Approaches to manganese mining in West Timor, Indonesia: Perspectives, values, beliefs and sustainability

by

Hannah Jane Ling

B. Sc (Honours) Flinders University, Adelaide
Grad. Dip Indigenous Knowledges, Charles Darwin University, Darwin

This thesis is submitted in fulfilment of the requirements of the degree of Doctor of Philosophy
December 2018

Research Institute for the Environment and Livelihoods
College of Engineering, IT and Environment
Charles Darwin University

Author's Declaration

I hereby declare that the work within this thesis, now submitted for the degree of Doctor of Philosophy of the Charles Darwin University, is the result of my own investigations, and all references to ideas and work of other researchers have been acknowledged. I certify that the work embodied in the thesis has not already been accepted or submitted for any other degree.

Signature: [redacted]

Date: 3rd December 2018

Abstract

There is a growing momentum globally to situate artisanal and small-scale mining (ASM) as a positive livelihood activity due to its potential to contribute to sustainable development. This discourse has acknowledged the significant negative impacts of past mineral governance and large-scale mining activities on local communities, particularly rural and indigenous peoples who may adhere to different perspectives, values and beliefs than mainstream society worldviews. Furthermore, local people's views are rarely considered in policy, management and governance of mineral resources.

The aim of this PhD research was to investigate local worldviews, consisting of perspectives, values and beliefs, which define the role of manganese mining in contributing to sustainable livelihoods and development in West Timor, Indonesia. The research was guided by four objectives regarding: 1) the distribution, practice and characteristics of manganese mining in West Timor; 2) the range of perspectives and values towards positive and negative impacts of manganese mining as a livelihood strategy; 3) the influence of local beliefs on different approaches to manganese mining; and 4) current policies and governance systems that constrain or support manganese mining as a sustainable livelihood.

The research applied a grounded theory approach. Over ten months of fieldwork, 133 semi-structured and key informant interviews were conducted with miners, village leaders and landholders across ten locations. Discussions were also held with government employees, company managers and NGOs in each district. Data were analysed qualitatively using three frameworks – a perspectives, values and beliefs

framework and a cyclical worldview framework, applied to investigate the diversity and dynamic nature of responses to mining, and the sustainable livelihoods framework to assess mining livelihoods.

Manganese mining started in 2007, and quickly spread across all five districts, engaging approximately 350,000 people by 2012. Manganese mining differs significantly from other forms of ASM. Local people who practiced mining viewed it as a positive livelihood option, commonly combined mining with existing agricultural activities and were able to address the minimal negative impacts. However where manganese mining was undertaken by a company using heavy machinery there were decreased benefits to communities and higher levels of negative environmental and social impacts. There was a diversity of beliefs applied to manganese mining, leading some communities to choose not to mine, whereas others protected sacred areas or used rituals to permit the extraction of manganese.

The tendency for government to favour mining companies over community-based ASM and view it as “illegal” has stifled the potential of ASM to contribute to local livelihoods. Policy and governance improvements, including recognition of local rights over mineral resources and acknowledging the positive contributions of ASM to local livelihoods, will enable more sustainable outcomes from mining in Indonesia.

Acknowledgements

Firstly, I would like to thank my four supervisors. Associate Professor Natasha Stacey, your constant dedication and advice went far beyond what I could have asked for. I have always felt supported and in safe hands. Rohan Fisher, thanks for your support and inclusion in the GPFD project activities and the many conversations through mountain roads in West Timor, your knowledge in the field was much appreciated. To Dr Wayan Mudita, thank you for welcoming me into UNDANA and always providing time and expertise when needed. To the late Dr Bronwyn Myers, your encouragement brought me to take on this PhD and in memory your guidance has been with me throughout this journey.

I would like to acknowledge the financial and logistical support provided by Charles Darwin University and Universitas Nusa Cendana to undertake the PhD. The Government Partnerships for Development project through the Department of Foreign Affairs and Trade provided funding for the research. Thanks to RISTEKDIKTI (Indonesian Department of Research, Technology and Higher Education) and TEKMIRA in Kementarian ESDM (Indonesian Department of Energy and Mineral Resources) for assisting and supporting this research.

To friends and family, your constant enthusiasm and encouragement has got me through, I am so incredibly grateful for your support. Luke, thank you for adventuring with me to distant places and standing beside me in the difficult times. Mel, thank you for travelling with me through the thesis writing mountains, as always so glad we walk these paths together. To Mum and Dad, I am so deeply grateful for your love

and support, for the long sessions on the whiteboard, venturing out to remote villages and for always being there.

To Willy Daos Kadati, for being an incredible guide. Thank you for so openly sharing your knowledge, experience and enthusiasm. I could not have done this without you.

And finally, and most importantly to the people of West Timor, I deeply appreciate your warm hospitality, laughter and patience. Thank you for giving your stories, opening your doors and sharing your food. I am so humbled by your generosity and I will carry you with me always. And thanks to those both seen and unseen who guided and protected me each step of the way.

Publications derived from this thesis

Ling, H 2017, 'Community mining in West Timor', *Inside Indonesia*, 130, http://www.insideindonesia.org/community-mining-in-west-timor.

Fisher, R, Ling, H, Natonis, R, Hobgen, S, Kaho, NR, Mudita, W, Markus, J, Bunga, W & Nampa, W 2018, 'Evidence for artisanal small-scale mining supporting rural livelihood diversification: The case of manganese mining in West Timor, Indonesia', *The Extractive Industries and Society*, in press, https://doi.org/10.1016/j.exis.2018.08.004.

Papers presented at International Conferences

Ling, H. (2015) Stakeholder worldviews and the social and environmental impacts of artisanal and small-scale manganese mining in West Timor, Indonesia, presented at *Between the Plough and the Pick: Informal Mining in the Contemporary World*, International Conference Canberra, Australian National University, 5-6 November 2015.

Ling, H. (2016) Perspectives, beliefs and approaches to small-scale manganese mining in West Timor, Indonesia, presented at *Community Mining in Indonesia: Minimising Harm, Maximising Benefits*, International Conference Jakarta, 2-3 November 2016.

Ling, H. (2017) Protecting the sacred, taming the sacred: Views on manganese mining in West Timor, Indonesia, presented at *International Symposium on Society and Resource Management*, International Association for Society and Natural Resources, Umeå - Sweden, 19-22 June 2017.

Table of Contents

List of Figures

List of Tables

Abbreviations and Acronyms

AMAN	*Aliansi Masyarakat Adat Nusantara* (Indigenous Peoples' Alliance of the Archipelago)
AMDAL	*Analisis Mengenai Dampak Lingkungan* (Environmental Impact Analysis)
ANU	Australian National University
APRI	*Asosiasi Penambang Rakyat Indonesia* (Association of Community Miners Indonesia)
ASGM	Artisanal and Small-scale Gold Mining
ASM	Artisanal and Small-scale Mining
ASMM	Artisanal and Small-scale Manganese Mining
AUD	Australian Dollar
BLHD	*Badan Lingkungan Hidup Daerah* (Regional Environmental Body)
CDU	Charles Darwin University
ESDM	*Kementerian Energi dan Sumber Daya Mineral* (Indonesian Ministry for Energy and Mineral Resources)
FPIC	Free, Prior and Informed Consent
GIS	Geographical Information System
GPFD	Government Partnerships for Development
HDI	Human Development Index
IDR	Indonesian Rupiah
IPR	*Izin Pertambangan Rakyat* (Permit for People's Mining)
LSM	Large-scale Mining
MM	Manganese Mining
NGO	Non-Government Organisation
NTT	Nusa Tenggara Timor (Province of East Nusa Tenggara)
OBAMA	*Ojek Bawa Mangan* (Motorbike rider carrying manganese)
PETI	*Penambang Tanpa Izin* (Miners without a licence)
RISTEKDIKTI	*Kementerian Riset Teknologi dan Pendidikan Tinggi* (Indonesian Ministry for Research, Technology and Higher Education)
SLF	Sustainable Livelihoods Framework
SSM	Small-scale Mining
SULTRA	Sulawesi Tenggara (Province of Sulawesi Tenggara)
TEKMIRA	*Pusat Penelitian dan Pengembangan Teknologi Mineral dan Batubara* (Centre for Mineral and Coal Research and Development Technology)
TKI	*Tenaga Kerja Indonesia* (Indonesian Workers)
TTS	Timor Tengah Selatan (District)
TTU	Timor Tengah Utara (District)

UHO	Universitas Halo Oleo
UNDANA	Universitas Nusa Cendana
US	United States
USD	US Dollar
WALHI	*Wahana Lingkungan Hidup Indonesia* (Indonesian Forum for the Environment)
WPR	*Wilayah Pertambangan Rakyat* (Area for Peoples' Mining)
WT	West Timor
YABIKU	*Yayasan Peduli Perempuan Kampung* (Care of Village Women Foundation)

Chapter 1: Situating the Research

1.1 Introduction

In recent years there has been a growing momentum globally to situate artisanal and small-scale mining (ASM) as a positive livelihood activity due to its potential to contribute to sustainable development, particularly at the local level (Amankwah & Anim-Sackey 2003; Hilson 2016; Hilson & McQuilken 2014; Lahiri-Dutt 2004). This momentum has encouraged a change in perspectives relating to:

a) Situating ASM as a legitimate livelihood activity and incorporating ASM within the poverty alleviation and sustainable development agenda (Hilson 2016; Maconachie 2011; Tschakert 2009);
b) Acknowledging past mineral governance and large-scale mining activities have had significant negative impacts on local, rural and indigenous communities (Acuña 2014; Ballard 2001; O'Faircheallaigh 2013);
c) Recognising and supporting local and indigenous rights over resources including minerals, viewing minerals not only as a national commodity but also as a local resource (Barney 2018; Jønsson & Fold 2011; Spiegel 2012).

In this context, this study investigates the role of manganese mining, a form of ASM undertaken in Indonesia, in contributing to sustainable development, as perceived at the local level. In doing so this PhD research examines how manganese mining (described in Chapter 3) contributes to sustainable development in a livelihoods context from the perspective of local people and their values (Chapter 4), how it is made meaningful and governed through belief systems and customary governance

(Chapters 5 and 6), and how current national policies and government perspectives support or hinder manganese mining for sustainable development as a legitimate livelihood activity (Chapter 6).

This chapter begins with an outline of the key issues in defining sustainable development within the field of the extractive industries and ASM, taking into consideration differing worldviews, and frames these issues within an Indonesian context, identifying the relevant knowledge gaps. The thesis aims and objectives are then presented with the significance of the research, to demonstrate how the research addresses the current knowledge gaps in the field of sustainable development and ASM. The chapter concludes with an outline of the thesis structure, describing the content and organisation of the chapter themes.

1.2 Key Issues in Resource Extraction and Sustainable Development

1.2.1 Sustainability in Mining, Development and Livelihoods

The extraction of mineral resources is one of the most controversial industries in the world regarding sustainability (Fonseca et al. 2013; Guirco & Cooper 2012; Whitmore 2006). Mining, both large and small-scale, are associated with extreme and sometimes irreversible environmental and social impacts (Dudka & Adriano 1997; Gamu et al. 2015; Hilson 2000; Kumah 2006) leading to strong negative perceptions of the industry (Hodge 2014; Jenkins & Yakovleva 2006; Whitmore 2006). Yet mineral reserves are also viewed as a key resource for development particularly in rural and remote regions where economic opportunities are limited (Langston et al. 2015).

