different scales of mining, a topic I discussed in an earlier section of this chapter (section 4.2.3. Artisanal and small-scale mining).

Table. 4.4. Professional background of present operators of mining technologies

	Current job	Previous job
1	Excavator operator	Dump truck driver (and student)
2	Excavator operator	Dump truck driver
3	Excavator operator	Excavator operator (for 11 years, wood & coal)
4	Excavator operator	Unemployed
5	Excavator operator	Driver, mechanic, helper of excavator operator
6	Excavator operator	N/A
7	Excavator operator	Firefigther
8	Loader operator	Unemployed
9	Loader operator	Driver
10	Loader operator	Helper in river sand and stone mining (in a company)
11	Loader operator	Loader operator (coal)
12	Loader operator	Student
13	Stone crusher operator	Mason (for 10 years)
14	Stone crusher operator	Student
15	Stone crusher operator	Mason
16	Stone crusher operator	Excavator operator
17	Stone crusher operator	Unemployed
18	Head (stone crusher)	Mechanic (marble)
19	Helper (stone crusher)	Farmer
20	Head (stone crusher)	Stone crusher operator
21	Dump truck driver	N/A
22	Dump truck driver	Mason, farmer
23	Dump truck driver	Driver (expeditions)
24	Dump truck driver	Dump truck driver

Source: Table created by author.

I do not intend to over-emphasize or over-state the no need for training as a characteristic specific to small-scale river sand and stone mining as it happens in the Jeneberang. No need for training is a characteristic that applies to all small-scale and artisanal mining. But when compared to the mining of other materials such as gold, copper, nickel, or sulphur, for example, there are differences regarding the process of finding these materials, obtaining them in their natural occurring form, and in the phases of transformation to convert them into

usable form.⁵⁶ In some cases, obtaining them exposes workers to risk of death (see Peluso, 2018). There are also differences in terms of their propensity and velocity to generate wealth (Hilson, 2002, p.151). Sand and stones, as found in the Jeneberang, do not require a prospecting phase. Moreover, except for the process of stone crushing to obtain stones of different sizes, the naturally occurring sand and stones in the Jeneberang do not go through any process of transformation. They are sold and they can be used in their natural occurring forms and conditions. Thus, when manual miners and excavator operators remove sand and stones from the river channel, they remove them in their usable form. These materials are low-cost and bulky.

That unskilled workers can do sand and stone mining in the Jeneberang even with their own hands also contrasts with the technical specialization, the technological equipment, and the heavy-duty machinery necessary to remove other rocks used in the construction sector such as marble, sandstone and granite in quarries. These rocks are removed from the mother rock through methods and equipment that demand specialized knowledge and abilities such as diamond wire saw cutting machines (Sorrenc Areniscas Monistrol, n.d.; Stone Group International, n.d.; Murray, 2017; Grupimar Marcelino Group, 2023). Marble can be and is manually removed from the mother rock too, but it puts workers at risk of injuries or even death (see Figure 1 in Sandberg & Wallace, 2013). In the Jeneberang, the sediments of different grain sizes, including boulders, do not demand any human labour to remove them from the mother rock. Physical processes along with the transformed geographical space where the sand and stones accumulate and congregate make them readily available for workers to collect them either manually or through excavators, at very small, and large-scales. Related to this, it is not a risky activity.

The certainties of finding materials in the Jeneberang contrasts with the uncertainties they generate for small-scale and artisanal miners who prospect for alluvial gold, for example. Excavator operators and manual miners in the Jeneberang have the certainty that they will

⁵⁶ Regarding gold, “alluvial gold [] is relatively easy to access because it is not contained in rocks, while gold that is ‘locked up’ needs to be liberated by crushing the gold material, and thus requires more technically advanced approaches” (Luning & Pijpers, 2017, p. 764).

remove sand and the stones. There is also certainty about the specific location and the time they will need to invest to make a profit. Their uncertainties are more related to not knowing how many trucks they will load in a day. As such, the uncertainty of the cubic meters of sand and stones they will mine and their fluctuations in income depend more on the number of clients that buy materials in a single day, rather than the challenges associated with finding and obtaining the materials. Excavator operators and manual miners in Parangloe have the certainty that every time they load a truck with river sand and stones there will be a profit. In this sense, they are also certain about the price to be charged. Excavator renters and workers of companies explained that prices are set at the local level. Therefore, there are no price fluctuations and uncertainties linked to international markets.

Finally, large-scale river sand and stone mining in the Jeneberang also do not require trained workers. This is different from large-scale mining of metallic minerals such as deep deposits of gold.

In the following section I examine what I understand as the main sociocultural and political reasons that, in combination with the material dimensions I just examined, help to explain how the current mining network in the Jeneberang has workers of local origin as its constitutive part.

4.6.2. Sociocultural and political aspects

Even though the material features of the geographical space, the mined river materials, and the mining equipment are key to understanding the involvement of local people in mining activities in the Jeneberang, there are some sociocultural and political factors that also help to explain why the mining network in Parangloe has been produced and held together in a particular way, enabling the participation of locals. Here I analyze them.

When it comes to private mining companies' workers, the local character of these businesses has been key in engaging with local people (Wicaksana & Amirudin, 2021). Mining companies in Parangloe are local/regional in terms of their owners' origins, the location of their headquarters, and the address in their certificates of incorporation, as declared by participants. They are also local/regional in the sense of their ethnic composition, religious

affiliation, and language. All this has helped to make them less alien or foreign to the locality. Parangloe is quite homogenous in terms of the ethnic backgrounds and religious affiliations of its human populations. The prevalence of local/regional mining companies has meant that firms and local people share some demographic characteristics that are relevant for the labour relationships they establish, for their understanding of their work culture and for the mechanisms to which they resort when tensions arise. Their local origins have made some mining companies to pay particular attention to hiring local people. This has been partially possible by the types of mined materials which provide flexibility in the selection of workers as not everyone hired must possess specialized knowledge or skills.

Another important factor shaping the participation of local people is the intentionality companies (their owners) have had for hiring people from the locality. The drivers of their intention are multiple, including their interest in and wish to keep a good relationship with people of the area so that local people are friendly with the company (local acceptance). Reasons also include the loyalty/responsibility/duty the owner of a company —originally from the area— felt towards his folks. For instance, when asked about where their workers were from, the staff of one of the surveyed companies highlighted that the owner wished to hire local people, and the staff of another company said that the company wanted to give priority to local people.

I observed that mining companies have tried to “go local”, and their attempts to do it have contributed to provide people from Parangloe with livelihood opportunities. Enterprises not only have hired people from the surroundings but have also enabled them to put down roots in companies by working over long periods of time. Companies have also tried to “go local” by having people from the locality in positions of trust that are strategic for the successful operation of mining sites such as supervisors or managers.

Whether the intentionality companies show results exclusively from their own will is difficult to assess and is out of the scope of this analysis, but interviews shed light on the key role the Indonesian government at the Kecamatan and Kelurahan/Desa levels has played in shaping a mining network in which local people are a constitutive part. The government heads we interviewed stated that they directly requested mining companies to hire local people as a

way to intercede for locals and mediate between local communities and mining companies. Prior to 2016, when the government of Kabupaten Gowa still had the authority to issue mining permits, it gave permit holders the responsibility to prioritize the local workforce, as written in the licences granted. Thus, both the Parangloe and Gowa governments have actively shaped the mining network as political actors. The first one by its role of mediator between local people and mining companies, and the latter by its role of permit issuer prior to 2016. More recently, as the authority to approve and issue mining licenses lies in the hands of the government of South Sulawesi, the government at the Provinsi level also assigns permit holders the responsibility to give priority to the employment of local people. This entanglement of interactions and negotiations among different actors in the Jeneberang has shaped the mining network and so far, it has tipped the balance towards the participation of people from the locality.

At the national level, Article No. 74 of Law No. 40/2007 on Limited Liability Companies (Undang-Undang Nomor 40 Tahun 2007) places obligations on companies that operate in the field of natural resources extraction to conduct social and environmental responsibility activities. These obligations are contained in Government Regulation No. 47/2012 on Social and Environmental Responsibilities of Limited Liability Companies (Peraturan Pemerintah Nomor 47 Tahun 2012). This includes obligations to engage with local population (Robinson, 2016, p. 159). I did not explore whether this national regulatory framework has influenced that local governments require companies to prioritize the local workforce and that companies do it. But there is here a line of enquiry with potential for further research about the influence of national policies.

But the local character of private mining companies is not the only relevant aspect in facilitating they employ people from Parangloe. The large number of companies doing mining in the upper reaches is also a significant characteristic of the mining network as mining activities get distributed among many actors. The existence of many mining firms has had implications for the number of job positions available. As of 2019, the relevant government authority in Provinsi South Sulawesi had shaped this configuration by how it officially assigned mining sites to companies. As shown in the previous chapter, the pattern

that has emerged in the Jeneberang river channel is to have mining companies operating in small-sized areas of between 5 to 10 ha designated as mining sites. The predominance of small-sized mining sites facilitates the distribution of access among various companies which, in turn, translates into more possibilities for local people to be employed. The geographical distribution of mining sites along approximately 15 km upstream the river channel has also shaped the way in which job opportunities for people in the surroundings of source sites are scattered across Kelurahan/Desa. The non geographical concentration of mining activities in only one or a few locations has opened more possibilities for people in local areas to find a job in river sand and stone mining.

Many people have been able to find jobs in mining companies because they are relatives of/or know the owners or because they have family members who work in a company and invites them to join. In this sense, strong family and kinship bonds permeate every aspect of life in Parangloe, including mining (surveys, conversations, and observations). Thirty six out of the 58 surveyed workers said they had family members working in their workplace or for the same employer. I did not dig into their conceptualization of “family members” so this should be taken in the broadest sense of the word to include networks that go beyond blood kinship. The same family and kinship logic is behind other labour arrangements such as groups of manual miners, and people working for excavator owners/renters. In this sense, social networks are relevant for shaping who in the locality can access the jobs that mining in Parangloe creates. Related to the qualities of social relationships in Parangloe, making of the workplace a family space contributes to ease the labour relationships in the sector too.

The government of Kabupaten Gowa has also been key in creating livelihood opportunities for people in Parangloe by its role as a mining actor, through the state-owned PD. Jasa Konstruksi company. By means of its direct participation in mining, the Gowa government has been relevant for diversifying the types of labour arrangements available. In doing so, it has contributed to broaden the possibilities for local people to join the mining sector in Parangloe. As explained in Chapter 3, by 2019 PD. Jasa Konstruksi had mining permits over three sites but the company neither employed its own workforce, nor did it have its own mining equipment. In its three mining sites the company partnered with excavator

owners/renters who had their own group of workers and paid them. Moreover, in two out of its three mining sites there were also manual miners who worked independently but in a partnership with the company. In this way, the state-owned company has pluralized labor arrangements and created work opportunities for locals.

Furthermore, by engaging in partnerships, PD. Jasa Konstruksi has also paved the way for private mining companies to pluralize the types of labour relationships they establish. As of 2019, almost all the surveyed private mining companies hired their workforce directly rather than through labour subcontractors, except for one company that had followed in the footsteps of the state-owned company. This private mining enterprise had also partnered with a group of local people who had rented an excavator and needed access to a mining site.

The state-owned company's incorporation of excavator owners/renters and manual miners into the mining economy has been partially driven by its need to exploit the mining sites it controls. But it also speaks to what I see as a broader pattern of moral relationships that mining companies establish with the locality, especially with those who are favoured the least from the mining economy. I focus on this in Chapter 5, but here I detail a situation that can be helpful to illustrate this. I had noticed that manual miners had been removing stones in a location that seemed to be controlled by a private mining company that does not engage in partnerships, neither with manual miners nor with excavator owners/renters. In our interview with the company's owner, we asked whether manual miners are asked for a fee for removing materials from the mining site his company controls. His answer was that the company just lets them in; manual miners are not asked to pay a fee because the sale they make is for their personal income. We went further to ask why, with so many locations in the river channel to remove stones from, manual miners collect them from the site controlled by his company. Our interlocutor naturally responded that it was because of the existence of roads which make possible that trucks access through the river channel. Regarding this, it is important to clarify that trucks can access the river channel only because of the prior work excavators do in creating access roads.

My interpretation of the owner's answer and the natural way in which he responded is that all this for him, as an entrepreneur, is local common sense and it is something that has been

normalized: that manual miners make some money out of the stones located in the mining site area he controls and without paying any fee in exchange. I see this kind of interaction of the entrepreneur with manual miners as an example of moral relationships that medium- and large-sized companies have established with local people on various fronts, which I elaborate on in the next chapter.⁵⁷ But to avoid the idealization of this type of interaction, it is necessary to nuance it by recognizing that such an attitude of the company's owner is situated within a context where it is about manual miners that sell materials for their personal income. In a situation where the deposits of sand and stone are large and would seem inexhaustible, at least in the short-term, manual miners do not pose any threat for large-scale mining businesses. On the contrary, they coexist very well.

4.7. Conclusions

Based on the surveys we conducted with 58 workers in 2019, in this chapter I have shown that the workers of sand and stone mining in the Jeneberang are local; namely, most of them live in the vicinity of mining sites in Parangloe. Thus, one of the implications of the present form the mining network has taken is that a local workforce is one of its main components. Related to this, a broader implication has been that there is an apparent lack of popular opposition towards sand and stone mining among the communities around the Jeneberang. In Chapter 2 (Research Design and Methods) I mentioned that the question —what explains the apparent acceptance of sand and stone mining in the upper reaches of the Jeneberang river by people living near mining sites? This has been a “behind the scenes” question of my research. The experience of local people finding jobs in river sand and stone mining helps to account for this (Wicaksana & Amirudin, 2021). A line of examination my research opens is linked to this relationship between locals having jobs in mining and the apparent social acceptance of river sand and stone mining in Parangloe. Local workers are part of local communities who live in the surroundings of mining sites. Do workers' (un)satisfactory experiences in mining have the potential to resonate with their communities? How? The response of a company's owner to our question about the community's perception and

⁵⁷ We learned that generally, manual miners pay a fee. Although I witnessed and I was told that depending on who is controlling the access to the mining site, there are times when they are not charged a fee.

reception of mining activities suggests that protest is a strategy that local communities use in the area when there is something they do not like. Thus, the apparent lack of a visible form or resistance towards mining in the area could be a sign of a general acceptance by the local population. The response of the owner was “if there was something that the communities did not like, they would surely protest”.

In the chapter I have also addressed the questions of what and who have shaped the mining network that operates in the Jeneberang? how and why? I have done so by analyzing how the interplay between material aspects (such as a “favourable” geology, enhanced processes of accumulation and retention of sand and stones, and so on), sociocultural logics and practices, and the politics of sand governance in relation to the employment of local people in the sector have shaped a present mining network in which a local workforce is a constitutive part of it.

The material dimensions of the mining network (such as the river, the basin, the sand, the stones, the hillside collapses, the dam, the sand pockets, and so on) have facilitated the incorporation of unqualified workers. For mining companies and excavator owners/renters, this has meant that they have been able to meet their workforce needs by employing people from Parangloe. I focused on river sand and stones’ features that matter for their mining such as their discernability and availability. I also looked at the (transformed) physical environment of the Jeneberang and its basin and how it makes it simple for workers to locate and obtain the sediments of different grain sizes that the mountainous areas naturally produce and deposit in the river. The transformed material features of the river channel in the upper reaches have enhanced how the sand and stones remain and accumulate, making these rivers materials still more “readily available” and facilitating the localization of extractive work. The mining technologies used in the Jeneberang, as another aspect of the material features of the mining network, have also shaped how locals work in mining due to the technologies’ general accessibility in terms of either no needing specialized capabilities or needing a set of skills that can be developed in Parangloe itself. In this sense, the acquisition of certain abilities required to operate the mining technologies used in Parangloe is accessible too.

In this chapter I elaborated on the material features of the physical environment —the Jeneberang, its basin, the sand, and the stones— that are relevant for mining. I approached

their properties from the perspective of mining activities linked to the construction sector. I implicitly framed the sand and the stones that people remove from the riverbed as “things” desired by humans for the purpose of using them as construction materials. In doing so, I obscured the properties of the river, the watershed, and the river materials that are relevant for the ecologies of the river system, the basin, and the sea to where they end up travelling. I also made visible their characteristics in relation to the ways in which they matter (or not) to Parangloe people. Thus, although I do not address their multiple values and importance for humans, for other living beings and for the non-living, I do recognize that the Jeneberang, its basin, and its sediments are relevant in many other ways and that they matter to non-humans too.

Regarding the local sociocultural and political logics that have shaped that the mining network has a local workforce as an element of it, I see several dimensions interacting with the material aspects explained above. One is a pro local employment policy encouraged by the governments of Gowa, Parangloe, and South Sulawesi that has mainly benefited the workers of private mining businesses. In this chapter, these government actions and efforts requiring companies to give priority to the employment of local people constitute the politics of sand governance. In this regard, our findings suggests that such a policy has not only been specified on paper (in the written mining license given to companies), but it has been materialized. I did not explore, however, whether the implementation of the policy by mining companies demanded specific enforcing actions from government authorities, especially at the Kecamatan and Kelurahan/Desa levels. But the interviews with the heads of governments suggested that it has been enough to talk with companies when social issues have arisen. These interactions between the Indonesian government at its different levels and mining companies that operate in Parangloe show that (recently) permits might come from the Provinsi level but the Kecamatan and Kelurahan/Desa levels actively participate in governing sand mining. Thus, their role is not limited to the issuance of the recommendations that companies interested in obtaining a mining license are required to submit as part of their application.

Another sociocultural dimension that I see shaping a mining network with a local workforce as part of it refers to the role played by family and kinship relationships to incorporate people to the jobs in mining. These relationships were common across the different categories of workers: among workers of private mining companies, workers of excavator owners/renters, and among manual miners. Related to this, I have shown that the general pattern in Parangloe is that river sand and stone mining is accessible for local people to work in it as no special aptitudes to undertake the work are necessary. However, as I mentioned earlier, this apparent inclusive accessibility of work in mining is differentiated. Workers' responses in the surveys showed that social networks play a significant role in facilitating work in mining. Kinship relations shape who works in mining and under which labour arrangements. Thus, people who happen to be friends, family, or acquaintances with owners of mining companies, with workers of the river sand and stone mining sector or with excavator owners/renters have more chances to be called for work. Moreover, they are drawn to the same labour arrangement of their contacts. It was quite common to find in mining sites members of one same family working together such as cousins, second cousins, uncles, and so on. In one instance, when people noticed I was surprised by the fact that all their responses were pointing to their family relationship, they wrapped up the conversation by saying: "we all are family!" (*keluarga semua*). This can be explained by a general pattern that we found of people in Parangloe tracing back their family roots to the area, at least as their roots refer to first-degree relatives such as the parents. We also learned of cases where husbands had moved to Parangloe after marriage with women from the locality.

Considering the strong presence and influence of family and kinship relationships, my study opens a line of potential future research: the foundations of the differentiated circumstances where some people know companies' owners, workers and/or excavator owners/renters and others do not. And given that some local people in Parangloe work in mining as excavator owners/renters, further research is also necessary to examine the differentiated accessibility to mining work based on other factors of differentiation such as access to capital and social networks located outside Parangloe and Gowa.

A third sociocultural factor influencing the local character of the workforce, especially among the workers of private mining companies, has to do with what I see as sociocultural understandings, practices, and expectations regarding the moral responsibility privileged sectors of the society have (or are expected to have) towards less affluent classes in Parangloe. Especially in a rural area where work opportunities are limited. In Parangloe, the definition of who the privileged and unprivileged sits at the intersection of current modes of differentiation based on income and material wealth and persistent ways of differentiation based on royal ancestry.

I see this, for example, in a pattern where owners of companies and individuals with access to mining sites hold titles such as *Haji* or *Karaeng*. Karaeng were the nobility who governed the kingdoms once located in the territories that constitute the area currently encompassed within South Sulawesi. Today, people in Parangloe continue using such a distinctive title prefixing a person's name to indicate that they are descendants of Gowa's kings. In social relationships, to be karaeng stills seems to be an important category for situating people within the social hierarchy, at least in Parangloe. It seems that those holding the title of Karaeng are more highly respected. However, not all karaeng today can be associated with material wealth, nor all rich people are a karaeng, as explained by my RA and an excavator owner. In general, my observations in the field confirm what Mattulada wrote about in 1982, that (in South Sulawesi) the social stratification of the past is still evident today, although it is less rigid nowadays (p. 14). Related to Islam, there are Parangloe people who have made the pilgrimage to Mecca and use the prefix Haji. I found a pattern of association between religious and nobility status and a privileged position within the society, in terms of being owners of mining companies or being owners of the land used as a mining site or holding relevant positions within community organizations like the ones I analyze in the following chapter.

Thus, the sociocultural dynamics around responsibility towards others (in this case local people who might be jobless or might need extra income) is shaped by principles and practices that derive from the interaction between present and enduring mechanisms of differentiation and (mainly Islam) religious understandings, beliefs, and practices. These

complex local sociocultural logics that help to explain the rationales behind mining companies' actions to employ locals is a topic I have yet to continue studying over the years to better account for them. The interpretation I present in this chapter is more akin to a first detailed approach than to a much-needed in-depth and conscientious ethnographic work. But I present a deeper reflection on this in the next chapter.

A final thought, mining work in the Jeneberang is constant throughout the year and, as the lasting existence of mining companies in Parangloe shows so far, it also seems to be long-term. Workers are constantly needed. I did not analyze the awareness workers have about this, but I deduce that such circumstances are clear for some of them as they have been able to re-join mining activities after having stepped out from the sector for a while. Others, workers of excavator owners/renters, have had the experience of shifting bosses when the mining equipment of a former boss no longer works (or is being fixed). Thus, the demand for and the supply of workers seem to be high. An examination of local workers perspectives on why they were employed for the job is an avenue for future inquiry that could complement our understanding of the reasons that have driven employers to have a local workforce.

Chapter 5. Local people's agency in shaping mining networks

5.1. Introduction

Scholars have documented how mineral mining in various geographical and temporary contexts have brought about social, cultural, economic, health and environmental impacts, especially for people around mining sites (e.g., Robinson, 1983; Jorgensen, 2006; Bury, 2008; Jacka, 2015; Robinson, 2016; Shiquan et al., 2022). Within the river sand mining literature, the environmental impacts have been widely investigated (e.g., Kondolf, 1994; Kondolf, 1997; Padmalal & Maya, 2014), including the effects on local sand-based livelihoods, and on local communities more broadly. These questions have gradually become key themes in this literature (Khan & Sugie, 2015; Lamb et al., 2019; Muiruri, 2020; Zhu, 2020; Marschke et al., 2021). Research has shown that rather than being a unidirectional interaction, the relationship between mining and local people is two-way.

Studies on mining in general —of gold, copper, nickel, coal, sand, and so on— have provided details of a variety of mechanisms and strategies through which local communities have tried (and have achieved in some cases) to shape how mining happens or does not happen. Examples include the works of Athukorala (2009) for river sand mining in Sri Lanka; Walter & Martínez-Alier (2010) for gold and silver mining in Argentina; Okoh (2014) for gold mining in Ghana; Merino Acuña (2015) for Peru; Brown & Spiegel (2017) for coal mining in the UK and Indonesia; Verbrugge (2017) for gold mining in Philippines; Dietz (2019) for gold mining in Colombia; Sternberg (2020) for Kyrgyzstan; and Zhu (2020) for river sand mining in China. I build on this research work and argue for the importance of spotlighting people's active role in shaping mining networks.

In this chapter, I document the ways that various local actors have been able to shape the river sand and stones mining network that emerged in the early 2000s in the Jeneberang river, in South Sulawesi, Indonesia. I show that local people have come up with mechanisms that have both exerted an influence over the mining network in terms of its organization and dynamics and enabled them to benefit —or continue benefiting— from mining operations. I show both local people's agency in moulding the behaviour of mining companies in their

relationships to them and the creation of particular kinds of moral relations within the supposedly amoral realm of corporate capitalism (cited in Jacka, 2018 p. 65). In the chapter, then, I address the questions of who has shaped the mining network, how, why, and with what implications for local people and for local mining businesses.

For my analysis in this chapter, I employ a moral economy approach that draws on the ideas developed by Thompson (1995) and Scott (1985). I argue that the mechanisms I found in Parangloe are underpinned by what I see as locals' claims for a right to subsistence and/or for a right to derive economic benefits from mining. These mechanisms channel material gains for some local people, mainly in the form of money. For some others these mechanisms enable them to grow produce that they both consume and sell. More generally, these mechanisms shape the actions of private mining enterprises and the state-owned company.

I begin the chapter by explaining the place of my research within the literatures of sand mining and of mining companies-local communities' relations, my contributions to these two strands of academic work, and my use of a moral economy framework. Next, I explain the research methods I employed and detail specific aspects of the research site that are relevant for this chapter. Then, I describe the actors and the mechanisms they have developed and implemented in Parangloe, and I analyze the ways in which these mechanisms have shaped the mining network. After that, and before providing a short conclusion of the chapter, I make clear how I use a moral economy approach to understand local people's capacity to shape the mining network and obtain benefits from extraction.

5.2. Literatures

The mining literature has documented the influence local communities exert over mining activities in terms of their agency to shape how mining takes place (i.e., Merino Acuña, 2015; Verbrugge, 2017) and to halt, hinder, and/or prevent the realization of mining projects (i.e., Walter & Martínez-Alier, 2010; Brown & Spiegel, 2017; Sternberg, 2020). Scholars have shown mechanisms and strategies local communities around the world have created and/or resorted to in a diversity of mining settings. Most of the community actions this research work has documented, however, consists in social mobilizations, protests, and resistance (i.e., Walter & Martínez-Alier, 2010; Merino Acuña, 2015; Brown & Spiegel, 2017; Sternberg,

2020). Other mechanisms include formal channels of participation such as local popular consultations (Dietz, 2019) and small-scale mining activities on companies' concessions (Okoh, 2014). The instances the mining literature has analyzed are mainly characterized by large-scale extraction of metallic and energy minerals —such as gold, silver, nickel, coal— conducted by transnational corporations or their affiliates. Scholarly work in this field has made an important contribution to our understanding of the complex relationships between mining companies and communities who live and/or make a living in and around mining sites by emphasizing communities' active role in shaping processes and outcomes in mining areas.

On its part, the emerging sand mining literature has described tensions and/or conflicts in sand mining settings around issues such as the competing interests of different ocean users for the same marine space and the value and uses of marine sand (Cho, 2006), the impacts river sand mining has on drinking water and irrigation systems (Athukorala, 2009, p. 79; Zhu, 2020, pp. 232-233), and riverbank erosion that make local people homeless (Khan & Sugie, 2015), including through violence (Rege, 2016).

Community actions addressed to influence mining operations and/or to transform their characteristics is still an understudied aspect of the literature, except for a few studies that have given insights into the topic. Zhu (2020), for example, documents some of the strategies riverfront Zhuang communities in rural China have deployed to stop illegal sand mining in the Maoling river and, in turn, try to shape a mining network in which illegal sand mining has no place. The mechanisms and strategies Zhu (2020) documents include formal complaint channels, violent actions against illegal miners, and the use of social media to make their demands public and receive support. Despite all this, Zhuang people have not been able to bring illegal river sand mining to an end (Zhu, 2020, p. 236). Another example is the work by Athukorala (2009) who examines an advocacy and awareness-raising effort in Sri Lanka carried out by civil society organizations (CSOs) and communities affected by river sand mining. Athukorala (2009) sheds light on community strategies such as campaigns, demonstrations, the mediation of religious and community leaders, appeals to politicians, and judicial activism addressed to both curb illicit large-scale and mechanized river sand mining

and push for the search of alternatives to sand that would decrease the extraction of river sand. Although community-based CSOs' activities were able to position river sand mining as a critical issue at the national level, they were less successful in encouraging a decreasing use of river sand (Athukorala, 2009, p. 86). Khan & Sugie (2015) also shed light on the actions of local communities to resist and mould sand mining activities, such as protests, the use of religious speeches in pray day and the contestation of mining by disturbing activities that are indispensable for it such as the transportation of sand. Runeckles et al. (2023) also show that resistance to illegal sand mining in the Red River takes various forms such as reporting to local government authorities, protests, and the use of mass media. Purnomo et al. (2021) also document resistance to sand mining among farming communities in Kabupaten Malang in East Java, and categorize it as structural, cultural, open, and hidden. This strand of sand mining research highlights not only the work and efforts of local people and communities in shaping mining networks, but also the many challenges they face in trying to do so.