There has been a growing global movement over the last couple of decades to make mining more sustainable by monitoring and regulating the environmental and social impacts, and channelling the profits to particular projects and aims, using various indicators, frameworks, licences and reporting systems to ensure accountability (Fonseca et al. 2013; Moran & Kunz 2014). This has included the introduction and implementation of Corporate Social Responsibility (CSR), social licences to operate and various sustainability frameworks, across multiple continents (Fonseca et al. 2013; Owen & Kemp 2012; Yakovleva 2017). In addition, the push for mining to become more sustainable has required defining sustainability within the field of resource extraction. This has led to considerable discussion in the literature as mining is "inherently unsustainable" (Young & Septoff 2002, p. 1), given as it is based on a finite resource and thus has a limited timeframe (Amankwah & Anim-Sackey 2003; Hilson & Murck 2000). Some argue that mining can never truly be sustainable, whereas others propose that mining can contribute to sustainable development (Erb 2016; Kirsch 2010; Whitmore 2006). These two polar perspectives are referred to as "strong" and "weak" definitions of sustainability respectively (Davies et al. 2012; Guirco & Cooper 2012; Han Onn & Woodley 2014).

Strong sustainability takes a conservative approach where manufactured (human made) products and natural capital (the resource) are not interchangeable, and human, environmental and economic capital must be sustained independently of each other (Blignaut & Hassan 2002; Guirco & Cooper 2012). Strong sustainability recognises that natural capital must be maintained in its original state as it performs various ecosystem services such as the flow and purification of groundwater by

limestone or air purification by plants which cannot be duplicated to the same effect as manufactured capital (Dietz & Neumayer 2007). In contrast, weak sustainability views natural and human-made capitals as interchangeable and promotes the flow of income and other benefits to support human welfare into the future, with the focus on transforming and improving assets as a whole rather than the maintenance and continuation of the natural resource capitals as separate entities (Davies et al. 2012; Rodrigues da Silva Enríquez & Drummond 2007). Therefore under the weak sustainability definition, mining may still contribute to negative social and environmental impacts and be considered sustainable as long as it is causing as little damage as possible while generating profitable outcomes for human wellbeing (Guirco & Cooper 2012; Han Onn & Woodley 2014).

A definition of sustainability in regards to mineral resource extraction includes a description by Hobbs (2005, p. 24) where sustainable mining converts:

> '*...what has been described as the vicious cycle of extractive investments to a virtuous cycle where jobs are created, revenues collected and managed competently, incomes saved and reinvested, there are forward and backward economic linkages, diversification is encouraged and environmental and social impacts managed, and where poverty and unsustainability are replaced by prosperity and sustainability'.*

This definition of sustainability in the field of resource extraction falls somewhere between the strong and weak definitions provided above.

Definitions of sustainability in the field of mining have been criticised as they are created predominately within a Western capitalist worldview, regardless of the fact that mining involves and impacts significant populations of rural and indigenous peoples who may adhere to worldviews with different perspectives and values (McGregor 2004). For example, continued meaningful connection to the land may be a central concept in sustainability definitions for indigenous peoples (Starke 2002). The role and perspectives of indigenous peoples and their relationship to the resource industries in the context of sustainable development has received little attention in the literature (Crawley & Sinclair 2003; Lertzman & Vredenburg 2005). However indigenous perspectives on sustainable development and resource use are particularly relevant because of their long-standing use and knowledge of ecosystems, and their complex and dynamic relationships to the natural environment (Berkes 2012; Lertzman & Vredenburg 2005; McWilliam 2001; Palmer 2015).

Sustainability has also been defined in the context of rural development and livelihoods. One of the earliest definitions of sustainable development was described in the global report *Our Common Future*, by the Brundtland Commission, as meeting "the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987, p. 16). The report also emphasised that there is not one single framework or blueprint for sustainability that covers all situations and that the application of sustainable approaches must be locally and contextually relevant, and may vary among different economic and political systems (World Commission on Environment and Development 1987). However there is a general consensus that sustainable

development of minerals, and other natural resources, includes environmental, social and economic considerations (Laurence 2011; Rajaram et al. 2005).

In the context of rural development, a livelihood is considered sustainable when it can "cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoones 1998, p. 5). An environmentally sustainable livelihood maintains or enhances the natural resource base on which it depends, whether local or global, and a socially sustainable livelihood demonstrates social resilience, wellbeing and the ability to provide for future generations, while not impinging negatively on other livelihoods (Chambers & Conway 1992). A sustainable livelihood can thus consist of both environmental and social considerations, and demonstrates long-term stability, durability and resilience to external and internal pressures (Scoones 2009).

There is considerable debate on how mining can contribute to sustainable development and sustainable livelihoods (Bebbington et al. 2008; Gamu et al. 2015; Han Onn & Woodley 2014; Pegg 2006). A number of factors have been identified as impeding the potential of mining to alleviate poverty. These include extreme and/or long term negative environmental and social impacts, rent seeking and corruption, unequal distribution of wealth and power, employment volatility and market instability (Childs 2008; Gamu et al. 2015; Kamlongera 2011). Pegg (2006) identifies that one of the main issues hindering sustainable outcomes is that of governance. Furthermore, the extent to which mining actually benefits local communities and the internal mechanisms for their distribution are not well documented (Ballard & Banks 2003). With regards to mining livelihoods, the resource base is non-renewable and

so will expire at some point. However mining could be considered sustainable if it contributed to livelihood diversification and poverty reduction with limited negative impacts on other livelihoods, under a weak definition of sustainability (Han Onn & Woodley 2014). The contribution of mining to sustainable development also differs depending on the context, in particular the way in which sustainability is understood by the various stakeholders involved, including local communities, the type of mining undertaken and the balance between the negative and positive impacts of mining activities (Ololade & Annegarn 2013).

1.2.2 Incorporating Local Worldviews into Concepts of Sustainable Development

There has been increasing recognition of the need to include the voice of local communities, particularly those who are involved in mining activities and those who are relevant resource or land owners, or those who are impacted by mining activities, in defining sustainability in a mining context and its contribution to sustainable development (Ololade & Annegarn 2013; Whitmore 2006). Hodge (2014, p. 30) argues that the implementation of sustainability concepts in mining requires that "...people can and will have an opportunity to participate in the decisions that affect their future, and they will be supported to ensure they have the capacity to do so effectively." The application of "Free, Prior and Informed Consent" (FPIC) to mining has been encouraged to address the marginalisation and unequal distribution of power between mining companies and local communities (Buxton & Wilson 2013; Mahanty & McDermott 2013). This is particularly pertinent as "much of the industry still struggles to understand the social risk that mining poses to people and their

lands" (Owen & Kemp 2014, p. 93) often because of the significant differences between the worldviews of the mining industry and local communities.

The perception and understanding of ethical considerations, such as sustainability related issues, are determined by the values and beliefs held within worldviews (Naugle 2002; Vidal 2008). There can be considerable difficulty experienced in incorporating sustainable development into local planning policies and programs when the existence of different worldviews have different requirements of what sustainability entails (Van Opstal & Hugé 2013). The term sustainable development is already constructed from multiple worldviews (Van Opstal & Hugé 2013) and this is evident in the different modes of sustainability previously identified earlier as strong or weak, which ultimately derive from one's relationship to the environment. Van Opstal and Hugé (2013) identify the need for an integral worldview that combines all underlying worldviews through dialogue and representation to work towards a common understanding of sustainable development that respects different perspectives, contexts and epistemologies. Banerjee (2003) argues that concepts of sustainable development are currently based more strongly on economic, rather than ecological considerations, by embodying a relationship to nature that is more associated with anthropocentrism and modern economic thought. Indigenous, traditional and local worldviews are vulnerable to marginalisation and exclusion in development contexts (Hart 2010) and have not featured equally with other worldviews, such as scientific and economic rationality, in the formation of concepts of sustainability (Van Opstal & Hugé 2013).

1.2.3 The Contribution of Artisanal and Small-Scale Mining to Sustainable Development

Artisanal and small-scale mining (ASM) is typically associated with economically poor rural populations, and low levels of education and employment opportunities (Hilson & Garforth 2013; MMSD 2002; Siegel & Veiga 2010). An estimated 20-30 million people globally are directly involved in ASM and another three to five times that amount are indirectly involved in ASM activities (Buxton 2013). ASM occurs in over 80 countries however it is generally practised in the developing countries of Africa, Asia and South America (Buxton 2013; Lahiri-Dutt 2003). Generally "artisanal" refers to manual, low-technology mining performed by individuals or members of families, including women and children, and is frequently considered informal and illegal because it is not often recognised or supported by state authorities (D'Souza 2005). In contrast, small-scale refers to the use of more developed mining technology, is sometimes licensed and can be performed in a more formally recognised or employed group of miners (D'Souza 2005). Large-scale mining (LSM) is legally approved and licensed mining, often implemented with more advanced technology and skills than ASM, and employs large groups of people (Buxton 2013). The LSM sector employs approximately 2-3 million people worldwide while ASM involves at least ten times more (Buxton 2013; Hilson 2016).

The main direct beneficial impacts from ASM are income, employment and mineral production (Ghose & Roy 2007; Nel et al. 2014; Shen & Gunson 2006). ASM is often taken up as a livelihood when people are forced to find alternative means of income due to poverty (Buxton 2013). ASM has been recognised for its potential to reduce

poverty by providing local opportunities for economic development, and also its significant contributions to national revenues and foreign exchange earnings (Hilson 2002; Shen & Gunson 2006; Sinding 2005; Tschakert 2009). ASM can also enable the exploitation of mineral reserves that are unsuitable for large-scale mining operations and reinvigorate smallholder farming activities, for example by providing additional income to purchase land, farming equipment and stock (Hilson & Garforth 2013; Hinton 2006). Although the direct benefit of ASM for income is clear, the indirect benefits of ASM have not been well researched. Most studies focus on identifying and addressing the multiple associated detrimental impacts, including mercury pollution from gold mining (Adler Miserendino et al. 2013; Gibb & O'Leary 2014; Ingram 2011; Shen & Gunson 2006).

The detrimental impacts of ASM may differ significantly depending on the mineral extracted, the type of mining employed and the country where mining occurs (Buxton 2013; Collins & Lawson 2014). ASM may be associated with severe environmental impacts such as pollution, deforestation, erosion and social impacts including health and safety risks, crime and conflict (Buxton 2013). Those involved in ASM do not often have the means or knowledge to address or alleviate the environmental and social issues associated with mining (Buxton 2013).

Despite the potential of ASM to provide benefits to local communities, it has not been welcomed by governments and global authorities, such as the World Bank and the United Nations, as a suitable livelihood to combat poverty due to its informality and association with dangerous activities. Therefore it has received far less attention in development agendas than other livelihoods such as forestry, fisheries and

agriculture (Hilson 2016). Most governments, donors and NGOs globally have criticised ASM, highlighting its negative impacts, and attempted to prevent, halt and deter ASM activities (Hilson 2016; Siegel & Veiga 2009). This response to ASM ignores its potential to contribute positively to sustainable development, poverty alleviation and livelihood diversification, while large-scale mining is frequently given preference.