I add to the two strands of literature mentioned above by documenting site-specific community mechanisms in the Jeneberang river. These mechanisms have contributed to shape a mining network that is inclusive of some local people. The mechanisms can be described as everyday and ordinary when compared to spectacular actions of rejection and popular protests, and they have not involved any form of violence (as far as I know). For this reason, they can go unnoticed. These mechanisms and their function resonate with James Scott's arguments (1985) about the everyday ordinary and thus unnoticed actions of poor villagers in Sedaka, Malaysia. In Scott's case, it is about "routine" resistance (p. 255) that can be effective for channeling material benefits to the poor in Sedaka. In Parangloe, it is about "routine" ways in which some local people are able to assert their rights to subsistence and/or to benefit from mining. The case study shows that not all mechanisms and strategies local people design and implement result from conflictual relationships, and that there is no uniform behavior of corporations (e.g. Wicaksana & Amirudin, 2021). It also suggests that in understanding the relationships between local people and mining companies the type of enterprises, the kind of mined materials and the cultural features of the local social realm

matter for the possibilities local people have to tip the scales in their favour (Wicaksana & Amirudin, 2021).

I employ a moral economy approach to make sense of what I perceive as site-specific dynamics between corporate power and communities in the site of my research. Following Thompson's (1995) and Scott's (1976) ideas, the moral economy at play in Parangloe refers to a popular consensus among the local people as to what legitimate practices of mining companies are for these people to continue making a living and/or for obtaining material benefits from mining. In other words, the consensus is around what are corporate practices that are respectful of the "subsistence ethic" (Scott, 1976) and that observe place-based notions of reciprocity and economic justice flowing from those who benefit the most from the materials available in Parangloe. The mechanisms that I examine in this chapter embody such a popular consensus. Given that most of these mechanisms are ubiquitous throughout Kecamatan Parangloe, I interpret that there is a general agreement among local people living across the different administrative units within Parangloe concerning what is expected from mining firms.

I traced the expectations of Parangloe people about mining companies' obligations towards them through comments and situations that I witnessed. These moral assumptions resonate with what Scott (1985) described about a village in Malaysia regarding the rules of generosity and consideration that wealthy villagers were expected to meet in their relationship with their poorer fellows. The explanation of an excavator owner serves to illustrate the expectations of paddy farmers about the behaviour of miners in Parangloe. We asked the excavator owner whether the operators who work for him mine next to/around some paddy fields I pointed to. He said "not, [because] farmers become angry if we mine there, [they get angry] because the excavators cause the entry of water and damage their rice fields". He further explained that farmers "fine the miners when they go there [around their fields]". So, farmers expect excavator operators not to undertake mining activities next to/around their paddy fields and to pay a fine if they violate this prohibitive norm. From our interlocutor's first response, it seems that his workers comply with the popular norm of not mining in the surroundings of paddy fields. Thus, this excavator owner seems to agree on what a legitimate practice of his

excavator operators is from the farmers' perspective. To elaborate a bit further, we asked the excavator owner how farmers force operators and owners to pay when farmers fine them. His answer was "if we go there, they fine us because if their rice fields are damaged there is no food for them, so we understand, it is about mutual benefit, do not disturb them and we are not disturbed either". His response did not address our question directly, but it suggested that there was no need for farmers to force his excavator operators to comply to the farmers' demand for payment should their means of subsistence not be respected because his workers do not mine around the rice fields in the first place. Moreover, his statement sheds light on his agreement on what mining practices are respectful of farmers' subsistence ethic and on his understanding of farmers' demands. If it is true that our interviewee's workers do not mine next to/around the paddy fields I pointed to, then a group of farmers in Parangloe have been able to shape the behaviour of miners as it relates to them and their agricultural livelihoods.

Through *de facto* functioning of the mechanisms local people implemented—as individuals and as a group—I see signs of mining companies and other mining actors (like the excavator owner above) complying with social norms and obligations and establishing moral relationships with communities that live in the vicinity. I ask—how can we explain that mining companies have acquiesced to the demands of local individuals and communities? While profit making and commercial goals drove companies to Parangloe (Hilson, 2006, p.43), they engage with the locality not only in commercial terms; companies' responses constitute an expression of the moral relationships they have established with people in the surroundings of mining sites. Mining firms and excavator owners are not foreign to the sociocultural principles of life in Parangloe which, I argue, are at the intersection of Islam's beliefs and practices and ways for wealthier people to show responsibility for less privileged others and act accordingly. Life in Parangloe also takes place within a persistent but changing hierarchical social structure of *kekaraengan* which dates to the precolonial history of the area and was characterised by paternalistic relationships between the nobles who governed (*karaeng*) and the governed. Thus, not just Parangloe people but companies and entrepreneurs are also enmeshed in local values and ideological forms that influence their acts (Scott, 1985,

p.38).⁵⁸ The contemporary expressions of all this mixture are shaped by uneven power relationships and by differentiated access to and control over resources.

The ways in which companies in Parangloe engage with people in the locality are also influenced by other ideological forms deeply rooted in the Indonesian societies. The explanation of a private mining company's employee regarding the attitude of the corporation towards the community helps to exemplify this relationship between ideological forms and behaviour of corporations. The employee described that the relationship between the local community and the enterprise he works for is collaborative and mutually supportive. Differentiating its company from others, he said that the company has provided local people with construction materials such as gravel and crushed stones when they have needed them to build their homes. Our interlocutor emphasized that the company has provided local people with as much materials as for building their houses in their entirety. When we asked about the company's reasons for behaving in such a way, he explained "initially, it was something coming from the directorship of the company, who is *Pancasilais*" which means that they are people who have *Pancasila* as their ideology (Badan Pengembangan dan Pembinaan Bahasa, 2016). Pancasila is the official philosophical basis of Indonesia, and it is made up of five guiding principles. Social justice is one of them. The employee said that as *Pancasilais*, the administration cares for the community.⁵⁹ He further explained that, as a result, the community also gives its support to the company. The employee's account suggests that mining companies' motivations for establishing moral relationships with people in the surroundings are also influenced by nationalist ideas that people have apprehended and embraced. His explanation does not hint at interests such as securing social acceptance and gaining legitimacy (Welker, 2009). But his comment that "so, that is why the company does not have any guards, we do not have security, stuff are just left there like that day and night" suggested both that there is no need of guarding the mining equipment and the company's

⁵⁸ This, however, does not rule out that companies' and entrepreneurs' actions are also strategically driven by their interest in extracting river materials and establishing in an area where they can run their operations smoothly.

⁵⁹ His exact words were, "*selalu jatuh hatinya di Masyarakat*".

stuff in a social environment where the community is supportive of the company, and that social acceptance is somewhat expected.

I also put forward the idea that the moral relationships that companies establish in Parangloe have their origin in a business logic that responds to the local common sense that permeates interactions between people, government authorities, and business entities (Geertz, 1983; Wicaksana & Amirudin, 2021). Mining companies in Parangloe are embedded in these logics as they are local in origin in the sense of the origin of their owners and their workforce. In most cases, most of their workers are from Parangloe itself, as shown in the previous chapter. They are also local in their knowledge and understanding of codes, values, principles, and practices. Workers, managers, and owners are not alienated from the locality and local dynamics. Owners generally establish person-to-person relations with managers and workers which contributes to keep owners grounded on the social and economic realities of the locality (Geertz, 1963). Managers are people who owners have come to trust and are essential for keeping owners and workers linked. In general, the size of operations and the size of companies in terms of their workforce facilitate personal relationships between them. Moreover, the site-specific ways of socialization greatly contributes to establish person-to-person relations in the workplace which I argue is another space where family and friends gather and interact.

A moral economy approach helps to analyze how the mining network and the mining economy are intertwined with the social, religious, and political spheres and take characteristics specific to the locality (Plattner, 1989, p. 4). This perspective considers companies as entangled in and negotiating local moral economies and is useful for understanding the successes of local people in shaping the network in ways that generate benefits for them.

In this chapter I make visible local people's and communities' agency in shaping a river sand and stone mining network in the Jeneberang. In doing so, I frame these networks as procedural rather than as end products. This is relevant for a more comprehensive understanding of the networks' configuration and for avoiding their reification. It is also necessary for the potential that examples of successful community efforts in shaping the

behaviour of corporations might have to resonate in other parts of the world (Walter & Martínez-Alier, 2010). Finally, such a framing of mining networks is useful for showing that they are always “in the making”, hence porous and malleable. In a world and temporary context where challenging corporative power seems insurmountable many times, highlighting the capacity of people living and making a living in and around mining settings is useful not only for analytical purposes but also for political ones.

Like scholars who work in other mining settings have demonstrated (Walter & Martínez-Alier, 2010; Okoh, 2014; Verbrugge, 2017; Dietz, 2019), I show that in this process of shaping companies’ actions, local people in some cases have been assisted and supported by the local government. In interviews with the heads of Parangloe, Lanna, Bontokassi, and Lonjoboko we did not address the question of why local governments have done so. But the conversations shed light on the importance it has for them to address the issue of unemployment; they think that river sand and stone mining has the potential to absorb local workforce. This partially helps to explain the active role of these government officials to support local people in getting their voices to be heard and making mining companies and related actors to comply with their demands. Our findings in the field indicate that in general, companies and other actors related to mining have accepted local dwellers’ demands. I interpret that this shows local people’s agency and mining actors’ understanding that they have no alternative but to agree to their demands to co-exist. And, although the community mechanisms I detail below have not contributed to change existing power relations (Dietz, 2019, p. 149), they have enabled community members to economically start benefiting—or continue benefiting—from mining activities that occur near their dwellings. For mining companies, this has meant that they have been able to operate in a generally calm social environment.

5.3. Research Methods

The ideas I develop in this chapter mainly draw on the 13 semi-structured interviews we conducted with community members who are directly involved in the mechanisms I analyze here. Some of the interviewees belonged to one of the three community organizations that we were able to trace in the field: the Mining Community Forum (FORMAT —*Forum*

Masyarakat Tambang), the Community Empowerment Institution (LPM —*Lembaga Pemberdayaan Masyarakat*), and the Community Resilience Institution (LKMD —*Lembaga Ketahanan Masyarakat Desa*).⁶⁰ We interviewed these individuals in their capacity as members and/or representatives of these organizations. Other participants were individuals in private road fee collection posts, one local claimant of land⁶¹, and two former small-scale miners.⁶² The questions we addressed in the interviews enabled us to learn about the historical interactions between local communities and mining companies (private and the state-owned) and about the ways in which community members benefit from river sand and stone mining.

The chapter also draws on the semi-structured interviews we did with the heads of Kecamatan Parangloe, Kelurahan Lanna, Desa Bontokassi, and Desa Lonjoboko. These interviews gave us insights into both the relationships between mining companies and local communities, and the role local governments have played in them. Finally, my observations in the field and the many informal individual and group conversations we had in Parangloe with different actors, and online local news, have all informed the arguments that I develop in this chapter.

5.4. *Research Site*

River sand and stones mining is strongly rooted in Parangloe and the mining economy is deeply embedded in the locality (Plattner, 1989, pp. 3-4), as shown by the history of mining in the area. As mentioned in previous chapters, by the 1960s, at least, Parangloe people were already manually removing sand and stones from the Jeneberang to sell to the trucks that would come to the area. Mining was already a source of cash for families in Parangloe. A gender division of labour characterized mining at the time: men would lift the stones and would load the trucks with them, while women would manually crush the stones. Hence river sand and stone mining is not foreign to the locality and those who participate in mining are

⁶⁰ We came to learn about the existence of FORMAT and former small-scale miners thanks to the information provided by a staff of the state-owned PD. Jasa Konstruksi. Several people made us aware of the existence and work of LPM and LKMD, interviewed government authorities and staff of companies among them.

⁶¹ “Local land claimant” is a noun I decided to use, not a noun I saw being used in the field.

⁶² We learned about the existence of private road fee collectors by witnessing them, and about local land claimants by both observation and by LKMD.

not foreign either. Former mining practices remain until today (although to a lesser extent) and local knowledges about mining continue to be used.

Today, the mining economy is still enmeshed in the locality as people in Parangloe continue having links to mining in different ways. Some local people work in the sector and are directly involved with at least one of the stages of the mining process which includes the removal of materials from the active river channel, stone crushing, and the transportation and distribution of these bulky materials. Others work in the sector by doing all the essential administrative work of mining companies (e.g., supervision, recording, money collection, accounting). Some provide crucial services for the maintenance of mining and processing equipment such as excavators, trucks, stone crushers. Many local people supply food, drinks, cigarettes, and petrol to dump trucks' drivers, mining equipment's operators, and manual miners. Others work in posts that are strategically distributed along the roads over which dump trucks circulate; some of these posts are run and managed by the social organizations which I detail below. The broader communities in Lanna, Borisallo, Bontokassi, and Lonjoboko also have links to mining. They have these links partly because they have a few or some relatives or friends who work in mining. They are also connected through the activities and events the community organizations I describe below host and sponsor with funds originated from mining include them, their children, their family, and/or their friends.

5.5. The Shaping of a mining network: local communities' mechanisms and strategies

In Parangloe, a diversity of individual and group actors —that include former landowners, former small-scale miners, community organizations, owners of access roads and local land claimants— have developed and implemented some strategies which have enabled them to be part of and derive economic benefits from the current river sand and stone mining economy. In this section, I provide details of these local actors who, I argue, have actively shaped the mining network that operates in the area since the early 2000. I outline the mechanisms they employ and analyze their strategies as they relate to the influence they have on the network's configuration and dynamics. These mechanisms have shaped that mining companies behave ethically towards host communities. I approach these mechanisms from a moral economy perspective as explained in the section above to both better grasp the values

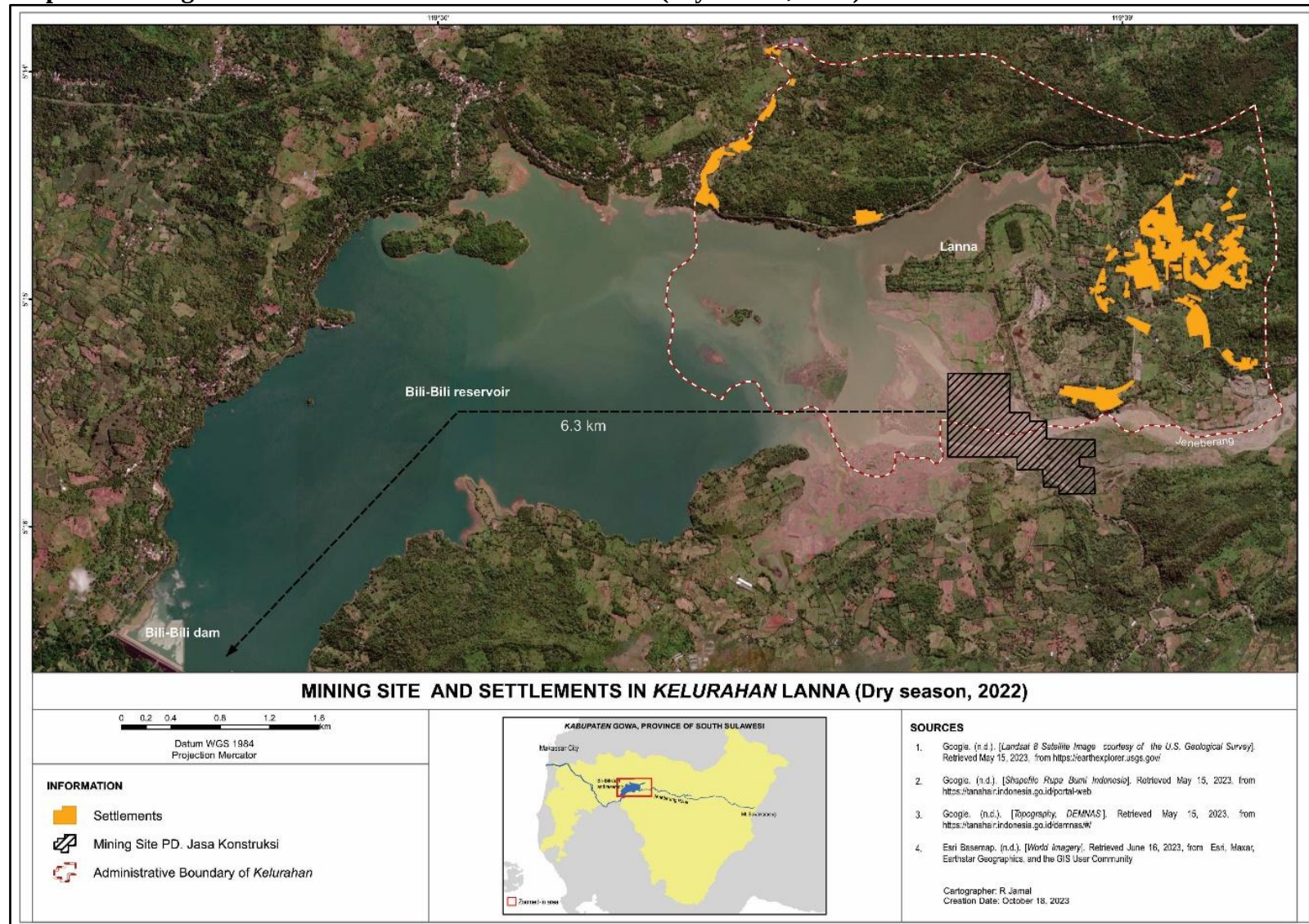
and notions mobilized by local people in their relationships with companies and better make sense of mining firms' responses.

5.5.1. *Former small-scale miners in Lanna*

The people of Parangloe have removed sand and stones from the Jeneberang river long before the state-owned company and private local firms started their mining operations in the area in the early 2000s. Since at least the 1960s, people in Parangloe have been manually mining river sand and stones for selling to trucks which would come the area. Mining by excavators started in the 1980s, as recounted by a former trader of river materials, but there were not as many excavators as there are today.

In 2019, the state-owned company PD. Jasa Konstruksi was actively operating in three mining sites. One of the sites was—and still is—in Kelurahan Lanna (see Map 5.1). Today's PD. Jasa Konstruksi site in the river channel in Lanna used to be Lanna's old town. The construction of Bili-Bili dam and reservoir in the 1990s entailed the displacement and resettlement of over 2,000 families as the area of the former Lanna was submerged (Agnes et al., 2009, p. 468). According to local research (Agnes et al., 2009) and the stories we heard in the field, people who were relocated received compensation for their land which has become part of the river channel and belongs now to the Indonesian state. Despite this, people in Lanna continue to work their former land to grow crops such as peanuts and rice when the river's water level is low, during the dry season. During the rainy season the area gets flooded intermittently. People also feed their cattle and horses on the vegetation available. With a land area of approximately 60 ha, PD. Jasa Konstruksi's mining site in Lanna is a patchwork of agriculture, grazing, and manual and mechanical sand and stone mining during the dry season and when the conditions of the rainy season allow. Photos 5.1-5.6 below show the different ways in which people in Lanna use PD. Jasa Konstruksi's mining site as I witnessed in 2019 and 2022.

Map 5.1. Mining site and settlements in Kelurahan Lanna (dry season, 2022).



Photos 5.1-5.6 Uses of PD. Jasa Konstruksi's mining site in Lanna



5.1



5.2



5.3



5.4



5.5



5.6

Photo 5.1: A farmer on her way to harvest peanuts (rainy season, 2022); **Photo 5.2:** Horses grazing in the mining site (rainy season, 2022); **Photo 5.3:** An excavator loading a truck with sieved river sand (rainy season, 2022); **Photo 5.4:** Manual miners collecting river stones (rainy season, 2022); **Photo 5.5:** Manual miners loading river stones to a truck (rainy season, 2022); **Photo 5.6:** Peanuts fields at the forefront and mining by excavators in the background (dry season, 2019). Photos credit: Wendy Alejandra Medina de Loera.

Before the existence of Bili-Bili dam and reservoir, and the subsequent submersion of former Lanna, people in this part of Parangloe were already involved in sand and stone mining. They used to remove these materials from the edges of the Jeneberang, not from the active river channel as it is done today, as told by local inhabitants. Back then the river channel was different from the current one in terms of its location and its width. People recounted that in the past, today's river channel was filled with paddy fields. A former miner who is still active explained that after the Indonesian government had acquired the land formerly owned by people from Lanna, locals continued to do sand and stones mining, sourcing them from their former land.

The large area over which PD. Jasa Konstruksi has a mining permit in Lanna used to be a site where local people removed sand and stones before this state-owned company started to operate there around the first decade of the 2000s ("Penambang pasir tradisional", 2012; interviews).⁶³ Those who were involved in mining at the time are referred now as ex miners/former miners (*eks penambang*). Back then, these local individuals used to be the holders of mining permits and Kabupaten Gowa was the government authority who issued them, as told by participants.⁶⁴ The ex-miner who is still active explained that usually a group of five people had a permit over a land area of 5 ha which they managed together. There were permit holders and people who did manual mining and by excavators in permit holders' mining sites in exchange for an access fee. According to the representative of FORMAT organization on which I focus below, the fact that Bili-Bili reservoir came into existence entailed that the removal of sand and stones materials in this flooded area became illegal, and the mining permits that had been previously issued to former small-scale miners were not longer valid. From the moment PD. Jasa Konstruksi arrived in Lanna onwards, mining permits were not longer issued to former miners, only to the company.

Knowing that PD. Jasa Konstruksi was planning to manage and exploit their mining area, former miners got concerned about their livelihoods ("Penambang pasir tradisional", 2012).

⁶³ Some people to whom we talked did not recall the approximate year when PD. Jasa Konstruksi started to operate in the mining site in Lanna, others said it was in 2007. A local news in 2012 suggests that by that year mining operations of the state-owned company in Lanna were still at a plan stage.

⁶⁴ An interviewee shared the photo of an old mining permit which corroborates what people said.

Local opposition and resistance emerged and delayed the company's start of mining operations, as recounted by a PD. Jasa Konstruksi's employee. Community members formed the Mining Community Forum (FORMAT as the acronym of *Forum Masyarakat Tambang Parangloe-Manuju*⁶⁵) with the goal of bringing former miners together and organize them. Our FORMAT interviewee explained that the interest of the state-owned company in getting in the area dates to before the reservoir came into existence, and that all the material produced in the occurrence of Mt. Bawakaraeng's landslide in 2004 strengthened its interest. Concerned community members, namely locals who had been engaged in mining in the area long before, formed FORMAT in view of the imminent entrance of PD. Jasa Konstruksi to the area and former miners' lack of access to mining licenses to engage in officially recognized mining operations by themselves.

FORMAT's goal was to organize former miners in order to facilitate that they both continue benefiting from mining (especially in view of the potential of the material that resulted from the landslide) and that they strengthen their position in a situation where their mining in what became the reservoir area became illegal. Based on these goals, as explained by the FORMAT representative we interviewed, I see FORMAT's creation as the crystallization of a consensus among ex-miners as to what practices the state-owned company should adhere to, and of their notions of economic justice in a situation where the government of Kabupaten Gowa stopped issuing mining permits to them. Jasa Konstruksi became the only entity officially allowed to conduct mining activities in an area formerly controlled by ex-miners.

In 2009, FORMAT came to be officially constituted through a meeting attended by government authorities (Kecamatan Parangloe's and Kecamatan Manuju's heads and the heads of all Desa and Kelurahan of both kecamatan), the police (Parangloe's and Manuju's Chiefs of police —*Kapolsek*), the army (Parangloe's and Manuju's Commanders of the army unit —*Danramil Tentara*), miners from Manuju and Parangloe who became FORMAT

⁶⁵ Manuju is another kecamatan of Kabupaten Gowa which also borders the Jeneberang river and is in front of Parangloe. During the dry season and when the rainy season has not reached its peak, one can cross the Jeneberang river from Parangloe to Manuju by walking; local inhabitants do so. People from Manuju have also been engaged in river sand and stone mining over time. In practice, when it comes to mining, the Parangloe-Manuju boundary is very permeable, particularly in some areas where the river channel widens. However, mining companies' in-site offices and other facilities are in Parangloe.

members, public figures⁶⁶ from Parangloe and Manuju, and representatives of the state-owned PD. Holding Company Gowa Mandiri of which PD. Jasa Konstruksi is a subsidiary. The meeting was also referred to as *musyawarah* in the meeting notes. In Gowa, and Indonesia more broadly, this means that the character of the meeting was more about deliberation and consensus, which does not necessarily mean horizontal relations. Moreover, the goal in *musyawarah* is to reach agreements. According to the meeting notes shared by our FORMAT interviewee, the attendees discussed two issues: the selection of a name for the organization and the formation of the organization's board.

In 2012, FORMAT and the state-owned mining company had a meeting (*rapat koordinasi*) in which they reached an agreement that remained valid when the field research was conducted. The PD. Jasa Konstruksi's employee we interviewed reported that "former miners forced the company to share profits" as the agreement consists in that ex-miners and FORMAT receive a specific amount of cash for every sale of river materials PD. Jasa Konstruksi generates. I did not delve into what the interviewee meant by "forced" (*terpaksa*) and on the leverage former miners had, but our FORMAT interviewee explained that PD. Jasa Konstruksi approached the government of Kecamatan Parangloe to coordinate with them for inviting FORMAT to cooperate (*melakukan kerja sama*) which can be seen as a sign of both FORMAT's importance and the interest of the state-owned company in working together with the organization.

According to our FORMAT interviewee, the organization and the ex-miners "agreed to collaborate with [PD. Jasa Konstruksi] with the agreement that the [state-owned company] would take care of the mining license and the community would join [the mining operations] once the permit was in place".⁶⁷ He further explained that the agreement with the state-owned

⁶⁶ These public figures are called *tokoh masyarakat* in Indonesian; our FORMAT interviewee is himself a *tokoh masyarakat*. In his words, "when someone from the community becomes *tokoh masyarakat* it means that the person has some qualities that others do not have such oral communication skills and the ability to think innovatively. A *tokoh masyarakat* is also someone who carries the aspirations of community members, often provides guidance and advice, and is respected. It is the community itself who often points to someone in the community as a *tokoh masyarakat*; there is an unwritten acknowledgement that 'this person' is a *tokoh masyarakat*".

⁶⁷ His exact words were "*kita di Format dan penambang sepakat untuk kerjasama dengan Perusda dengan perjanjian Perusda mengurus izin dan masyarakat tinggal ikut dengan Perusda ketika sudah ada izinnya*".

company is a collaborative arrangement in which “the ex-miners have/own the mining location and the materials while PD. Jasa Konstruksi has/own the mining permit”.⁶⁸ This latter statement by our interlocutor suggests that former miners continue to see the location and the river materials to be extracted from it as theirs, based on their past relationship to the land that is now part of a mining area. It also suggests that they also see their collaboration with PD. Jasa Konstruksi as one necessary not only for them to continue doing mining activities in a formal way, but also for the state-owned company to have *real* access to a mining site over which it has a mining license.