Company-controlled mining performed on a large-scale has historically been supported and preferenced over small-scale community-driven mining, by governments of both developed and developing countries because of its considerable economic contributions to national revenue (Buxton 2013). However ASM can employ far more people at the local level than LSM because it requires limited skills and formal training and thus can be a more inclusive form of employment for poorer rural populations (Ribeiro-Duthie & Castilhos 2016). A study by Langston et al. (2015) found that while both ASM and LSM can present opportunities for, and threats to, sustainable development, the socio-economic benefits of ASM outweighed the negative impacts and there were far more benefits at the local level from ASM than LSM. Although there are a number of formal procedures in place to encourage income from LSM to contribute to community development, such as Corporate Social Responsibility (CSR), this process can be ignored or implemented inappropriately (Abuya 2016; Hilson & Yakovleva 2007; Warnaars 2012). In contrast, wealth from ASM goes directly to local miners and mining communities so that the benefits can be channelled to outcomes that are meaningful and empowering at the individual, household and community level as there is autonomy over the income generated from mining (Langston et al. 2015).

These studies suggest that ASM has increased potential to contribute to sustainable development at the local level.

In the literature, there has been a growing recognition of the positive potential of ASM, particularly in rural areas, and the need to support ASM through legal recognition and formalisation (Hilson & McQuilken 2014; Maconachie 2011; Tschakert 2009; Verbrugge 2016). Multiple studies, including in Tanzania, Ghana, Malawi, Sierra Leone and Laos, demonstrate that ASM can contribute to poverty reduction (Fisher, E et al. 2009; Hilson & Banchirigah 2009; Kamlongera 2011) and livelihood diversification, particularly within a subsistence agricultural landscape (Cartier & Bürge 2011; Hilson 2016; Lahiri-Dutt et al. 2014). Formalisation and regulation of the ASM sector has received significant support through the literature as a way to manage ASM activities, so that the environmental and social impacts can be monitored and addressed appropriately (Maconachie 2011; Siegel & Veiga 2009). The formalisation and regulation of ASM acknowledges miners as having a right to mine, thereby empowering people at the local scale and providing a sense of responsibility and recognition (Jønsson & Fold 2011). Viewing ASM from the perspective of local communities and incorporating their participation in decision-making as much as possible has been recommended (Heemskerk 2005; Tschakert 2009). The need to understand cultural diversity across multiple locations and its influence on approaches to ASM has also been identified as requiring further research (Heemskerk 2005). Acknowledging community values and knowledge of the perceived impacts of ASM are fundamental in guiding appropriate programs and policies to support ASM development as a sustainable enterprise (Heemskerk 2005).

1.2.4 Resource Extraction, ASM and Development in Indonesia

Indonesia has a long history of mineral extraction, with gold mining present from the 4th century and diamond mining since the 7th century, however Indonesia has only established itself as a mining nation since its independence in 1945 (Aspinall 2001). Indonesia is now considered one of the biggest mining nations in Southeast Asia, with 60 million tonnes of coal produced annually (Aspinall 2001). Natural resource extraction in Indonesia has provided substantial capital wealth. However it has been a controversial issue due to the unregulated exploitation of mineral reserves in the name of economic development with little concern for the social and environmental impacts, including significant human rights abuses (Ballard 2001; Devi 2013; Simatauw 2002). Many mineral locations are situated in remote areas and so the mining industry provides a form of economic development for local communities where often few other opportunities exist (Devi 2013).

Both large-scale and small-scale forms of mining are present in Indonesia, with at least 250,000 miners involved in artisanal and small-scale gold mining (ASGM) alone in 2010 (Castilhos et al. 2006; Hentschel et al. 2002; Ismawati 2014). Due to the informal, sporadic and shifting nature of ASM, the number of miners participating in ASM in Indonesia is not well known and may be far higher than these estimates (Lahiri-Dutt 2004). Miners involved in ASM have been overlooked and discouraged globally, including within Indonesia, and the liberalisation of the mining industry has predominately focused on foreign-owned medium and large-scale mining companies (Jønsson & Fold 2011; Lahiri-Dutt et al. 2014; Spiegel 2012). Recent research suggests that the ASM sector may provide vital economic opportunities to Indonesia's rural

populations, and that acceptance and support of ASM may contribute to significant poverty alleviation and sustainable development at the local level (Dara 2014; Lahiri-Dutt 2004; Langston et al. 2015; Spiegel 2012).

The control of mineral resources in Indonesia has been strongly influenced by colonial policies and has historically been managed by the central government for national economic development (Wiriosudarmo 2001). During the reign of Suharto (1966-1998) profits from mining were absorbed by a small group of Indonesia's elite and used to sustain military power (Devi 2013). Under several laws, local land holders and communities were given limited power over their land and mineral resources at the surface and below were declared as "national wealth" to be controlled by the state (Devi 2013). For example under Law 11/1967, land holders could not refuse mining companies entry if a "fair" compensation had been agreed (Gandataruna & Haymon 2011). Local people have been largely excluded from decisions regarding mineral resource use in Indonesia, and only considered as beneficiaries from large-scale mining in the form of community development.

All levels of Indonesian Government tend to preference large-scale mining as it brings significant financial benefits to investors and can provide lucrative rent seeking opportunities to those in senior government positions (Langston et al. 2015). In this context, ASM has predominately been viewed by political leaders and authorities as an "illegal" and undesirable activity due to its negative environmental and social impacts and often unregulated state which is essentially a product of the failure of the legal system to recognise local resource rights (Aspinall 2001; Spiegel 2012; Wiriosudarmo 2001). However there has been some progress in ensuring more

equitable distribution of mineral wealth and autonomy over natural resources in recent years.

Since 1998, with the decentralisation of government and greater regional autonomy, significant changes have been made to the Indonesian mining regulatory framework, which have included increased power over mining activities and distribution of wealth at the local level (Devi 2013). These changes respond to the call from local communities that greater benefits from the mining industry reach the local level and that there is increased transparency and social performance from mining companies (Devi 2013). Mining laws have typically been hazy, without clear outlines of the roles and responsibilities of land holders and mining licence holders, often creating tension and preventing equitable distribution of mineral wealth for development (Gandataruna & Haymon 2011; Spiegel 2012). Following the decentralisation of resource governance, there has been recognition of the lack of institutional capacity at lower levels of government to manage mining activities. The lack of capacity identified included poor administrative practices, legal uncertainty and inadequate coordination across government departments, and has led to a "recentralisation" of authority over extractive industries from the district to provincial government from 2015 (Gandataruna & Haymon 2011).

While there has been some progress towards a mining regulatory framework which provides increased benefits at the local level, ASM and mineral governance remains a contentious and evolving domain (Devi 2013). While there is legislation and a licence available specifically for artisanal and small-scale mining (*Izin Pertambangan Rakyat* (IPR) – Permit for People's Mining) in Indonesia, Wiriosudarmo (2001, p. 47)

states that “the role of SSM (small-scale mining) for rural development has never been considered” and that “all articles in the Mining Law 11/1967” regarding ASM or People’s Mining (PM), tend to restrict rather than promote ASM. There is still considerable progress required in Indonesia to shift the national perspectives on recognising the potential of ASM to contribute to sustainable development and support the industry in a positive manner (Spiegel 2012).

In summary, global debate continues on the role of mining, including ASM, in contributing to poverty alleviation, livelihood enhancement and sustainable development. What constitutes “sustainable” and how this can be achieved is still contended within the mining industry globally and may also be perceived differently by local communities in terms of the appropriateness of strong and weak definitions of sustainability. While the positive contribution of ASM to sustainable development has received increasing attention, there is still significant advocacy and research required globally to transform the perspectives of governments and donors towards incorporating ASM within the development agenda. Within Indonesia, minerals have traditionally been treated as a national commodity for national agendas. However more recently, through decentralisation of resource governance, there is increasing autonomy at the local level to manage natural resources (Spiegel 2012). There still remains a tendency at all levels of government to overlook, and even ignore, ASM as a significant livelihood particularly in rural regions. Thus, there is a need to understand the role of ASM as viewed by local communities. To do this requires an investigation of ASM at the local level to recognise its role in contributing to

sustainable livelihoods and development within community perspectives, values and beliefs.

1.2 Thesis Aims, Objectives and Questions

This PhD research provides a detailed assessment of manganese mining in West Timor, in the province of NTT, and an analysis of its contribution to sustainable development as viewed at the local level, where local is defined as the rural population that follows customary forms of village governance. Artisanal and small-scale manganese mining is unique in that it does not occur outside of eastern Indonesia and is predominately practiced within West Timor. Manganese mining in West Timor is a relatively new activity, starting around 2007, with significant potential to provide economic contributions to rural populations. A study by Fisher, R et al. (2018) found that approximately 350,000 people in West Timor (20% of the total population) have been engaged in manganese mining over the past decade, across the five districts. Despite the scale of the industry and its potential for rural economic development, manganese mining in West Timor has only been briefly described in a small number of articles (Dara 2014; Sahin et al. 2012; Tahu & Meak 2013). These few studies that have been conducted on manganese mining, suggest that while there may be negative impacts associated with manganese mining such as environmental degradation, there are also a number of potential livelihood benefits, including increased food security and income, that require recognition and further study.

In response to the knowledge gaps identified in the previous section, the aim of this PhD research is to investigate local worldviews, consisting of perspectives values and

beliefs, which define the role of manganese mining in contributing to sustainable livelihoods and development in West Timor, Indonesia.

The research addresses four key objectives and is guided by the following associated research questions:

Research Objectives and Questions

Objective 1: To investigate the distribution, practice and characteristics of manganese mining in West Timor.

Question 1: How is manganese mining currently practiced within local worldviews in West Timor and how does it differ from other forms of ASM globally?

Q 1.1 What are the current manganese mining practices and distribution in West Timor?

Q 1.2 Who is involved in manganese mining and the manganese market in West Timor?

Q 1.3 How does manganese mining relate to common themes in ASM?

Objective 2: To analyse the range of perspectives and values which define the role of manganese mining as a livelihood strategy in contributing to sustainable development in West Timor.

Question 2: How is manganese mining viewed as a livelihood strategy in West Timor, what associated benefits and negative impacts are of concern to local communities and how can manganese mining contribute to sustainable development?

Q 2.1 What is the current livelihood context in West Timor and how does manganese mining combine with other existing livelihood strategies?

Q 2.2 What assets are used in ASMM and what is the vulnerability context?

Q 2.3 How are the livelihood benefits and negative impacts of mining experienced through local perspectives and values, and does this differ between community and company mining?

Objective 3: To investigate how local beliefs influence different approaches to manganese mining.

Question 3: How do local beliefs influence different approaches to manganese mining practices and how are they changing because of mining?

Q 3.1 What beliefs and concepts of the sacred are related to manganese mining activities?

Q 3.2 How are rituals used to influence the outcomes of manganese mining?

Q 3.3 Does manganese mining stimulate cultural renewal and cultural loss?

Objective 4: To investigate opportunities to support manganese mining for sustainable development at the national and local level.

Question 4: How is manganese mining currently managed through national and local governance systems and how can it be improved to support sustainable development?

Q 4.1 What national policies and legislation govern manganese mining activities in West Timor?

Q 4.2 How do local governance systems influence manganese mining activities in West Timor?

Q 4.3 What changes need to occur to enable manganese mining to contribute to sustainable development in West Timor?

Each of these objectives and research questions are addressed in specific chapters as noted in Section 1.4 below.

1.3 Significance of the Research

This research provides an analysis of the role of manganese mining in contributing to sustainable development at the local level in Indonesia, which is particularly pertinent considering the new development of this industry and its potential to expand in the future. It also makes a major contribution to the understanding of manganese mining as a form of ASM, that has not been previously documented to this extent.

The research takes a worldview approach to investigate sustainability within a local context, using individual and community perspectives, values and beliefs to understand the role of manganese mining in contributing to sustainable development. Few studies have yet examined the role of worldviews in determining the potential success of sustainable development initiatives (Van Opstal & Hugé 2013). However de Vries and Petersen (2009) suggest a thorough analysis of people's values and worldviews to understand the way in which they interpret concepts of sustainability. Hedlund-de Witt, A (2014, p. 8324) also recommends taking a worldview approach; stating that to formulate relevant sustainable development goals, it would be "...particularly useful and informative to reflect on different worldviews, ...with respect to development and quality of life, in order to select, formulate, and communicate goals in a way that truly honours and includes the different worldviews, stakeholders, and perspectives as fully as possible."

ASM is known to reduce poverty, but the mechanisms of this process and how it is viewed by the stakeholders involved, and in particular the miners, is not well understood (Collins & Lawson 2014; Heemskerk 2005; Tschakert 2009). At present,

there is a lack of inclusive approaches to ASM research globally which has essentially excluded the voice of miners from the discussion on how the ASM sector should develop (Tschakert 2009). This narrow approach perpetuates limited understanding of the structural challenges and the livelihood opportunities that ASM offers (Buxton 2013). As well as addressing the gaps in local knowledge to understand how ASM can be supported in local situations, there is also a need for further research into sustainable livelihood development in an ASM context and how it can be achieved globally (Buxton 2013). Incorporating the diversity of worldviews and understandings of sustainability will contribute to the understanding of a broader definition of sustainable development in the field of resource extraction that is inclusive of local worldviews, with considerations regarding appropriate policies and governance.

1.4 Thesis Outline

This thesis consists of seven chapters, followed by a reference list and appendices. Chapter 1 (current chapter) situates the research; Chapter 2 provides the methodology and study locations; Chapter 3 discusses manganese mining in West Timor; Chapter 4 investigates manganese mining as a livelihood strategy, taking into account the benefits and negative impacts of concern to local communities; Chapter 5 explores beliefs and manganese mining, in particular concepts of the sacred and ritual practice; Chapter 6 discusses national policies and customary governance in regards to manganese mining; Chapter 7 presents the conclusions and recommendations. Figure 1.1 illustrates the organisation of the chapters and associated research objectives and questions.

Chapter 1	• **Situating the Research**
Chapter 2	• **Methodology and Conceptual Frameworks**
Chapter 3	• **Objective 1:** To investigate the distribution, practice and characteristics of manganese mining in West Timor • **Questions 1.1, 1.2, 1.3**
Chapter 4	• **Objective 2:** To analyse the range of perspectives and values which define the role of manganese mining as a livelihood strategy in contributing to sustainable development in West Timor • **Questions 2.1, 2.2, 2.3**
Chapter 5	• **Objective 3:** To investigate how local beliefs influence different approaches to manganese mining • **Questions 3.1, 3.2, 3.3**
Chapter 6	• **Objective 4:** To investigate opportunities to support manganese mining for sustainable development at the national and local level • **Questions 4.1, 4.2, 4.3**
Chapter 7	• **Conclusion and Recommendations**

Figure 1.1: Overview of the research objectives and questions addressed in each chapter of the thesis.

As the introduction chapter, Chapter 1 provided the background, aim and justification for the research, including the research objectives and questions and an overview of the structure of the thesis. The main topics of sustainability in mineral resource extraction and ASM were discussed regarding local worldviews and livelihoods, including the relevance of these issues in an Indonesian context.

Chapter 2 presents the research locations, methodology and approach. The development of the PhD research project is introduced with its links to the Government Partnerships for Development (GPFD) project and partner organisations, and the requirements achieved including language training, and ethics and research permits to undertake fieldwork. The study area is then introduced, including the initial situational analysis and the site selection process undertaken. The two conceptual frameworks and the data collection methods and analysis are then presented. Finally, limitations and challenges of the research are discussed.

Chapter 3 presents an overview of manganese mining in West Timor. The distribution of manganese and mining, the types of mining practices and the price and market of manganese are discussed, including the stakeholders involved in manganese mining activities. In addition, manganese mining is defined within the broader ASM literature.

Chapter 4 investigates manganese mining as a livelihood strategy from the perspectives of local communities and their values regarding the benefits and negative impacts of mining. The livelihoods context in West Timor is provided prior to manganese mining, outlining the common livelihood strategies, assets and

vulnerabilities experienced in rural regions. Manganese mining as a livelihood strategy is then investigated, including in combination with farming. The benefits of manganese mining as experienced by local communities at the individual, household and community are analysed, followed by the negative impacts, including environmental and social issues. Finally, how the benefits and negative impacts of manganese mining were addressed and balanced by local communities is explored.

Chapter 5 investigates beliefs and ritual practice applied to manganese mining. A background to Austronesian cultural features in West Timor is presented. Mining within worldviews that regard the earth as a living being are explored, followed by beliefs of the earth, particular places and manganese as sacred. The application of rituals to mining, including sacrifice and systems of reciprocity, are analysed. Finally, how beliefs and cultural practices have been lost or reinvigorated through mining is discussed.

Chapter 6 explores national and local governance systems for manganese mining in West Timor and how these forms of governance hinder or support sustainable outcomes. National government policies and regulations that impact manganese mining are investigated including decentralisation, the issuing of mining licences, Law 4/2009 regarding export ban and the involvement of police and army officials in mining activities. In this context, indigenous identity and rights over natural resources are discussed. Local governance systems used to manage manganese mining at a kingdom, village and landholder level are analysed at each of the mining locations. Opportunities to enable more sustainable outcomes from national policies and local governance systems in the field of ASM are discussed.

Chapter 7 concludes the thesis. The key research findings are presented and recommendations for future mining, policy considerations and stakeholder involvement in mining activities are discussed. Opportunities for future research are presented.

Chapter 2: Research Locations, Methodology and Approach

2.1 Introduction

This chapter describes the location, the methodology, research approach and process, conceptual frameworks and the methods and analysis that were applied to investigate manganese mining in West Timor. Firstly, I describe the formal processes required to obtain human ethics clearance and research permits. I then outline the origins of the research and the larger involvement and collaboration with the Government Partnerships for Development (GPFD) project titled "Artisanal and small-scale mining for development (eastern Indonesia)." Thirdly, the study area and site selection process are discussed. Fourthly, this chapter introduces the conceptual frameworks and methodology used and lastly, the methods applied in the field to collect the data and to analyse the results. Limitations and challenges in conducting the research are also discussed.

2.2 Development of the PhD Research Project and Linkage with GPFD Project and Partner Organisations

This PhD project was developed as a research component of the larger Government Partnerships for Development (GPFD) project titled "Artisanal and small-scale mining for development (eastern Indonesia)." The GPFD project was funded by the Department of Foreign Affairs and Trade, and implemented by Charles Darwin University in collaboration with various partners, from April 2014 – June 2017. The GPFD project aimed to build local capacity in eastern Indonesia to monitor the environmental and social impacts of artisanal and small-scale mining (ASM) and to

develop improved governance to minimise the negative impacts of ASM and maximise the benefits. The project involved the collaboration of the host university Charles Darwin University, Australian National University, Universitas Halu Oleo (UHO) (Sulawesi Tenggara), Universitas Nusa Cendana (UNDANA) (NTT), Department of Environment (BLHD) (NTT) and the Association of Community Miners Indonesia (APRI).The GPFD project focused on informal mining in Indonesia, specifically small-scale gold mining in the Sulawesi Tenggara (SULTRA) and small-scale manganese mining in Nusa Tenggara Timur (NTT) including West Timor (see https://asm4d.wordpress.com for full project details). One of the aims of the CDU, ANU, UNDANA and UHO collaboration was to support a parallel research component through PhD studies. Two ANU PhD students focused on small-scale gold mining in Sulawesi, while this PhD thesis focused on manganese mining in West Timor.

Prior to embarking on this PhD study, I was a student at CDU completing a Graduate Diploma in Indigenous Knowledges. During this time, I heard about the GPFD project and the PhD opportunity to study manganese mining in West Timor through CDU. This PhD project was significantly supported by the GPFD project through funding for fieldwork and involvement in project activities. I attended two GPFD community forums in West Timor on small-scale mining, one in February 2015 and one in May 2016, as well as three training workshops, two in Soe, West Timor, on GIS mapping with field visits and report writing, and one in Darwin on small-scale mining governance. In addition, I presented initial results at two conferences alongside the GPFD project. The first presentation was titled “Stakeholder perceptions, values and approaches to the social and environmental impacts of artisanal and small-scale

manganese mining in West Timor, Indonesia" and was part of the conference "Between the Plough and the Pick: Informal mining in the contemporary world" held at the Australian National University in Canberra in November 2015. The second presentation was titled "Diversity in worldviews and approaches to small-scale manganese mining in West Timor, Indonesia" delivered at a conference held in Jakarta with APRI in November, titled "Community mining in Indonesia: Minimising harm and maximising benefit" (see http://tambangrakyat.org/conference). A summary of the GPFD project activities I attended are listed in Appendix B.

This PhD project was strongly supported by the Indonesian university Universitas Nusa Cendana (UNDANA) in Kupang, NTT. UNDANA is a prominent research institution in the province of NTT and has an established connection with Charles Darwin University. This partnership ensured local technical and administrative support with acquiring the research permit in Indonesia and on-ground fieldwork assistance. The GPFD UNDANA research team, which was formed through the GPFD project, undertook social and environmental research on manganese mining in West Timor, specifically in the Noelmina catchment which falls within the districts of Kupang and Timor Tengah Selatan. The GPFD UNDANA research team provided support and recommendations for the PhD fieldwork through assisting in site selection, introducing key informants and discussing and confirming fieldwork results. All PhD fieldwork was conducted independently of the UNDANA research team, however comparisons and discussions of results were useful to consider questions and confirm findings. I presented the main preliminary research findings to UNDANA on 16th March 2017.

2.3 Obtaining Ethics and Research Permits

In order to perform fieldwork for this research, human ethics approval from Charles Darwin University and an Indonesian Research Visa from the Indonesian Ministry for Research, Technology and Higher Education (RISTEKDIKTI), were required. The research received approval from the Charles Darwin University Human Ethics Committee (Reference No. H15060) on 22 July 2015. Due to the sensitive nature of small-scale mining in Indonesia, approval for an Indonesian Research Visa required a presentation and meeting with RISTEKDIKTI in Jakarta in November 2015. A research counterpart with Universitas Nusa Cendana (UNDANA) had been formed previously to support the research process, including a presentation given on the initial PhD proposal at UNDANA to outline the research objectives. However following the meeting, a request was made by RISTEKDIKTI to obtain approval and form an additional research counterpart with the Indonesian Ministry for Energy and Mineral Resources (ESDM). A research counterpart was arranged with the Indonesian Ministry ESDM within the mining research department TEKMIRA (*Pusat Penelitian dan Pengembangan Teknologi Mineral dan Batubara* - Centre for Mineral and Coal Research and Development Technology), through the assistance of the NGO Association of Community Miners Indonesia (APRI) in collaboration with the GPFD project. Final approval of the research permit was granted in April 2016 for a 12 month Indonesian Research Visa. As a part of the research counterpart agreement, I met with the Indonesian Ministry ESDM in Bandung in April 2016 and November 2016 to discuss research progress and results.

2.4 Language Training and Preparation for Fieldwork

I engaged in Indonesian language training and completed Level 1 and 2 Indonesian in-country in Lombok in early 2015, Level 3 online and Level 4 in-country in Kupang at UNDANA during mid 2015. Basic Indonesian language skills enabled me to communicate and understand all of the basic interview data. A local research assistant, Willy Kadati, was employed during the main periods of fieldwork to help with translation, logistical support and cultural protocols. Willy Kadati is originally from Timor Tengah Utara (TTU) and is fluent in English, Indonesian and several local languages, and was present during all major field work and data collection across the research locations. He has extensive traditional and local knowledge based on his cultural position and also his experience as a guide in West Timor. His knowledge was critical in providing local context and guiding additional questions in interviews.