The collaboration between PD. Jasa Konstruksi and ex-miners has pros and cons for the latter, as told by one of them. According to him, the fact that PD. Jasa Konstruksi is the permit holder makes life easier for those individuals who used to be the holders of mining licenses as they no longer have to deal with the “headaches” of processing mining permits themselves. However, the current economic benefits they derive from mining are small. We also asked an ex-miner who is now an excavator owner about this. To our question about whether he preferred the current situation where there is a collaboration agreement with PD. Jasa Konstruksi or the past situation where the state-owned company was not involved, he said that “it was good in the past because [they] paid [only] to the owner of the mining location, now [they] have more expenses because [they] must give money to many. [They] used to make [a net profit of] Rp. \$100,000, and now [they] make Rp. \$50,000”.⁶⁹ In the past the money for each sale was distributed only between excavator owners/renters or manual miners (as the actors who did the mining) and those individuals who had mining licenses over a site (as permit holders). In the current situation in PD. Jasa Konstruksi’s mining site in Lanna the money is unequally distributed among the state-owned company (as the permit holder), excavator owners/renters or manual miners (as the actors who do the mining), FORMAT and ex-miners (as those who had been engaged in mining before the entry of the state-owned company into the area).

⁶⁸ He said “*penambang punya lokasi dan material sementara Perusda punya izin, itu menjadi kolaborasi*”.

⁶⁹ His precise words were “*Kalau dulu bagus, karena kita langsung bayar ke pemilik tambang, sekarang bertambah lagi pengeluaran karena banyak yang harus diberi uang. Dulunya dapat 100 ribu sekarang keluar 50 ribu jadi kurang lagi*”.

Our FORMAT interviewee shared the meeting notes that detail the agreement the state-owned company, FORMAT, ex-miners and current miners reached regarding the distribution of profits for each sale PD. Jasa Konstruksi makes. Interviewees reported that, depending on the value of the sale, which ranges between Rp. \$300,000-750,000 (USD\$20-50), FORMAT receives Rp. \$5,000 or \$10,000 (USD\$30-60¢), former miners' representatives receive between Rp. \$15,000-40,000 (USD\$1-3) which later they distribute among their fellows. Interviewees' claims suggest that the written agreement on profits distribution has been implemented. The written agreement indicates that the state-owned company, FORMAT representatives, and current and former miners discussed the issue, and that there were points in the meeting that resulted in a lengthy and heated discussion.⁷⁰ Nevertheless, it is noted, the though topics were discussed in a still familiar and friendly atmosphere.⁷¹

A comparison between what people reported to us in 2019 on one hand, and the 2012 written agreement on the other, suggests that the amounts of profits distributed to FORMAT and ex-miners have not been updated (raised) since then. Further research is necessary to learn whether there have even been endeavours or requests to update the amounts of profits distributed, especially considering that the values of the sales have indeed been raised. Part of the money FORMAT receives from mining "is saved for the organization of social activities such as the celebration of Independence Day and important religious festivities". Our interviewee said that "FORMAT's goal is that the broad community in the surroundings also feel the results coming from mining because not everyone is involved in mining".

In terms of FORMAT's activities, the representative we interviewed said that every time there is an issue between the state-owned mining company and former miners, FORMAT intervenes to facilitate the communication between them and provide a way out. More recently, given the long wait time for the relevant South Sulawesi government authority to issue the required technical recommendation for extending PD. Jasa Konstruksi's mining

⁷⁰ I am not sure of what the tone of the discussion on profit distribution turned out to be but based on a conflict solution meeting I witnessed in Parangloe once I would not be surprised that the process to reach the agreement was conducted in a polite and respectful environment. The conflict solution meeting that I witnessed was mediated by local government officers.

⁷¹ It exactly states that "*dari rapat tersebut ada beberapa materi pembahasan yang mengakibatkan cukup alot, tetapi masih dalam suasana kekeluargaan dan silaturahmi*".

permit, FORMAT has approached government authorities and advocated for the prompt issuance of the company's mining licence. It is of FORMAT's interest that PD. Jasa Konstruksi gets its mining permit extended due to the economic benefits that the organization and its members derive from the mining activities of the state-owned company.

Thus, former miners and FORMAT have contributed to shape the mining network in that they continue to be part of it by continuing deriving economic benefits from mining activities. The current river sand and stone mining network in Parangloe is inclusive of local people as local workers are a constitutive part of it. Locals have a variety of job positions in companies and through other labour arrangements. But former miners have achieved that the network is also inclusive of them who are older and displaced workers of the sector.

Our FORMAT interviewee explained that FORMAT has the ability to call on companies for working together/mutual cooperation (*gotong royong*), something I see materialized in the agreement between PD. Jasa Konstruksi and former miners. Considering FORMAT's goal, as told by our interviewee, it can be suggested that the creation of FORMAT embodies ex-miners' expectations and interests in continuing benefiting from mining. The agreement to channel profits to ex-miners and FORMAT suggests that former miners had the capacity to make PD. Jasa Konstruksi to comply with their views of what was an appropriate action from the company. The agreement and its implementation also suggest that the state-owned company acknowledges that its arrival to Lanna was disruptive of ex-miners' livelihoods, that it is necessary to compensate them for their loss, and that the company recognizes the bond between former miners and the land they used to own and use for mining. Through the agreement with former miners, the state-owned company has also carefully manufactured consent. So, even though the mining permit has given the company "a legal space to rule, [] in practice this [has had] to be exercised with care" (Luning & Pijpers, 2017, p. 774).

The government of Kecamatan Parangloe (and Manuju) played an important role in mediating the relationship between former miners and PD. Jasa Konstruksi, especially due to the support provided to FORMAT for its official constitution/acknowledgement. However, this can only partially help to explain that the state-owned mining company has yielded to former miners' request for a compensation for their lost livelihood. My interpretation about

the company's acceptance of ex miners' demands is based on the current situation rather than on the processes leading up to the existing financial arrangements. The PD. Jasa Konstruksi's staff we interviewed said it took one year for the company to get into the area as former miners rejected the company and protested against it. I interpret PD. Jasa Konstruksi's acceptance of former miners' terms and conditions as a business logic in part guided by the acknowledgment of and understanding that it moved into an inhabited space where dwellers were already leading certain livelihoods and that it needed to concede to their demands to coexist.

The logics of political alignment between the kecamatan and kabupaten levels also helps to explain former miners' outcome. The head of Kecamatan Parangloe has the endorsement of the head of the Kabupaten Gowa. And PD. Jasa Konstruksi is owned by the government of Kabupaten Gowa. The state-owned mining company is not separated from the politics at the kabupaten level and, in turn, at the kecamatan level. By politics I mean a variety of interests at stake that include the implications that violating the subsistence ethic of former miners might have for the general social environment in Parangloe, for the legitimization of political figures, for electoral politics, and for the atmosphere in which mining businesses are run. However, this reasoning does not rule out the genuine interest of some local leaders (in Parangloe and its administrative subdivisions) in addressing the issue so as not to affect members of the community of which they are part. The endorsement of Kecamatan Parangloe (and Kecamatan Manuju) for the formation of FORMAT can be seen as an escape valve from ex-miners' pressure but also as the genuine interest of government authorities to address the issue. PD. Jasa Konstruksi's initiative approaching the Kecamatan government to bring FORMAT into conversation with them speaks to the acknowledgement of the company that the issue was sensitive and to its interest in addressing it.

Arrangements between small-scale miners and large-scale operators can be found in other mining contexts too (Verbrugge, 2017). However, what draws the attention in Lanna is that PD. Jasa Konstruksi's arrangement is with **ex** small-scale miners and the revenue sharing scheme consists in handing money in to them and their organization (FORMAT). The revenue from mining activities, in this case, is generated only by the state-owned company

and its partners.⁷² Former miners do not actively participate in the mining activities from which they receive a specified amount of money. The arrangement, however, has not uprooted existing inequalities between the state-owned company and former miners. For instance, the company derives higher economic benefits from its mining operations than the amount of money ex miners and FORMAT receive for each sale the company makes. In the same way, PD. Jasa Konstruksi has monopolized the mining permit over the 60-ha site, restricting the possibility for ex miners to be permit holders. Despite this, the capacity of the former miners and FORMAT to impose their terms cannot be denied. And although relationships between small- and large-scale mining actors are not static and they may change throughout the mining cycle (Verbrugge, 2017, p. 354), the arrangement between PD. Jasa Konstruksi and ex miners has endured for around 10 years now. The question remains whether the arrangement will come to an end when ex-miners pass away, or whether the arrangement continues to be valid with ex-miners' offspring, recognizing their families' relation to their former land rather than former miners' relation to the land as individuals.⁷³

5.5.2. Former landowners in Lanna

Other people from Lanna, whose former land is part of the mining site that PD. Jasa Konstruksi manages and exploits today, have continued to farm their former land seasonally, when the river flow recedes. The conversations we had in Lanna suggest that these former local landowners are fully aware of and recognize that their former land is now state land. But still, they have continued being users of it. A female farmer told us that “farmers **confirmed** [with the state-owned mining company] that they could plant their crops [in the mining site] when the river flow recedes and [the company] takes back [the land farmers used as agricultural fields] after the harvest”.⁷⁴ I not only witnessed that this female farmer and

⁷² As mentioned in previous chapters, given that PD. Jasa Konstruksi does not have neither its own mining equipment nor the labour force to operate it, the company partners with excavator owners/renters who employ their own (mostly local) workers.

⁷³ Further research is necessary as well to examine whether former miners' descendants continue to share the sentiment that they possess rights. I owe this idea for future research to Robinson's (2016) observations in a nickel mining setting in Sulawesi.

⁷⁴ The female farmer said “*Tapi kita konfirmasi, untuk kasi ke kita untuk ditanami kalau air sedang turun, kalau sudah ditanami diambil lagi*”. I translated the verb “*konfirmasi*” as “confirm”, but the meaning, as employed by the farmer, is not clear. One possibility is that she meant that farmers asked permission to the company for them to farm the land when the river flow recedes. It is also possible that she meant that farmers let the company

others continue to cultivate paddy and peanuts and graze their cattle and horses within PD. Jasa Konstruksi's mining site, but also that PD. Jasa Konstruksi seems to have given in to the continuity of their agricultural practices, recognizing somehow their former relationship to the land. The PD. Jasa Konstruksi's employee that we interviewed expressed confusion as to why former landowners continue to cultivate their former land within the company's mining site, but he did not express rejection, disagreement, or disapproval of them doing so.

The state-owned company apparently has adopted a "live and let live approach" (Aubynn, 2009) towards former landowners who do farming within its mining site.⁷⁵ Following the observations made by Robinson (2016) for a different mining setting in Indonesia, PD. Jasa Konstruksi's "live and let live" approach towards former landowners "implies a de facto acknowledgement of local land rights and notions of justice, even if the landholders do not hold formal title to the land" (p. 151).

I did not have the opportunity to explore the process through which PD. Jasa Konstruksi apparently has come to adopt such approach. But regardless of whether the tolerance the company showed resulted from a negotiation with former landowners or from some kind of tacit understanding/agreement with them, former landowners' ability to shape the company's behaviour towards them materialized in their continuous access to their former land for over approximately 15 years. This speaks to the approach of PD. Jasa Konstruksi and Kabupaten Gowa government, which is to respect the land use practices of local inhabitants in the mining site area in order to coexist with them.

I interpret that these former landowners have been able to mobilize a claim of their right to subsistence and that they exert a moral claim to their former land through the continuous use they make of it.⁷⁶ And given that this practice is common to a collective of former landowners, I see that there is a popular consensus among them about what their right to

know that they would do it. I am thankful to my RA for making me notice the ambiguity in our interlocutor's use of the word "confirm".

⁷⁵ The approach Aubynn (2009) frames as "live and let live", adopted by a gold mining company in Ghana, describes the relation between a large-scale mining company and artisanal and small-scale miners; the company tolerates some small-scale mining undertaken in marginal parts of its concession.

⁷⁶ This idea draws on Lahiri-Dutt's (2017) work on what she calls the moral and immoral economies of coal mining in India.

subsistence is and what is a legitimate practice of the state-owned mining company for them to continue making a living out of their former agricultural land.

The capacity of former landowners to assert their use rights over the land that was theirs at some point in the past is based as much as in their practice of everyday forms of resistance (Scott, 1985), as in the interest of PD. Jasa Konstruksi in particular, and the government of Kabupaten Gowa in general, in having a quiet and peaceful social and business environment. This is something that can also be seen in how the state-owned company has incorporated individuals from Lanna in its mining operations by employing them as in-site supervisors. The company has also shown Lanna people that they are necessary for the company to operate as there are people from Lanna who work as operators of excavators and as manual miners in the company's site or who are the excavator owners/renters that PD. Jasa Konstruksi needs as partners. Former landowners who continue to use the land within the mining site are family and/or friends of these local people who are working in partnership with PD. Jasa Konstruksi. Thus, the company has opted for letting former landowners to continue making use of their former land. This has been facilitated by the fact that the agricultural practices of former landowners do not disturb the mining activities of PD. Jasa Konstruksi. Such a condition has been shaped by the material features of the mining site, in that there is plenty of space (60 ha) that can be a quarry, and there are plenty of river materials scattered all over the place.

Regarding the shaping of the river sand and stone mining network that operates in Parangloe, the continuity of former landowners' agricultural activities in today's PD. Jasa Konstruksi mining site has contributed to shape the network, specifically in Lanna. Based on what I observed in 2019 and again in 2022, the land that locals continue to use for agricultural purposes restricts its use as a mining area. PD. Jasa Konstruksi and its partners adapt their mining operations in terms of their location within the mining site as to enable Lanna people to continue using their former fields. Thus, former landowners have been able to influence where within the large mining site mining takes place. They have also helped to make the mining network accommodating regarding the survivability of agricultural livelihoods which would have been otherwise displaced. So far, for former landowners, this has meant the

endurance and stability of their livelihoods. This has positively impacted how Lanna people “enact” the state-owned mining corporation (in the sense employed by Marina Welker, 2014).