I also completed a workshop on Human Ethics in September 2014 which guided the formation and implementation of appropriate and mindful fieldwork. A 'Working with Communities' online short course (see http://workingwithcommunities.com) was also completed in 2016 which focused on building skills required in developing and carrying out sensitive community engagement in development projects, including research involvement. This course assisted me in undertaking culturally respectful and appropriate research, and gave deeper understanding into the importance of cultural social systems and methods of engaging with different respondents and to work with cultural aspects sensitively when carrying out fieldwork.

2.5 The Study Area, Situational Analysis and Site Selection

2.5.1 The Study Area: West Timor

West Timor is located in the province of Nusa Tenggara Timur (NTT), Indonesia, and includes the western half of the island of Timor (Figure 2.1). The independent nation Timor-Leste is found in the eastern half of the island (except for the enclave Oecussi which is found in the north of West Timor). West Timor consists of five districts or *kabupaten* including Kupang, Timor Tengah Selatan (TTS), Timor Tengah Utara (TTU), Malaka and Belu. The city of Kupang, located in the district Kupang, is the largest city in West Timor with a population of about 300,000 people and is also the main city for the province of NTT (Tidey 2012). Although geographically Kupang City sits within the district Kupang, they are managed as separate political regions but both at the same level of government. The next two highest populated cities are Soe in TTS and Kefamenanu in TTU. The next level of geographical governance after *kabupaten* is *kecamatan* (sub-district), followed by *desa* (village) and *dusun* (hamlet).

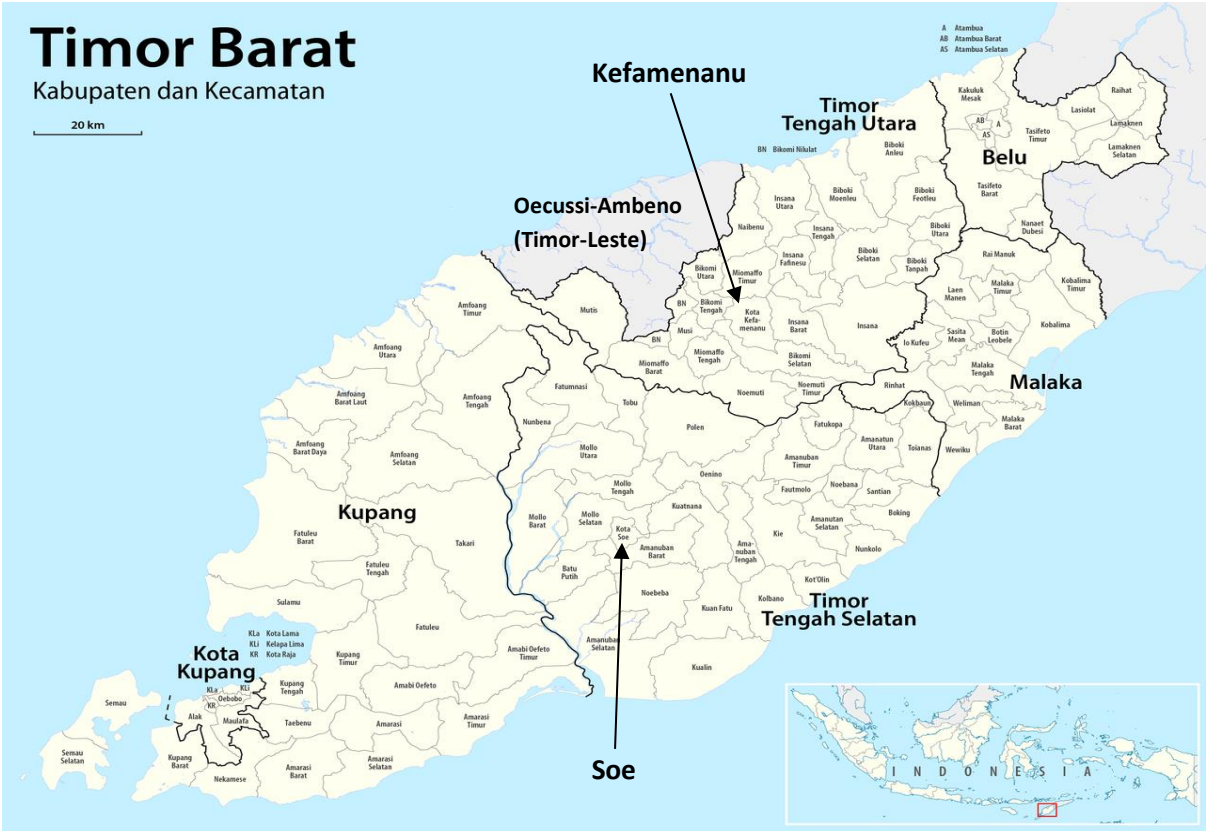

Figure 2.1: Map of West Timor and the five districts Kupang, TTS, TTU, Belu and Malaka, and three largest cities Kupang, Soe and Kefamenanu (Dörrbecker & Dedering 2015).

Eastern Indonesia is considered, by many Indonesians, as more remote and undeveloped than the western regions of Indonesia (Campbell-Nelson 2003; Farram 2004). In NTT, the Human Development Index (HDI) is lower and the Human Poverty Index (HPI) higher than the Indonesian average, indicating a region that is underdeveloped and economically vulnerable (Badan Pusat Statistik 2013, 2014a). There are also low levels of health and education in NTT, including a high proportion of malnourished children under the age of five, and many people do not have access to clean water (Barlow & Gondowarsito 2009; Miller et al. 2013). The economy of NTT relies predominately on agriculture and the majority of the population are subsistence farmers (Badan Pusat Statistik 2014b; Benu 2003). This region exhibits

low economic potential, and the quality of infrastructure, such as roads, ports and airports inhibit further business development (Suharyo et al. 2007). Tidey (2012) observed that the provincial town Kupang, has no thriving trade, or prominent industrial or tourism sectors. Livelihood choices for people in West Timor are limited, and the most promising strategy suggested has been to diversify from farming into supplementary alternatives (McWilliam 2002). The livelihood context in West Timor is described further in Chapter 4.

West Timor is mountainous, particularly in the interior, and scattered with plains. The climate consists of wet and dry seasons, where the dry season is particularly long and may last for eight to nine months of the year, producing short seasons of agricultural productivity on the limited arable land available (Pradhan et al. 2011). The prolonged dry season contributes to water shortages and community health degradation, increasing the incidence of sporadic hunger and malnutrition (Pasaribu 2007). Natural water supplies, such as wells, springs and creeks are critical in West Timor, especially in the dry season when most of the water sources dry up except for a number of large perennial rivers (Pradhan et al. 2011).

West Timor consists of two main indigenous cultural groups with distinct languages; the *Atoni (Pah) Meto* or *Dawan* to outsiders who are widely spread across West Timor and the *Tetun* who have a much smaller population, residing mostly in Belu and the eastern regions of TTU and Malaka (Farram 2004; Fox 2006b). There is also a smaller matrilineal cultural group the *Bunaq/Marai* who are located along the mountainous border with Timor-Leste. West Timor has a long exposure to the outside world due to their sandalwood resources, with the earliest documentation

of Chinese trade for sandalwood dating to 1350, and a number of Chinese settlements remain today (Hägerdal 2012). West Timor has received significant migrant populations from nearby regions such as Rote and Sabu since Dutch control, and also more recently from Java since Indonesian Independence (Fox 1977). West Timor also received significant refugee populations following the vote for independence in East Timor in mid 1999 (Bradt & Drummond 2008). The cultural history of West Timor is presented further in Chapter 6.

2.5.2 Situational Analysis

A month of preliminary fieldwork was conducted in October 2015 to meet with the UNDANA research counterpart, to identify possible field sites, to meet with key informants, and undertake a situational analysis to gather information on the current state of manganese mining. The situational analysis involved discussions with NGOs, local government administration offices and mining companies across three of the five districts Kupang, TTS and TTU, as well as a number of visits to potential field sites where mining was known to have occurred or was still active. This initial analysis proved crucial in forming relevant and structured research objectives, fieldwork methods and strategic site locations, as very little published research was available about manganese mining in West Timor at the start of this PhD project. The situational analysis indicated that manganese mining was present in each district of West Timor and that while mining activities had mostly ceased a large percentage of the rural population had participated in manganese mining. The analysis also indicated that there was a diversity of values, beliefs and approaches to manganese

mining across West Timor and assisted in identifying a range of sites that were representative of this diversity and were suitable for fieldwork and research.

2.5.3 Site Selection

A total of 10 sites (hereafter referred to as Location 1 to 10) were selected for detailed fieldwork and data collection which included at least one site in each of the five districts in West Timor. The fieldwork was carried out in these locations over an 11 month period from May 2016 to March 2017 (Figure 2.2 and Table 2.1). The ten sites selected allowed coverage of the diversity of responses to manganese mining and the worldviews which underpin these different responses. Sites were chosen in consultation with UNDANA researchers, local government officials, NGOs and key informants.

In the districts of Kupang and TTS, Protestantism is the predominant religion whereas Catholicism is the main religion for the other three districts TTU, Belu and Malaka. This is important as the Protestant religion encourages the destruction of sacred objects and buildings, and is against the use of traditional ceremonies, whereas Catholicism is far more accepting of the practice of traditional ceremonies alongside church activities (Rose 2016). This has meant that the management of mining through the use of ceremonies is significantly different between Protestant and Catholic areas in West Timor and sites for fieldwork were chosen with this in mind. West Timor also consists of at least three major language and cultural groups including the *Atoni Meto*, the *Tetun* and the *Bunaq/Marai*. Sites were selected to include at least one location in each cultural language group. Lastly, sites were selected following the situational analysis so that there was a representative diversity

of the responses to manganese mining, including those that refused to mine, those that engaged in mining but only hesitantly, others that engaged but only used hand tools, and others that were involved strongly in mining, often using heavy machinery or where a mining company was present. Most sites were chosen in TTU as this district had the most manganese mining activity due to the abundance of manganese deposits there. Location 6 was chosen as it also had marble mining present as well as manganese mining. An additional site with small-scale gold mining in TTU (not included in the main 10 sites) was selected as a case study to compare local responses to gold, manganese and marble mining.

The ten sites will be referred to in this thesis as Locations 1-10 to keep information confidential as required through human ethics procedures, particularly as some of the results include culturally and legally sensitive issues and activities. Figure 2.2 indicates the general position of the ten locations in West Timor.