5.5.3. Social Organizations

In Indonesia, local communities can form Community Empowerment Organizations (*LPM - Lembaga Pemberdayaan Masyarakat*) and Community Resilience Organizations (*LKMD - Lembaga Ketahanan Masyarakat Desa*) at the kelurahan and desa levels, respectively. Differences in their name aside, LPM and LKMD are social organizations that work in collaboration with the government at the kelurahan and desa levels. They are formed on communities’ initiatives and the government can help to facilitate their formation. Their role is to assist the kelurahan and desa governments to implement programs that contribute to community development and empowerment (Peraturan Daerah Kabupaten Gowa Nomor 8 Tahun 2015). The description provided by the treasurer of one of these organizations is that “[LPM and LKMD] are partners of the [kelurahan and desa] governments, [for] community empowerment”. LPM and LKMD have their chairs, vice-chairs, treasurers, and vice-treasurers who are elected, re-elected and replaced every four or five years by community representatives that are invited to participate in a meeting. When talking about the election of LPM’s and LKMD’s representatives, the treasurer that we interviewed suggested that if someone is elected or re-elected for any of the positions mentioned above it does not matter whether the individual is willing to serve as a LPM’s or LKMD’s representative or not; the individual must accept the appointment. The treasurer said, “if elected [as a representative by the meeting attendees] such appointment **must** be accepted because the selection is trust-based; do not disappoint the voters”.⁷⁷

In Parangloe, I witnessed the active status of the LPM in Kelurahan Lanna and the LKMD in Desa Borisallo. I know of the existence and active status of the LKMD in Desa Bontokassi but the scheduled interview could not be held. I was told the LKMD in Desa Lonjoboko is active, but I was not able to interview them. In these four administrative units, their LPM and

⁷⁷ This is my translation of “*Kalau dipilih harus diterima, karena itu kepercayaan, jangan mengecewakan peserta rapat*”.

LKMD organizations are closely linked to river sand and stone mining in that they generate some income from mining activities. The money the organizations make comes from dump trucks who either go to mining sites to buy river materials or belong to mining companies that operate in Parangloe and make deliveries to customers or to themselves in the processing facilities they have somewhere else, like in Makassar and other parts of Gowa.

LPM and LKMD have posts that are strategically located in the roads over which dump trucks must circulate to go from mining sites in the river channel to the main road (Poros Sungguminasa-Malino Road) which connects Parangloe with Makassar and other parts of Gowa. Map 5.2 below shows the location of the LPM and LKMD posts we visited, and photos 5.7 and 5.8 show what they look like. Lanna's LPM has three posts and Borisallo's LKMD has two posts. Local people work in these posts and collect levies from mining. Every time a dump truck leaves the mining site loaded with river sand and/or stone materials it pays Rp. \$5,000 or Rp. \$10,000 in the post (USD30¢ or 60¢); the fee varies depending on the kelurahan/desa. Collectors keep a daily record of the total number of trucks that go through their post and hand in a proof of payment, like the ones shown in photos 5.9 and 5.10 below, every time they receive the established fee from drivers. When drivers work someone else's trucks, they use the proofs of payment to get reimbursed. Collectors hand the money over to their respective LPM's and LKMD's treasurers the following day.

Map 5.2. Location of LPM and LKMD fee collection posts in Lanna and Borisallo.



Photos 5.7-5.10. Fee collection posts and proofs of payment.



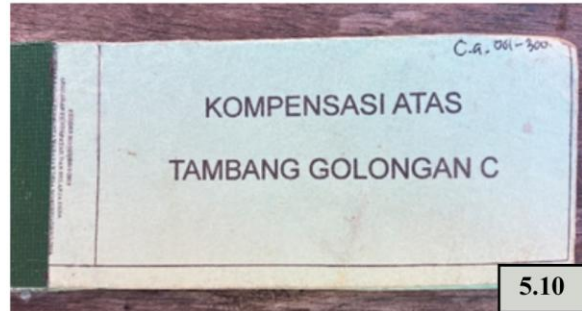
5.7



5.8



5.9



5.10

Photo 5.7: Fee collection post in Lanna; **Photo 5.8:** Fee collection post in Borisallo; **Photo 5.9:** LKMD's ticket book; **Photo 5.10:** LKMD's proof of payment. Photos credit: Wendy Alejandra Medina de Loera.

According to the interviewed treasurer, LPM and LKMD undertake a variety of activities that include the construction of public facilities, the improvement of public areas (e.g., fencing off the soccer field), the organization of social activities (e.g., when someone dies), youth activities (young people are grouped together within the *Karang Taruna* youth organization), and sports events they hold during major public holidays. The treasurer used the adjective *gotong royong* to describe that the type of activities the community does are carried out together and in collaboration with each other. The economic revenue that LPM and LKMD in Parangloe generate from river sand and stone mining is used then for infrastructure development and various community activities. In this way, LPM's and LKMD's income from mining partially trickles down to local people, in kind rather than in cash, as the local community, through their LPM's and LKMD's representatives, participate in the definition of activities and projects in which they will spend their budget. LPM and LKMD have contributed to shape the river sand and stone mining network in Parangloe by

making the more affluent actors such as private companies and consumers to give some of the economic gain generated back to the locality.

As mentioned above, LPM and LKMD work in collaboration with the government at the kelurahan and desa levels. One of the government officers that we interviewed explained that LPM and LKMD “are village organizations but protected by/under the auspices of the kelurahan and desa governments”.⁷⁸ Therefore, LPM and LKMD have government support and the fee they charge is in accordance with government regulations or decisions. This can partially help to explain that those who directly benefit from mining such as the companies that operate in Parangloe and consumers who buy from mining sites have accepted LPM’s and LKMD’s request for a fee for mining activities. However, conversations we held, and my field observations, shed light on a more complex explanation of the ability LPM and LKMD have had for shaping the response of mining enterprises and buyers.

I perceived that a strong sense of social responsibility permeates the social relationships in Parangloe around mining issues, especially towards those who are more socio-economically vulnerable. The account shared by the interviewed treasurer regarding the interaction between local people and private mining company X helps to both see instances of mining companies acting as responsible actors and illustrate the expectations of locals about the behaviour of mining firms. We asked our interlocutor whether there has ever been a situation where the farmers whose rice fields are in the proximity of company X’s mining area have been disturbed by mining activities. The treasurer explained that “farmers’ complaint is that there are some rice fields that are not watered because the irrigation channels have been damaged by the transportation of river sand and stones”.⁷⁹ In this case, he added, “the company sometimes helps to make water ditches to irrigate their fields”. The treasurer’s account suggests that the private mining firm in question has taken responsibility for the impacts of its activities by repairing the damages caused. It also suggests that mining businesses are expected not to affect local people’s assets and livelihoods, to take

⁷⁸ The exact words of the Desa’s head were “*ini organisasinya desa, tapi dinaungi oleh desa*”.

⁷⁹ He specifically said “*Kalau petani di bawah keluhannya ada sebagian sawah yang tidak terairi air karena ulah pabrik, jadi aliran air yang ke sawah itu rusak akibat aktivitas pengangkutan material, baik material batu*”.

responsibility for their actions and to remedy the damages caused. When we asked whether company X has ever refused to help, the treasurer answered with a tone of perplexity that “it **cannot** refuse [*tidak bisa menolak*] because it takes materials and makes money from there, so it **must** participate [*mesti harus berpartisipasi*]”. The treasurer’s use of the words in bold suggest that companies are expected to obligatory act responsibly toward communities.

In the interview with the treasurer, we also talked about the different conditions of the roads that connect mining sites to the main road. The explanation of the treasurer regarding this also suggests that companies are expected to participate in the improvement of roads and that companies have done so. I pointed out that the road heading to the mining area of company A was in much better shape than the road to the mining area of company B. The treasurer explained that “sometimes, when roads are in poor conditions, [LPM and LKMD community organizations] participate; [these organizations] cooperate with [mining companies] for improving the roads”. The idea of companies acting as patrons and as responsible actors can be witnessed through the treasurer’s account. Driven by our eagerness to confirm that we were understanding correctly, we asked the treasurer —so do LPM and LKMD partner with mining companies to improve roads? Our interlocutor responded “yes, [the community organizations] do partner with [companies to improve road conditions]; [companies] need buyers so they **must** cooperate [*mesti harus kerjasama*], [the community organizations] do not do it by themselves”. Here it is about the roads over which companies’ trucks and their consumers circulate. The treasurer’s response in this regard suggests that mining companies are seen as having the obligation to participate in road improvement as they and their consumers are road users and benefit from using them. I interpret that the expected social obligations and the responsibility indeed assumed by mining companies and other mining actors in some instances originate in their capacity to both recognize that the geographic space where they conduct mining activities is no empty space and act accordingly to coexist.

5.5.4. Owners of access roads

While the previous section focused on community organizations and their mechanisms for their interaction with river sand and stone mining actors, this section looks at the actions of individual community members in Parangloe. Specifically, I focus on landowners whose

lands are now access roads to mining sites in one Desa and in Kelurahan Lanna. To start with, interviews and informal conversations gave us important insights into the physical transformations and land use change in Parangloe. These changes are of major importance for understanding and making sense of some of the current dynamics between local people, private mining companies, and the dump truck drivers who go to the area to buy river materials.

In the riverine part of Parangloe there are numerous access roads to mining sites like the ones shown in Map 5.2 above and the collage of photos below. These roads enable dump trucks, and others, to travel from the road that connects Parangloe with Makassar and with other parts of Gowa (called Poros Sungguminasa-Malino Road) to mining sites and vice versa. These roads are wide enough for one or even two dump trucks to circulate in opposite direction. To the foreign eye, like mine, these roads might seem like they were always there. However, the land over which these somewhat broad roads sit formerly had a different use such as vegetable gardens, orchards, cornfields, narrow roads, and they had one or more local owners who currently charge loaded dump trucks a fee for circulating over their land.⁸⁰ I did not explore whether these local landowners had formal rights over the land. My analysis is based on interviewees' claims that the land is owned by an individual or a group of individuals.

⁸⁰ A fee collector explained that where the access road he was watching over is located today there used to be a trail suitable only for motorbikes.

Photo collage 5.1. Access roads to mining sites (rainy season, 2022).



Photos credit: Wendy Alejandra Medina de Loera.

In some of these access roads, local landowners (access roads owners) have set up modest posts where loaded dump trucks pay Rp. \$5,000 or Rp. \$10,000 (USD30¢ or 60¢). In other cases, people just wait outside their house for receiving the money from dump trucks. Fees' variation depends on the owner and on whether a differentiation is made between a small or large truck. Dump trucks are the only road users who pay a fee, and they only do so when they pass through loaded with river materials. I have only witnessed the activities of a few collection points in one Desa and in Kelurahan Lanna, but we were told that there are many posts and that they exist in all administrative units of Parangloe on which I focus. The people with whom we talked in three posts were locals (one woman and two men) who collected the money for landowners and got paid in return.

The fee collector mentioned above explained that the road he was watching over was built in the way it is today as mining activities developed. "This road has an owner", he said. He further detailed that "there was no road before, but someone wanted to do mining, so [the landowner and the person willing to do mining] made an agreement to build a road here using this land". This suggests that mining companies needed to negotiate with local people to be able to have access roads to their mining sites for their own use and their customers'. However, when it comes to the payment of a road fee charged by landowners, this is a practice that landowners have applied and that dump trucks —whether owned by mining companies or by their clients— must comply with. Depending on the route through which trucks circulate, they might encounter one or more fee collection points, and they pay a fee in each post that they are requested to do so. Drivers already know where they have to pay and how much they must pay.

In this case I traced both the moral assumptions of access roads owners and signs that show how mining companies and buyers are complying with the social norms of the owners through the working of private fee collection posts on the ground. The existence of private fee collection posts and fee collectors across Parangloe suggests that there is a popular consensus among local access roads owners on what a legitimate practice of mining companies and their clients is, based on their notions of economic justice flowing from those who benefit the most from mining in the Jeneberang. Owners of access roads expect to obtain

economic benefits from mining and expect mining companies and their customers to obey their rules. Trucks, either owned by mining companies in Parangloe or by their customers, have accepted the terms imposed by individual road access owners, as evinced by drivers' actions; I saw them stopping at the collections posts and handing money to fee collectors. Moreover, interviewees had a reaction of surprise to my questions about whether there have been truck drivers who have refused to pay or not, as if refusal to pay was not something common. My conclusion is that the norm is that drivers accept it is their responsibility to pay, recognizing in this way the rightful position of access roads owners to charge a fee for circulating over their land.

What helps to explain the ability of access roads owners to shape the behaviour of mining businesses and related actors? I argue that dump truck owners and operators are not foreign to the social and cultural logics that shape existing socio-economic relations in Parangloe. Although not all owners and operators were born and raised in Parangloe, and not all of them live there either, they share with Parangloe people many social and cultural elements—such as their Makassarese ethnic background (*orang Makassar*), their Makassarese language (*bahasa Makassar*), and their religion (Islam)—because they are originally from nearby areas that include Makassar, other parts of Kabupaten Gowa, and other Kabupaten of South Sulawesi. All this has equipped trucks' owners and operators with the skills to understand the common sense that prevails in Parangloe and regulates the social, cultural, and economic practices there (Geertz, 1983). Therefore, access roads owners have been able to assert their right to derive economic benefits from others' use of their roads, and road users, whose interest for the transportation and commercialization of river materials is at stake, have been receptive to owners' demands. In this way, people whose land is around the mining site area and through which trucks pass have actively shaped a mining network that is inclusive of them in terms of the monetary benefits trickling down to them.

5.5.5. Local claimants of land that has become part of the Jeneberang river channel

As I noted in Chapter 3, the upper reaches of the Jeneberang, which include Parangloe, are the foothills of Mt. Bawakaraeng and produce a lot of sediment and debris runoff. Every year, heavy rainfall transports these sediments downstream. The area is also characterized by the

yearly occurrence of landslides during the rainy season (Nov-Apr). The collapse of a caldera of Mt. Bawakaraeng in 2004 was particularly generative of a massive amount of sediment and debris. Over time, collapses, landslides and the subsequent sediment and debris runoff have added sediments of different grain sizes (e.g., sand, gravel, cobbles, boulders) to the river channel and banks, and have impacted local people's land/fields in nearby areas by burying them in debris, especially in the uppermost area (Hasnawir et al., 2006, p. 271).⁸¹

Local people explained that the sediment and debris that have traveled downstream have widened the river channel and eroded the banks. As consequence, the plots of land that used to be by the riverside at some point in the past, have become part of the river channel. Although people's lands have been buried in debris and constitute part of the riverbed today, the ownership claims over them, and the social acknowledgment of these claims, have not vanished. During fieldwork I did not explore whether the land claimants had formal rights over this land. My analysis is based on what interviewees indicated was land that belonged to/was owned by X, Y, Z individual or group of individuals.