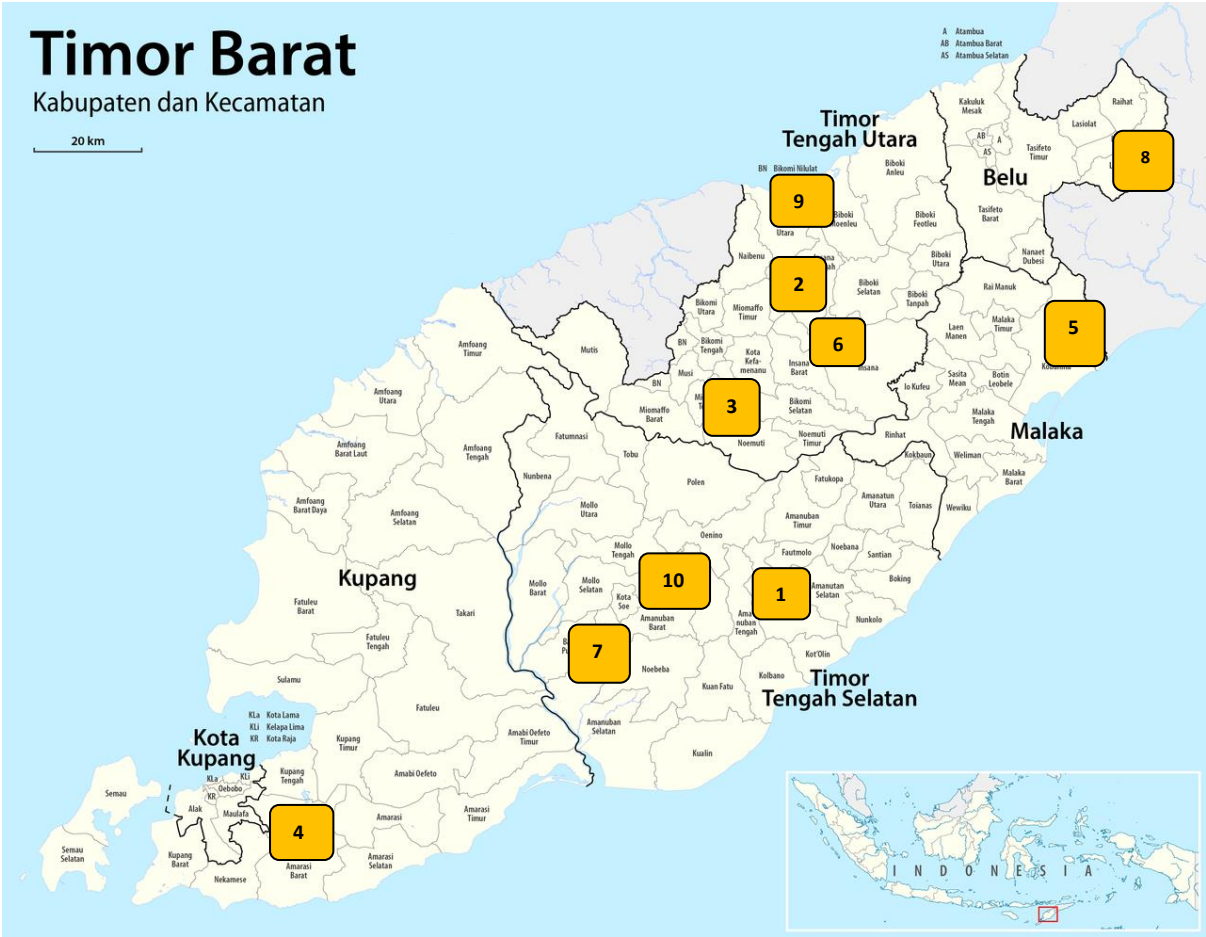

Figure 2.2: General position of the ten fieldwork locations across the five districts in West Timor.

Table 2.1 provides specific information for each of ten locations, including the type of mining, date when fieldwork was completed and the dominant ethnicity and religion at each location. The type of mining refers to the most common form of mining in that location and whether mining was community-driven or company-controlled. Only two locations (Location 1 and 2) had no mining present. Detailed results regarding the characteristics of the ore deposits present, the reasons why locations participated or not in mining, the form of mining used, and the outcomes of mining are provided in Chapter 3.

Table 2.1: List Of The 10 Fieldwork Locations With The Type Of Mining (Described Further In Chapter 3), Date When Fieldwork Was Conducted And The Dominant Ethnicity And Religion At Each Location.

Location	District	Type of Mining	Mining Management	Date (2-3 weeks)	Ethnicity/Nominal Religion
1	TTS	No Mining	N/A	Aug 2016	Meto Animist
2	TTU	No Mining	N/A	Oct 2016	Meto Catholic
3	TTU	Manual Only	Community	Jan 2017	Meto Catholic
4	Kupang	Manual Only	Community	May 2016	Meto Protestant
5	Malaka	Mostly Manual	Community	Oct 2016	Bunaq/Tetun Catholic
6	TTU	Mostly Manual	Community	Feb 2017	Meto Catholic
7	TTS	Mostly Manual	Community	Jun 2016	Meto Protestant
8	Belu	Excavator	Company	Mar 2017	Bunaq/Tetun Catholic
9	TTU	Excavator	Company	Sep 2016	Meto Catholic
10	TTS	Excavator	Company	Oct 2016	Meto Protestant

2.6 Methodology and Research Approach

A grounded theory approach was used in the design and analysis of this research, as this approach seeks to capture the interactions between people, their perceptions, actions and the phenomena while allowing a wide range of methods to be implemented (Ormston et al. 2013). This approach also allows theories to develop out of data collected through the research process, so that the theories which emerge are strongly situated or 'grounded' in reality (Richards & Morse 2012). Grounded theory is one of the best known qualitative research approaches which aims to generate theories that explain social processes or actions regarding a phenomena, through analysis of data from participants involved in the phenomena (Ormston et al. 2013). Grounded theory seeks not only to reveal relevant conditions but also to establish how the actors under investigation actively respond to these conditions, and what the consequences of their actions are (Corbin & Strauss 1990). Grounded theorists agree that the usual canons of "good science", such as significance, compatibility, consistency, reproducibility and precision, should be retained but that they should be redefined to fit a qualitative approach (Corbin & Strauss 1990). There are many different versions of grounded theory, which may be more specific to particular research areas, and the term is sometimes used to refer to broadly inductive research strategies (Ormston et al. 2013).

However, in grounded theory it is the researcher's aim to catch the interaction between people, their perceptions, actions, consequences and the phenomena involved (Ormston et al. 2013). Data collection procedures may include interviews and observations, as well as government documents, newspapers, letters and reports. Analysis begins as soon as the first bit of data is collected and it often directs

the following interviews and observations (Corbin & Strauss 1990). Analysis then informs the next data collection and new data is analysed, creating a process which is highly adaptive and based on ongoing discovery, allowing for direction as well as flexibility as new avenues are highlighted during the research process (Corbin & Strauss 1990).

Qualitative research seeks to interpret and characterise particular events or phenomena in their natural setting, often referred to as interpretivism, using representations often in the form of field notes, interviews, conversation, photographs and recordings, to understand the phenomena in terms of the meanings people bring to them (Lincoln & Denzin 2011). In qualitative research, knowledge is understood to be affected by the values of the people who produce and receive the knowledge and it may also incorporate a pragmatic theory of truth whereby all beliefs are true if they have practical utility, so that by believing in them they are proved useful, helpful and productive to the people who hold them (Ormston et al. 2013). Qualitative research takes into account that perceptions of reality or a phenomena are not a product purely of direct observation but also of human interpretations of what the senses have communicated to the individual, so that very different understandings may arise from the same event which are influenced by the social, cultural and historical aspects of the investigated and the investigator (Ormston et al. 2013).

In contrast, quantitative research is more concerned with facts and physically measurable aspects, rather than human-orientated values and perceptions, and is generally based on positivism (Hammett et al. 2015). Quantitative research often

involves the use of experiments to test hypotheses or questions, or the use of surveys or structured interviews, for cross-sectional or longitudinal studies, to collect data (Creswell 2003).

This research methodology took an abductive research strategy where the aim is to describe and understand from the actor's perspective a particular phenomena or reality, through accounts of the actor's everyday activities, ideas and beliefs (Hammett et al. 2015; Ormston et al. 2013). Abductive research is the basis of grounded theory and is mostly qualitative which was well suited to the topic under investigation.

2.7 Conceptual Frameworks

The concept of a *worldview* was chosen in this study as the main overarching concept with which to explore people's perspectives, values and beliefs in relation to manganese mining in West Timor. The concept of a worldview is still emerging and there is no formal or general theory, however it has been suggested as a useful concept to understand environmental attitudes and behaviours, particularly around sustainability, as it supports an interdisciplinary, holistic and integrative approach (Hedlund-de Witt, Annick 2012; Johnson et al. 2011; Koltko-Rivera 2004).

In essence, worldviews determine how we live our lives in response to events. They shape our belief systems, decision making, assumptions, and modes of problem solving (Vidal 2012). A worldview provides one with a dependable framework for learning, transferring and using knowledge with others who also share a similar worldview (Irzik & Nola 2009). It also provides a framework to describe, interpret and

make sense of experiences and events so that one may understand the world in which one exists (Leong 2008). It defines one's place in the world, and influences language, religious beliefs, social systems and guides everyday activities and behaviours (Hewitt 2000; Vidal 2008). Worldviews have been described as "the inescapable frameworks of meaning and meaning-making that profoundly inform our very understanding and enactment of reality" (Hedlund-de Witt, Annick 2012, p. 74).

However very few studies have examined the role of worldviews in determining the potential success of sustainable development or personal sustainable lifestyles (Hedlund-de Witt, Annick 2012; Van Opstal & Hugé 2013). de Vries and Petersen (2009) suggest a thorough analysis of people's values and worldviews to understand the way in which they interpret concepts of sustainability. Worldviews influence people's relationship to the environment and humanity, and guide actions to manage natural resources, including non-renewable resources. Worldviews are important to consider in the context of traditional natural resource management as "...the researcher needs to study the worldview as the organising concept behind the cultural ecology of a group, without which the logic of many traditional management systems would be difficult, if not impossible, to access" (Berkes 2012, p. 75).

I have chosen the three terms *perspectives*, *values* and *beliefs* to investigate and describe key aspects within worldviews. The notion that a worldview is made up of these three main components was described by Rokeach (1973) and presented further by Koltko-Rivera (2004), using the three expressions evaluative beliefs, prescriptive or proscriptive beliefs and descriptive or existential beliefs, which are

terms relevant to the field of psychology. Hedlund-de Witt, Annick (2012, p. 75) uses the simpler terminology, as followed in this thesis, when suggesting that "the concept of worldview may have the potential to function as an integrative framework with which to investigate the interaction of beliefs, values, and attitudes."

Perspectives, or evaluative beliefs, refers to the way in which something is regarded or judged, whether it is considered to be something good or bad (Rokeach 1973). The term *values*, or prescriptive beliefs, refers to one's judgement of what is important in life, what is desirable or undesirable (Rokeach 1973). Values may be expressed and observable through individual and group attitudes and behaviours (Fulton et al. 1996; Kluckhorn 1962). *Beliefs*, or existential beliefs, refers to what is considered "real" and what actually exists, such as the presence of a spirit or god, or in this study in particular, what is considered sacred (Rokeach 1973).

Worldviews are constantly evolving and transforming. They may change and shift over time as they are influenced by different aspects (Hart 2010). Multiple worldviews may exist within one culture or society, and often dominant worldviews are held by the majority of members of the group while some alternative worldviews may also exist within the same group (Hart 2010; Smith 2013).

Two main conceptual frameworks were used in the data collection and qualitative analysis of the research data. The first is the cyclical worldview framework (Figure 2.3), which represents the process of how worldviews transform and change, particularly in regards to the components of perspectives, values and beliefs, and in response to manganese mining. The second conceptual framework (Figure 2.4)

provides a system to view how specific perspectives, values and beliefs lead to a particular response or approach to mining.

The cyclical worldview framework is loosely adapted from a number of worldview diagrams presented in a paper by Koltko-Rivera (2004), where the causal relationships between the self, behaviour and experience are illustrated. First, from the self comes a decision based on the worldview, which is then carried out in a behaviour resulting in an experience which feeds back to the self and reinforms the current worldview. The cyclical worldview framework presented below further elaborates on this process of worldview transformation.

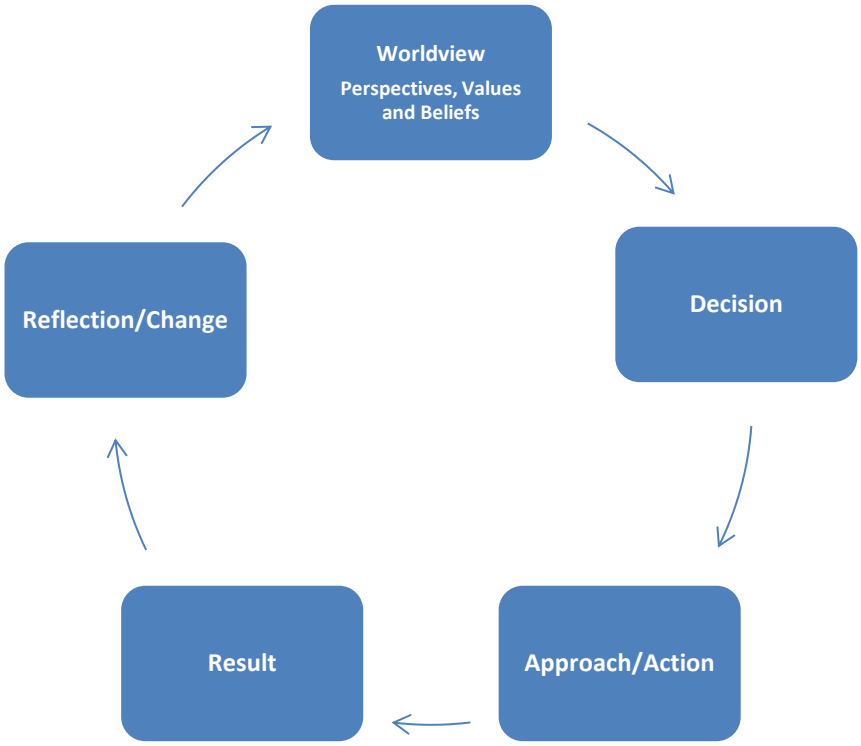

Figure 2.3: The Cyclical Worldview Framework - How worldviews change or are reinforced through decisions, actions, results and reflection.

The cyclical worldview framework shows the circular, integrated and co-creative nature of worldviews within reality. For this research, worldviews consist of perspectives, values and beliefs, which are used to inform decisions, based on the environment or situation at hand. The decision (which is at this stage held in the mental realm) is carried out as an approach or action, giving a particular result. The result from the action is reflected on internally, and may influence change to previously held perspectives, values and beliefs, ultimately changing one's worldview.

In the context of manganese mining in West Timor, the situation is the opportunity to mine, which is a relatively new situation and decisions are made that perhaps have not previously been considered before. People may choose to mine, sometimes in a very specific way, for example, only surface mining, and others may choose not to mine at all. Their decision informs their action or approach and this produces a result, such as money from mining and perhaps, for example a landslide or illness caused by mining. Then follows a period of reflection on what resulted from their actions and whether a change is required, for example to stop mining or mine in a different way. This change in perspectives, values or beliefs, thus informs the next decision and the cycle continues again. The cyclical worldview framework is thus used in this research to capture and present the *dynamic* nature of changing and evolving perspectives, values and beliefs within a worldview in response to mining.

The second framework (Figure 2.4) illustrates how the perspectives, values and beliefs influence the type of approach taken to manganese mining and is used in this study to capture and present the *diversity* of responses to mining. The perspectives

are divided into what is perceived as the positive contributions from mining, and also what is perceived as the negative impacts from mining. Examples of positive contributions may include money, skills or new employment opportunities, and negative impacts may include environmental destruction, increased livelihood vulnerability or mining accidents.

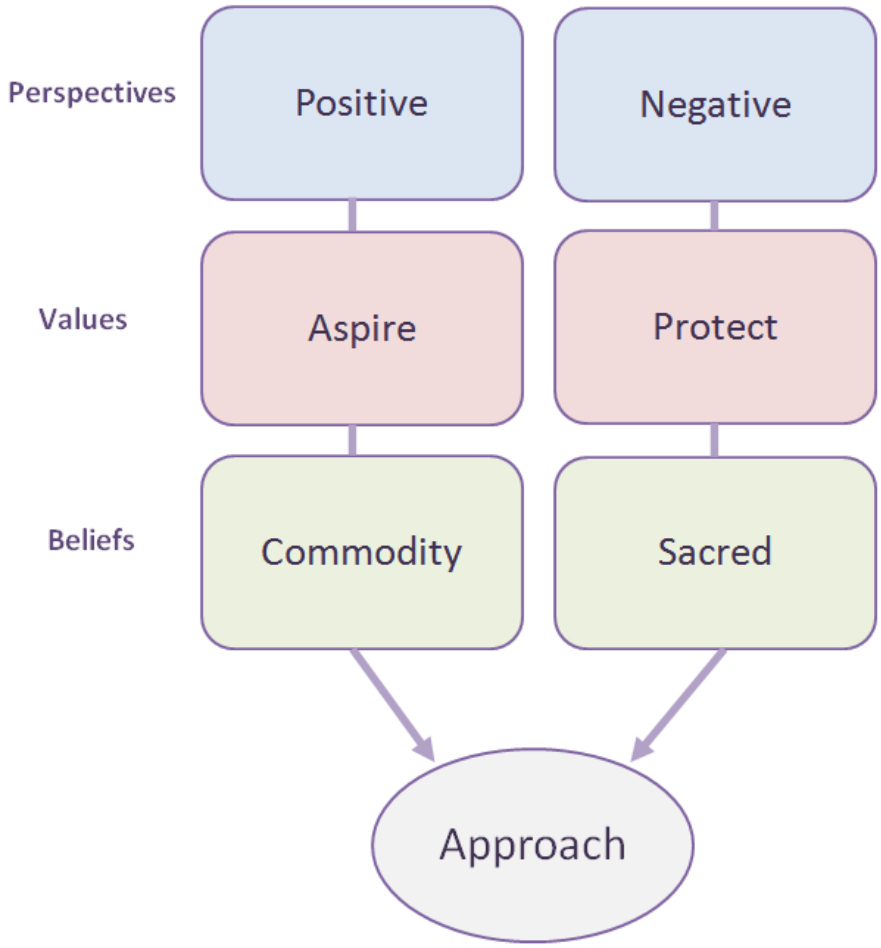

Figure 2.4: The Perspective, Values and Beliefs Conceptual Framework - How perspectives, values and beliefs are connected to influence a particular approach or response.

Values are divided into what people aspire to (ie. what they currently do not possess but what they desire to have which mining may give them the opportunity to pursue)

and what people want to protect (ie. what they already have which they wish to protect which mining might threaten). The concept of values in this study is similar to that presented in Schwartz (1994), where values are placed on a bipolar dimension, with one extreme representing values that favour change and new direction, and the other extreme representing values which seek to conserve and protect current practices and ways of being.

Beliefs are separated into what people believe is sacred or a commodity (ie. not sacred). Therefore, if one aspires to a new house, better education and a new car, and does not value what they currently have, the positives (eg. income) from mining will outweigh the negatives, particularly if the natural resource, in this case manganese, is viewed as a commodity and not sacred. In contrast, if one believes they have everything they need, they have a lot to protect and little to gain from mining, and the negative impacts may outweigh the positive. If the natural resource is viewed as sacred, then they may choose not to engage in mining. These frameworks are not used to critically analyse the local worldviews (including perspectives, values and beliefs) presented in this study, but are used to organise the different themes and trends in the data. The first conceptual framework is used to illustrate the *dynamic nature* of changing and evolving worldviews in West Timor and the second conceptual framework is used in later chapters to illustrate the *diversity* of perspectives, values and beliefs regarding manganese mining in West Timor.

2.8 Data Collection Methods and Analysis

2.8.1 Research Approval: National, Provincial and Local Government Administration

After the human ethics clearance and the Indonesian research visa was approved, the main fieldwork began with the majority of the interviews conducted between May 2016 to March 2017, with approximately 2-3 weeks in each location.

As required by the Indonesian research visa, before fieldwork commenced letters from the national government advising of the research were first given to the relevant local government offices including province and district levels, and letters of approval were obtained from these government offices. These letters of approval from the province and district were then given to the relevant sub-district (*kecamatan*) and village (*desa*) offices before fieldwork commenced in each particular location. When submitting research permit letters at each government level, discussions with government administration offices about manganese mining was often useful for gathering background information, general opinions and confirming potential field sites. The *kepala desa* (the government representative at the village level) was always approached first to request permission for fieldwork before starting interviews in each village. The *kepala desa* in each village was also usually a key informant to gather basic information about the village and provide an overview of the experience of manganese mining in that area. The *kepala dusun* (the government representative at the hamlet level) was also approached in each village and would often introduce us to key informants, such as local buyers, customary leaders or company employees, or join us when interviewing community members so that they felt comfortable talking with outsiders.

2.8.2 Data Collection: Interviews

The main form of data collection used for this research was semi-structured interviews. Semi-structured interviews are generally conversational and are often guided by a set of pre-determined questions or themes but are not limited by these and are used mainly to stimulate discussion (Bernard 2011). Using semi-structured interviews allowed for a consistency in topics and themes to be explored across the ten locations, such as the benefits of mining or the role of ceremonies in mining, with the flexibility to explore personal viewpoints and values on these issues. When required, some of these interviews took a more in-depth approach, particularly when discussing cultural beliefs and practices with key cultural informants such as elders and customary leaders, to explore these issues in more detail and with deeper context.

Approximately 10-20 interviews were conducted in each location with a total of 133 semi-structured and key informant interviews recorded in total (Table 2.2). Interviewees included miners, community members, local buyers and customary leaders. However, in two villages where no mining was conducted the number of interviews was only 2 and 3 respectively in Location 1 and 2. Interviewees were approached on a random basis by walking through the village or mine site if active, and approaching people if they were available and open to being interviewed, however key informants were usually targeted specifically. A plain language statement about the research with the contact details of the researcher and collaborating universities, as well as approval of the research from all levels of government, was given to the respondents before the interview began and their

consent was always required. All respondents were informed that their involvement was voluntary, the information would be kept confidential and they could choose to withdraw from the interview at any time if they wanted to. All data collected was held by the researcher and entered electronically into a password protected laptop to maintain confidentiality.

Table 2.2: Number of interviews (semi-structured and key informant) at each of the locations, specifying respondents as a couple, male or female, and the date when interviews were conducted at each location.

Location	District	Interviews	Couple	Male	Female	Date
1	TTS	2	0	2	0	Aug 2016
2	TTU	3	0	2	1	Oct 2016
3	TTU	16	6	8	2	Jan 2017
4	Kupang	20	3	14	3	May 2016
5	Malaka	10	4	5	1	Oct 2016
6	TTU	14	4	8	2	Feb 2017
7	TTS	20	3	13	4	Jun 2016
8	Belu	14	4	8	2	Mar 2017
9	TTU	20	3	13	4	Sep 2016
10	TTS	14	1	10	3	Oct 2016

Interviews were typically 1-2 hours long and were conducted to the least inconvenience of the respondents, usually at their house, at the mine site or the local

village administration office. Interviews were carried out in a relaxed and open manner, and often general conversations occurred before the interview to help the respondents feel more comfortable and at ease with newcomers asking questions. Only respondents above the age of 18 years were interviewed. Betel nut was always given before an interview, as is tradition in West Timor when receiving a host or arriving as a guest (Kehi & Palmer 2012). Food and light refreshments were also provided where possible.