This section is based on what I observed happening in two locations, in one Desa. Each location belonged to a local individual, as explained by interviewees. The locations included sites in the broad river channel of the Jeneberang which is now state land, something many in the area seem to be aware of. Interviewees, who are third parties in this case, claimed and acknowledged that the land they pointed out to us was owned by individual X and individual Y.⁸² The land, however, has been lost to the river; it lays in the riverbed, and it is part of the river channel today. Further research is necessary to understand the claims of ownership in Parangloe and determine the basis on which certain local people claim the land belongs to them. However, two things are clear: the claimants are indeed land users and local people recognize them as the owners.

The two locations that I observed are used as mining sites. The land claimants have welcomed the partnership with local manual miners and local excavator owners/renters who remove sand and stones from the land they claim as theirs in the river channel. Land claimants put in

⁸¹ Collapses and landslides have also caused several deaths, injuries, and material losses over the years.

⁸² I refer to these individuals as "owners of land" in Figure 3.3 in Chapter 3.

the mining sites and the other actors put in the required workforce and mining equipment. The profit land claimants make comes from a fee manual miners and owners/renters of excavators pay to them for each dump truck they load with river materials.

At first sight, the role local land claimants play in the mining network in Parangloe might seem conventional in the sense that they use, manage, and exploit a mining site as any other mining company in the area with access to a mining site would do. However, they are not so ordinary as in Parangloe most of the mining enterprises with access to a mining site do not partner with manual miners and owners/renters of excavators; they have their own mining equipment and rely on their own workforce. In this sense, land claimants' role in the mining network is more like the role played by the state-owned PD. Jasa Konstruksi. Due to the lack of their own mining equipment and their own workforce, they both follow a scheme of partnerships that broadens the possibilities for manual miners and excavator owners/renters to participate in the mining economy.

Land claimants have actively contributed to shaping the mining network that my research assistants and I came to know in Parangloe by becoming a constitutive part of it; they have become crucial links between local people and the river sand and stone mining economy in the area. It is somewhat fortuitous that they are “gatekeepers” of quarries within the Jeneberang as their former land happened to be in what today is the riverbed and the geographic area is characterized by sediment and debris production and runoff. But land claimants have helped to increase the network's capacity to absorb the local workforce. I interpret that their actions have been deliberately addressed to have a place in the local mining economy. Things unfolded in such a way that in securing a place for themselves, local land claimants have also guaranteed that local manual miners and excavator owners/renters have a place in it. Through the partnerships they establish, they have opened spaces for manual miners, excavator owners/renters and their respective excavator operators and guards to become involved in mining activities. Land claimants have opened work opportunities particularly for those who, by themselves, do not have access to a mining site. It is true that local land claimants derive economic benefits from making these spaces available, but this does not undermine their important active role in shaping the mining network in Parangloe.

The strategy that land claimants have employed to have a place in the river sand and stone mining economy has also been constitutive of unequal power relations between them and the manual miners and excavator owners/renters with whom they partner. Land claimants have the monopoly over quarries within the river and selectively grant access to their quarries in the river channel, while there is a surplus of labour willing and available to participate in the exploitation of the quarry. In their relationship with other mining actors such as the state-owned company and private mining enterprises, the mechanism used by land claimants has enabled them to position themselves as key players in the mining economy, along with private companies, and PD. Jasa Konstruksi.

5.6. Moral Economy

The heterogeneous mechanisms designed and used by local individuals and communities in Parangloe for being included in the mining network have responded to their calculations of both what is necessary and what is possible within the site-specific conditions of political and social power structures and the opportunities they offer.

When it comes to former miners, the support of Parangloe and Lanna governments for FORMAT's formalization suggests that both government levels have made room for listening to their demands and have pushed for avoiding ex miners' complete displacement from the mining network. Ex-miners' organization FORMAT partially owes its bargaining power to the support received from the kelurahan and kecamatan governments. In this way, former miners' agency for shaping the mining network and the mechanisms they have employed for influencing the power relations in their interactions with the state-owned mining company can be partially explained by the opportunities provided by the political power structures.

FORMAT's bargaining power also stems from ex miners' capacity to invoke their right to continue receiving economic benefits from mining for their subsistence. The agreement in force between PD. Jasa Konstruksi and former miners is evidence of this. Ex-miners' ability to mobilize their claims for their right to subsistence is situated within a set of changes in which first the building of Bili-Bili dam and reservoir, and then PD. Jasa Konstruksi's monopolization of the mining site and the mining license impinged on such a right. In this

case, ex-miners' ability to invoke their ideas of economic justice is in their relationship with the state-owned company. Here it is possible that PD. Jasa Konstruksi's nature as a state-owned enterprise has played a role in the company's receptiveness to ex miners' claims for a right to subsistence (and in its attitude towards former landowners who continue to do farming in the mining site the company controls). A comment by the PD. Jasa Konstruksi's employee that we interviewed suggests that the state-owned company perceives itself as having an obligation of setting a good example to other companies.⁸³ In the interview, the employee was referring specifically to the company's obedience to the regulation of not undertaking mining activities without having a valid permit, but his comment hints at the idea that such a role model function might be equally applicable to other situations, like to the relationships that the state-owned company establishes with communities and individuals in Parangloe.

Local governments have also been key for the existence of community organizations such as LPM and LKMD at the kelurahan and desa levels, respectively. While the Indonesian state paved the way for the institutionalization of community participation in organizations of this nature, it has been the governments at the local level who really have borne the responsibility for the formation of LPM and LKMD. For locals, the materialization of concrete community mechanisms such as these community organizations provides tangible evidence of the existence of participatory opportunities. Local individuals and communities in Parangloe have envisaged political opportunities that are available to them (Meyer, 2004) and have taken advantage of them by engaging in LPM and LKMD. The nature of LPM and LKMD as state-sanctioned community organizations might have strengthened their ability to get mining companies and their customers to pay the requested fees. But it cannot be denied that Parangloe people have had the capacity to mobilize their notions of economic justice and, in turn, receive the support of local governments to exact economic benefits from corporations and consumers. It remains to be explored, however, whether charging mining businesses and related actors a fee for mined river materials was an initiative coming from LPM and LKMD or an agenda that local governments proposed LPM and LKMD to pursue.

⁸³ The employee said "*kami harusnya yang memberi contoh Perusahaan yang lain*".

On their part, the agency that other local actors —such as owners of access roads and former landowners who still undertake agricultural activities in PD. Jasa Konstruksi's mining site— have had for influencing the actions and behaviour of mining companies can be explained by their ability to invoke a moral economy of obligations and assert their rights to subsistence and/or to benefit from mining. The opportunities that the social power structures in Parangloe have offered to them have also played a role in all this. In the case of access roads owners, their position as the current owners of a plot of land has made their demands legitimate to the eyes of mining companies and their clients. Their capacity to receive a payment for the use of their access roads has, in turn, reinforced their recognition as owners and has strengthened their position within the local social hierarchy as nowadays they are not only landowners but also key elements in the mining network. The mechanism access road owners have used in their relationships with private mining companies and their customers has shaken and challenged the uneven power relations between them, but it has not turned them around.

A moral economy approach helps to account for the agency of local people in mining network shaping as it frames mining corporations as local and enmeshed in and negotiating local moral economies. This understanding of companies provides a grounded view of their behavior rather than assuming they all behave uniformly across geographies and throughout time (Sternberg, 2020, p. 1397) and situates them as subjected to the expectations that people develop based on their notions of obligations. In Parangloe, I see that people's notions of obligations are rooted in a combination of place-based ideas of economic justice, Islam, and old but persistent and changing social hierarchies traced to the Kingdom of Gowa.

The framework is also useful for understanding that people continuously imagine and construct corporations in certain ways and assign responsibilities to them (Welker, 2014), and that all this mediates people's interactions with them. Seeing companies as entangled in local sociocultural and political dynamics and as continually imagined, reimagined and constructed as actors also helps to both see that companies engage in everyday negotiations with local people and make sense of the ways in which corporations seek to navigate and meet the expected obligations. Framing corporate power in such a way is useful for

understanding the successes of local people in shaping the network in ways that generate benefits for them. But the moral notions that local people have developed and the responses of companies have not remained in the realm of the ideas; they have been informed and (re)shaped by material inequalities, uneven power relations and differentiated possibilities for accessing and benefiting from resource exploitation.

More broadly, a moral economy approach to the relationship between corporate power and local people also helps to make sense of the heterogeneity of corporations' behaviors which can be seen even in one island (such as Sulawesi). For instance, the attitude and actions of the state-owned company in Parangloe towards former landowners who continue farming in the mining site contrast with what Robinson (2016) documented in a nickel mining area in other part of Sulawesi where PT Inco, a subsidiary of International Nickel Company of Canada (p. 151), "enforced a ban on keeping buffalo and on burning forest to prepare swidden rice fields on lands adjoining the concession area" (p. 145), impacting the local subsistence economy. Thus, the diversity of experiences with mining invites us to consider in our accounts the type of relationships that companies and people establish which are informed by logics that go beyond profit and include religious aspects, long-lasting but changing social hierarchies and values and notions associated to them.

This chapter contributes to our understanding of the factors and processes through which mining networks come to life, take the form they take, and get transformed over time. In contrast with the two previous chapters in which I emphasize the material characteristics of the mining network's components, in this chapter I have brought local people's agency to the forefront of my analysis. However, the material is still present in this chapter: it has informed what local people in Parangloe see as legitimate practices of mining companies, their place-based notions of respectful and reciprocal corporate practices, and the claims they make and seek to mobilize and exert. The cases of former landowners in Lanna, owners of access roads, and local claimants show that the transformations of the physical environment have impacted them by changing their relationship to their land. Former landowners' land was submerged when Bili-Bili dam and reservoir was constructed, access roads owners experienced the land use change of their plots, and local claimants' land was "eaten" by the river. Their claims for

rights to benefit from mining or for continuing accessing the land for produce are grounded on a material past. Namely, the physical environment they used to know, experience and inhabit. That local people trace their claims to a material past and root them in it past partially helps to explain that they have been successful in mobilizing them with mining companies.

5.7. Conclusion

In this chapter I have shown that people who live in the vicinity of mining sites actively participate in moulding the behaviour and actions of mining corporations. To explain people's ability to shape the behaviour of mining corporations according to their interests and expectations, I have approached the relationships between communities and corporate power as situated within a framework of shared values and ideological forms that facilitate that companies accept the claims that locals make. All this, I have argued, has been facilitated by the type of companies that come into play both in terms of their local origin and their size. I have employed a moral economy perspective to make sense of people's claims and their capacity to mobilize their claims and, in turn, get companies to respect their right to subsistence either mining-dependent or not. My main goal in this chapter was to show that local communities are not passive recipients of mining impacts and that they design and implement mechanisms other than direct resistance and opposition towards corporate power to make companies to complain to what they see as legitimate practices that are respectful of their subsistence ethic. The place of this chapter in the dissertation is that it reminds us that the constitutive parts of mining networks not only change over time but that they are malleable.

My analysis in this chapter draws on and is linked to a work of body within the wide literature on mining. Scholars of this field have focused on the complex relationships between corporations and local communities in mining areas. They have not only shown that local communities actively participate in shaping mining, but that local communities exert influence over mining corporations (Walter & Martínez-Alier, 2010; Merino Acuña, 2015; Verbrugge, 2017; Brown & Spiegel, 2017; Sternberg, 2020). Social mobilizations, protests, and resistance are the main mechanisms that the literature has documented. I add to this

scholarship by analyzing local people's actions and companies' responses within a materially place-based sociopolitical and economic framework where popular claims are strongly attached to the materialities of the space, especially of the physical environment.

The chapter also connects to the emerging sand mining literature and their efforts to not only document and understand the impacts of sand mining on people but also the actions that people take in sand mining settings for protecting their livelihoods and their subsistence ethic. I contribute to this literature by proposing to understand people's actions in this regard and positive company responses as an outcome of shared values and understandings and the companies' entanglement in local moral economies which, together, boost people's abilities to mobilize their claims.

Chapter 6. Conclusions

In the dissertation I have argued that material elements—including the river, water, sand, stones, topography—and human elements—including the actions of local people—actively participate in shaping mining networks. And that they shape these networks by interacting with political economic processes and socio-cultural factors. In the case I study the political economic processes include the increasing need for construction materials associated with urban growth and urban sprawl, the politics of access to mining sites, employment policies, the interactions between government levels and so on. And the socio-cultural practices include site-specific notions of obligations and reciprocity, family and kinship relationships, general demographic homogeneity and so on. This place-based interaction influences how mining networks come together or, in other words, what the provisional (either fleeting or long-lasting) constitutive parts of the place-based socio-material associations are and how they interact with each other. I grounded my research on the socio-material associations that I interpreted had been formed around sand and stone mining in the Jeberang river. A key idea linked to my overall argument is that the socio-material associations that I call mining networks throughout the dissertation are temporary and take different forms. I make this assertion based on both the mining activities I witnessed in the field in 2019 and 2022, and on what I was able to trace about the recent past through studies conducted in the area by study teams commissioned by Japan International Cooperation Agency.

I mainly engage with the incipient but fast-growing sand mining literature in this dissertation. I anticipate that detailed research of river sand and stone mining activities in Indonesia could greatly contribute to our understanding of how mining is done, by whom, when, since when, where, why, and with what implications for local people. I consider that one of the main contributions of my study relates to the rich detail it provides regarding the physical environment, the sand and the stones, mining temporalities, mining operations, mining actors, the corporate structure, mining equipment, labour arrangements, worker categories, work in mining, government roles, and so on. The features that I record in the dissertation also contribute to documenting the heterogeneity of our material world. My goal was to map

and scrutinize the various changing elements that constitute the mining networks that have existed in the Jeneberang river in the late 20th century and early 21st century.

Scholars studying sand mining have considered various political, economic, social and cultural factors that shape how mining happens, in terms of who gets to participate in mining, how and why. Institutional set-ups, legal frameworks, political settlements, and gender norms have been some of the elements that scholars have analyzed in their explanations of why certain groups gain access to sand exploitation and not others (Hougaard & Vélez-Torres, 2020; Ameziane & Suykens, 2023; Kauffer & Torres, 2023). My main contribution to this literature is that I have closely examined the material aspects of the place that I study to provide a spatially grounded analysis of the regional political economy of sand and stone mining in the Jeneberang river (building on Gallardo Zavaleta et al., 2023). Thus, my work is not only grounded in terms of sociocultural dynamics and political economic processes but also in terms of material features and changes. The shifting material characteristics that I highlight in the dissertation are rooted in a geography of a sediment producing area that makes the Jeneberang river a sediment-rich (transformed) water body. I deeply explore the material features of the geographical space that I study and the technologies used in Chapter 3 and Chapter 4.

Related to the above, I consider that other main contribution of my research is bridging the gap between the social and the material, especially for the physical environment. Geographical spaces are constituted by a set of physical, biological, and human elements and processes, and by complex interactions between them. In the dissertation I unpack this web of elements in order to identify them and analyze their role in enabling certain configurations around river sand and stone mining. I also make connections between them to make visible the ways in which they actively generate socioeconomic and political outcomes which materialize in a mining network. I do all this in Chapter 3 and Chapter 4.

Work within the sand mining literature has approached mining activities from a historical perspective (Ameziane & Suykens, 2023; Rahman & Suykens, 2023). I build on this work by offering a historical analysis of mining networks in the Jeneberang. My goal was to highlight that mining networks change over time. More precisely, that the form they take

varies over time because their constitutive parts and the interactions between them are constantly changing. My contribution is that I have brought the material to the center of my historical analysis to show that the transformations of the ways in which mining is undertaken and is organized cannot be disconnected from the changes of the physical environment which generate spatially grounded conditions that enable or constrain some forms of organization over others. Empirically I show that a human-led major transformation of the Jeneberang in the 1990s, which materialized in the construction of a dam, a reservoir, and sediment control structures, boosted the availability of sand and stones upstream the river and contributed to the emergence and development of large-scale mining companies and to a decreasing number of people engaged in manual mining. I examine these changes in Chapter 3.

I devoted Chapter 5 to an analysis of how the mining networks were shaped by local residents, using a moral economy approach. Some sand mining literature has shown how individuals and communities have acted to influence sand mining operations and/or to transform how they take place (Athukorala, 2009; Khan & Sugie, 2015; Zhu, 2020; Runeckles et al., 2023). In this regard, my dissertation shows three main things. First, that mining networks are malleable and subject to change. Second, that local people actively participate in shaping the actions and behaviour of one main constitutive part of mining networks: mining corporations. Third, that in certain cases where corporations are entangled in social dynamics and enmeshed in local moral economies local people can successfully mobilize their claims for subsistence (which are underpinned by moral and religious notions of obligations) and achieve that mining companies respond favourably to them. Thus, a contribution of my dissertation is a demonstration of how to use a moral economy framework to better account for the interactions between local people and corporate power, including their interactions in the fields of employment and artisanal small-scale mining-large scale-mining interactions.

My decision to focus on how local people's actions shape mining networks goes back to the very first time I witnessed the mechanisms that I explored in Chapter 5. Since that moment I became committed to documenting what I see as grassroots politics around mining. From my perspective, it is likely that mining operations in the Jeneberang will become recorded history

partially because they have been the focus of local research and partially because of the footprint mining activities might leave. I am less sure about whether the mechanisms employed by local people will leave their trace in written form. On the ground, probably these mechanisms will become treasured in the historical memory of Parangloe people. Chances are also that, rather than becoming part of the collective memory, as a social and political practice lost in time, these mechanisms will continue to be put in practice as long as there continue to be mining operations. The generational change, among other things, might pose challenges for their continuity, though. Time will tell and I hope to be able to see it and examine it through a longitudinal study.

Another contribution that I have sought to make through my dissertation is to bring sand mining literature and mining scholarship closer to each other. Within mining scholarship, I specifically engaged with both a strand of ASM literature interested in understanding ASM-LSM links and work that examines the relationships between mining companies and local communities. My engagement with both has encouraged me to reflect on and identify the specificities of river sand and stone mining as it refers to the sand, the stones, the river, the workers, the type of mining companies, the know-how knowledge, and so on. Engaging with strands of the extensive existing research on mining can strengthen our abilities for doing careful comparative work that considers the heterogeneity of the material world. In this sense, my study also contributes to the literature on extractivism. Partially by strengthening and extending the ideas of hydroextractivism and partially because of how I have brought the ideas of *extractivism* to Asia and transformed them. I do this by considering how the interactions in which government, communities, and corporate power engage are distinct from those we see in the region where the ideas of *extractivism* were born.

I showed in the dissertation that the ways in which mining networks come together have implications for local people. In Chapter 3 I showed the implications that a mining network predominantly constituted by Limited Liability companies and mainly focused on stone mining has had for a bigger exclusion of individual mining businesses (sole proprietorships) as mining sites and mining technologies are no longer easily accessible to them. In Chapter 4 I showed that the implication of the current mining network for local people is that they

still find work in mining, but for some of them it has meant to be in partnerships that generate less income for them when compared to their past experiences of partnerships. For those who have been employed by private mining companies, the implications have been more favourable as they have a job in a rural area characterised by limited job opportunities outside the agricultural sector. In Chapter 5 I showed that local people have had the ability to shape the behaviour of mining corporations which are one main constitutive part of mining networks. The implications of this have been that these people have been able to either continue their agricultural livelihoods or derive income from mining operations. Taking all this together, I identify a bigger implication for local people, for mining companies, and for government authorities: that combined, all the implications I explained above, have contributed to a lack of popular opposition to river sand and stone mining among the communities that have long lived around the Jeneberang.

Finally, with this study I seek to contribute to existing research on mining in the Jeneberang. Such research can be described as fragmented in the sense that it has tended to focus on an individual Desa/Kelurahan and on specific actors (government, local people, companies). Then, my main contribution to this research lies in offering a general historical analysis of river sand and stone mining in terms of actors and places. My study looks at mining companies, but also at workers and politics, and it focuses on the riverine part of Parangloe, treating the mining area as a whole.

In the following section I explain what I see as the practical implications of my research.

6.1. Practical implications

The empirical information I described in my dissertation can contribute to broaden our knowledge about sand and stone mining in Indonesia. Thus, it has practical utility as a source of knowledge. It is true that it is very specific to one (out of many) location, but its connections with the development of Makassar as the main urban hub in Eastern Indonesia make it representative of other urban centers in the country as they grow at a rapid pace.

The Indonesian government, through Statistics Indonesia (*Badan Pusat Statistik*), produces statistical information about quarrying (Indonesian Quarrying Statistics). This statistical data

registers the yearly estimated volumes of sand mined at the national levels, the estimated total number of quarrying establishments, and the workforce in the quarrying industry according to the type of material extracted (Sodikin & Gumelar, 2016). These national statistics offer a general picture of sands mining in the country but do not help 1) to distinguish one kind of sand from another (except for quartz sand); 2) to identify the spatial distribution of mining operations in the country; and 3) to identify the amount of mined sand by its origin (whether it was removed from the coast, the sea, river beds, or from a sandpit). I anticipate that my research can contribute to addressing these empirical limitations.

At the Kabupaten and Kecamatan levels, my research helps to address an apparent knowledge gap regarding the estimated number of people who work in mining in Parangloe. In Chapter 4 I presented the figure that I calculated, but as far as I could confirm in the field, no official statistics are kept regarding this. I anticipate that my study has the potential to encourage the collection of such statistical information to get a more precise idea of the importance of mining activities in Parangloe in terms of employment and relevant details about the workforce. It is my impression that the Indonesian government invests substantial economic and human resources into statistical data collection and has endeavored to keep records of many socioeconomic issues. Thus, I see potential in my research motivating government agencies to gather data of work in mining, which is relevant for understanding agrarian transitions, among other things.

My documentation of the workforce in river sand and stone mining in the Jeneberang also has the potential to be used as a source of knowledge by those in Parangloe who are trying to be officially allowed to do mining. Specifically, by a group of local small-scale miners in the reservoir area who use pumps as mining equipment. My study shows that mining in the area employs a significant number of people and that it is a source of cash not only for those directly involved in mining stages such as removal, processing, trade. Thus, what my research demonstrates quantitatively and qualitatively can help supporting the arguments of those who demand to open the reservoir area as an official mining zone specifically for small scale miners.

A broader practical implication of my research that I see is that my explanation may inform policies concerning the formation of mining networks elsewhere.

6.2. Future research

In my dissertation, I approached mining networks as process rather than as “end products”. This is methodologically useful as it requires the analytical exercise of identifying and unpacking their component elements. Moreover, framing them as “in the making” helps to address the normative purposes of showing their malleability and shedding light on the possibilities of their transformation. Their shifting character suggests that other outcomes are possible, in terms of political economic arrangements and the extractive relationship with the physical environment. A trade-off, however, of in-depth analysis of some of the networks’ constitutive parts is that the examination of these networks is not exhaustive.

In Chapter 3 I examined two forms that the socio-material association I call mining network has taken. In focusing on the big picture of the transformation over the last 40 years or so, I gave a general overview of power dynamics in the current network, but I did not trace specific power relations (e.g., political and family connections, economic power, social status) that influence who the owners of mining businesses are, who the owners of mining equipment and permit holders are, among other things. A finer analysis of uneven power relations at the heart of the present mining network is an area for future research. Additionally, in looking at the general historic transformation I sacrificed a detailed examination of the changes that the present mining network has undergone from the early 2000s to date. Semi-structured interviews and conversations shed light on some transformations such as the spatiality of mining activities in the upper reaches area and work organization (e.g. gendered work, labour arrangements, mining licenses, mining methods), but I did not examine them extensively. Such an analysis could help both elucidating the expansion of capitalist relations in river sand and stone mining in Parangloe prior to the arrival of large-scale mining companies, and showing the transformations of these relationships once these companies became the main mining actors.

Inspired by Ameziane & Suykens (2023), my analysis in Chapter 3 opens an area for further research focused on regulatory frameworks and political settlements to better understand the role of government policies and the politics of river sand and stone mining governance respectively. I endeavoured to do some of this in the chapter but given my interest in bringing the material dimension to the center of my analysis, my examination in this regard was not that exhaustive. Although there is no guarantee that policies on paper will be implemented as designed, they do shed light on the distribution of responsibilities among government levels and agencies and can help to explain how certain mining actors and not others come to predominate in the mining network. Examining the politics of mining governance can show the actual actions of these different government levels and agencies that shape who get to participate in mining and how, and who does not get to be part of it. More importantly, they can reveal the divisions and discrepancies within “the government” according to scale and agency and the implication of the interactions between political and economic power for the configuration of the network.

In Chapter 4 I focused on how locals came to constitute the workforce of the present mining network. In providing a general overview I omitted a more profound analysis of the differentiated experiences and power positions of those who have joined the mining sector. For instance, for local landowners with access to a mining site, their participation in mining has been influenced by the combination of geological processes and their ability to continue asserting their claims on land that has now be lost to the river channel. But others who have also lost their agricultural land to the river channel, have engaged in mining activities as manual miners instead (without access to a mining site in their own). Thus, future research can further explore this to help elucidating both the unequal circumstances of Parangloe people who have been able to secure jobs in mining and the ways in which these inequalities shape how people join and work in mining.

In looking at the “local” composition of the workforce, I have omitted both a gendered analysis of work in mining and an examination of whether Parangloe people have tried to work in mining but have not been able to secure a job and why. Regarding the gendered perspective, there are about 10 women who work as manual miners in Desa Lonjoboko. Their

motivations for engaging in mining activities and the specific socio-economic circumstances that have driven them to do it are part of my pending research agenda. As for locals who have not been able to work in mining, further research is necessary to explore the socio-economic circumstances and power dynamics that have prevented them from participating in the mining economy(ies), apart from the role of family relations in facilitating that locals secure a job in mining.

Considering that religious beliefs and practices permeate everyday life and they have shaped certain understandings, attitudes, behaviours, and so on in Parangloe, Chapter 5 opens a line of enquiry in relation to the influence of Islam and Imams on the ways in which governments, mining companies and local communities interact with each other in Parangloe. Khan & Sugie (2015) similarly shed light on the active role Imams in Bangladesh play in shaping (or trying to shape) mining networks or resisting mining activities (pp.7-8). An access road owner in Parangloe explained once that he gives some of the money he collects from trucks to the local Mosque. Thus, in-depth analysis of this can help to better understand the responses of companies, governments, dump trucks and others towards the demands of local populations.

Finally, I see my study as the first stone of a larger project that ideally would encourage the working together of a multidisciplinary group of researchers and would foster Mexico-Indonesia relationships. I feel inspired by the multidisciplinary and binational work of the Val-Uses project that examines the sediments in the Usumacinta river in Mexico (CCGS TV, 2022). I anticipate that something similar can be done in the Jeneberang. This would not be the first time of a Mexico-Indonesia binational team working together in issues related to the Jeneberang area (see Hasnawir et al., 2018).

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Appendix A: Parangloe land area by type of farming land

Land use	Land area (ha)	Land area (ha)
	2019	2022
Dry/non-flooded agricultural fields	15,740	15,678
Sawah/flooded agricultural fields	1,089	1,151
Non-agricultural land	5,297	5,297
Parangloe total land area	22,126	22,126

Source: Table created by author based on Badan Pusat Statistik Kabupaten Gowa, 2020, p.37; Badan Pusat Statistik Kabupaten Gowa, 2023c, p. 36.