Figure 2.5: Conducting semi-structured interviews in the field in TTS in August 2016, with the research assistant, Willy Kadati on the far right.

Interviews were recorded always as handwritten notes and sometimes recorded using an audio recording device if permission was granted and the respondents felt comfortable. Direct quotes were taken during the interview to capture particular words and concepts, especially if referring to local traditional beliefs or views. Interviews were usually conducted in Indonesian, although some were also in the local languages of either *Dawan*, *Tetun* or *Marai/Bunaq*. A number of respondents

could not read or write, or preferred to speak in their local language only, and additional support was given to make sure these respondents fully understood the research aims and their involvement. Usually interviews included either individual respondents, family members including the husband, wife and children, or sometimes small groups of 2-4 people if respondents felt more comfortable in this setting and had similar experiences of mining. Interviews were guided by a number of questions (see Appendix A) to get respondents talking about their experience and opinions of manganese mining. These set of questions were used as a guide as situations differed considerably between locations and some locations required additional questions. Interview questions focused on respondent's involvement in mining in the village (e.g. when, how, with who), the benefits and negative impacts they had experienced from mining, what was considered sacred in mining and why and how (e.g. particular places or manganese itself), whether ceremonies were used and if so how, and what visions and recommendations they had for manganese mining in the future.

Data collected included both quantitative and qualitative information. Interviews also included time for the respondents to ask questions about the research and for us to share knowledge with respondents about mining laws, manganese and mining experiences in other parts of West Timor. Many respondents were not familiar with what manganese is or what it is used for, or how the local prices were influenced by global prices and the current Indonesian mining laws so interviews also provided important opportunities to discuss local knowledge gaps and talk about these issues further. Longer in-depth interviews were conducted with key informants to collect

data on more specific aspects of local manganese mining or on traditional practices and beliefs, to understand how manganese mining as a new livelihood is held within their cultural worldview.

Figure 2.6: Semi-structured interviews with female miners during their lunch break near a gold mine site in TTU, February 2017.

In addition, more than 20 discussions were held with government employees at district, provincial and national level, researchers, NGOs and mining companies (Table 2.3). These discussions provided information during the situational analysis in the early stages of field work, but also continued during and after field work to confirm findings and discuss results. Topics discussed included where and how manganese mining occurred in West Timor, current policies and legislation regarding

mineral governance and ASM, resistance to mining, negative and positive impacts of manganese mining, and relationships of mining companies with government and local communities.

Table 2.3: Discussions with government employees, researchers, NGOs and mining companies (names given in brackets) regarding manganese mining (MM) in West Timor (WT), including the interview location, date and topics discussed.

Location	**Respondent Name**	**Respondent Type**	**Date**	**Topic**
Darwin	Bupati Ayub Tetu Eki	District Head Kupang	Apr 2015	Governance of MM
Kupang	CARE Indonesia	NGO	Aug 2015	MM in WT (neg/pos impacts)
TTU	Harbour Master at Port Wini	Government employee	Aug 2015	Manganese trade
Kupang	Maxi Rihi Dara	Researcher	Aug 2015	MM in WT (neg/pos impacts)
Kupang	Department head	District mining department	Oct 2015	MM in Kupang district (licences, distribution)
TTS	Mining manager	Mining company employee (SMR)	Oct 2015	MM activities, community and government relations
TTU	Mining manager	Mining company employee (PUTRA)	Oct 2015	MM activities, community and government relations
Kupang	Heri Kota	Researcher and mining company adviser	Oct 2015	MM AMDAL approval
Kupang	PIKUL	NGO	Oct 2015	MM in WT (neg/pos impacts) and resistance
TTU	Department head	District mining department	Oct 2015	MM in TTU (licences, impacts, distribution)
TTU	Manganese trader	Trading company	Oct 2015	Manganese trade in TTU

TTU	Mining manager	Mining company employee (Asia Traco)	Oct 2015	MM activities, community and government relations
TTS	Department head	District mining department	Oct 2015	MM in TTU (licences, impacts, distribution)
TTS	Department head	District planning and development department	Oct 2015	Mapping, licence approval
TTS	Mining manager	Mining company employee (HAN)	Oct 2015	MM activities, community and government relations
Kupang	Department head	Provincial mining department	Oct 2015	MM in WT (licences, impacts, distribution)
Jakarta	Researcher	Social impacts ASM (ESDM -TEKMIRA)	May 2016, Oct 2016	ASM in Indonesia (licences, impacts)
TTU	Geologist	Mining company (Asia Traco)	Sept 2016	Distribution and geology of manganese
TTU	Mining manager	Mining company employee (ANS)	Sept 2016	MM activities, community and government relations
Jakarta	APRI	NGO	Nov 2016	ASM in Indonesia (licences)
Belu	Department Head	District planning and development department	Feb 2017	MM in Belu (licences, impacts, distribution)
Belu	Priest	Catholic Church	Mar 2017	Resistance to mining
Kupang	Department head	Provincial mining department	Mar 2017	MM in WT (licences, recentralisation)

2.8.3 Data Collection: Field Observations and Secondary Data

Other methods of data collection included field observations and secondary data such as reports and government documents. Mine sites were visited where possible

and with permission photos were taken. All photos in this thesis, unless otherwise stated, were taken by the author. Observations of mining methods and mine site characteristics were recorded, as well as any rehabilitation activities. The research assistant and I often stayed in the village where possible and were involved in local activities such as ceremonies and visited culturally significant sites to gain local context and understanding to the interview data. When we stayed in the village, we usually lived with the *Kepala Desa* or a household who had the facilities to accommodate visitors.

A literature review was also completed to give further context to the interview data, particularly concerning cultural and historical information. Work on the literature review began in 2015 before fieldwork started, to guide some of the interview questions, and also after fieldwork during 2017, to investigate particular themes which arose from the interview data. The literature review mainly concerns Chapter 3, 4 and 5, and relies on anthropological and historical documents by Indonesian and international authors. Documents on Indonesian laws, specifically concerning natural resources and mining, were gathered from government departments, as well as data on current mining licences in West Timor.

Figure 2.7: Mine site observations and discussions with miners in TTU in October 2015.

2.8.4 Data Analysis

All interviews were entered into Word documents, and qualitative and quantitative data were organised in Excel in preparation for analysis. All interviews were dated and labelled according to the location and respondent number for documentation purposes. Respondent interviews in this research are referred to as LX/HX/RX or KX to identify the location (LX), hamlet (HX) and respondent/key informant (RX/KX) number of each interview, without exposing the identity of the respondents.

Quantitative data was collected to give context and general understanding of the major characteristics of mining in each location, however were not analysed for

specific purposes or comparison between sites to develop conclusions. Triangulation of the quantitative data was achieved through cross-examining information between interviews and checking with other documents, such as reports, and also with experts in the field. For example, sometimes respondents had difficulty remembering the year that they began mining, however documents on mining licences in the area could provide exact years that mining companies started operation in that location. When responses were unclear or unusual, the question was often repeated in a different way later in the interview to clarify the information.

The qualitative data was analysed through a reflective and interactive process to give context by exploring the research findings in consideration of cultural and local circumstances. Annotations and coding were used as a way to highlight and comment on particular issues in the interview data, both of which are useful ways to uncover patterns and categories, and realise evidence to support conceptual theories, frameworks or relevant themes (Newig 2011). Memos were also used in the analysis stage to record and summarise particular issues that arose, and to link information between interviews with observations, ideas and existing research from the broader literature (Newig 2011). Some of the analysis was done manually on hard copy versions of the interviews and other sections were organised and grouped in Excel spreadsheets.

The Sustainable Livelihoods Framework was loosely applied in Chapter 4, providing a structure to organise and interpret the data on mining livelihoods including livelihood assets and activities and vulnerabilities and livelihood outcomes as a qualitative assessment. This method and how it was used is described further in Chapter 4.

2.8.5 Delivering the Findings and Recommendations to Research Participants

In September 2018, a recommendations report in Indonesian was presented to the *Kepala Desa* at each of the locations in West Timor where research was undertaken, as well as a number of local NGOs and the provincial mining government department. This final trip allowed for further discussion on the key findings and reflections on the current mining situation before the thesis was submitted.

2.9 Limitations and Challenges of the Research

There were a number of issues and difficulties faced during the PhD candidature. Difficulty in obtaining the Indonesian research visa because of the sensitive research topic, was time consuming and delayed the start of fieldwork by six months. However, the lengthy process also required that a research counterpart with the Indonesian Ministry for Energy and Mineral Resources was developed which became a helpful and relevant contact to have at the national level.

The choice to have 10 sites to ensure a sound representative assessment across West Timor also meant that there was less time to go more in-depth in each location. Several weeks were taken up just submitting and collecting the required permit letters for each location. But having a large number of sites was important to the research design to capture the diversity of worldviews and responses to mining across West Timor, rather than understanding in-depth only a few examples; the aim was predominately to create scope to compare and contrast and investigate dynamism and diversity rather than depth. Many of these locations were remote and were difficult to access. The co researcher and I always travelled together on

motorbike, but many sites required us to walk as the roads were often in poor condition or flooded during the wet season. This again was time consuming but built up an experience of being in these places.

Having a large number of sites limited the time we could spend in each place and so there was not much time to build up trust and strong relationships with the local people. We often relied on contacts or “gate keepers”, who were trusted in the village and could introduce us. Staying in the field locations and being involved in community activities, such as gathering food from the gardens, attending ceremonies and church services, and spending time chatting at the beginning of each interview helped respondents get to know us better and feel relaxed and safe.

Generally, respondents were very open to talking about mining and their experiences, even though it is an informal and in some cases illegal activity, often because they felt they had the right to manage their own resources on their own land, despite whether an Indonesian law determined it illegal. Most mining companies were friendly and allowed access to sites and encouraged us to talk with them and the local people. In Location 10 we were not able to access one hamlet as the mining company did not allow us to use the road (which is used by the public to access the hamlet) although we approached them numerous times and had permits from the national level to the *kepala desa*. This experience helped us see the way in which larger mining companies can control areas and resources without necessarily keeping the community’s best interests in mind.

There were challenges regarding the timing of the research as most mining activities had ceased by the time the field research was underway (due to various reasons

discussed in Chapter 3). This meant that a lot of the stakeholders were not present, and respondents were relying on their memory of the experiences of mining, and so some of the negative impacts perhaps may not have been as clear or obvious as when mining was occurring. However, there were benefits to conducting the fieldwork when mining activities had mostly ceased as respondents had experienced the boom and bust nature of mining and there had been time to reflect on how mining had influenced their lives and what they would recommend in the future if mining was to return.

Gender is an important issue to consider in mining, including ASM (Eftimie et al. 2012; Großmann et al. 2017; Lahiri-Dutt 2008). This research gave consideration to women respondents where possible however it was not the aim of this research to focus specifically on gendered issues in manganese mining. Gendered issues and women's experience of manganese mining in West Timor was covered by another researcher within the GPFD project team and the research results are currently being analysed and prepared for publication.

The next chapter provides an overview of manganese mining in West Timor, including the distribution of manganese and types of mining practices, the price and market of manganese, the stakeholders involved and manganese mining in relation to other types of artisanal small-scale mining.

Chapter 3: An Overview of Manganese Mining in West Timor

3.1 Introduction

Despite ASM being widespread in Indonesia, particularly gold mining, small-scale mining of manganese is mostly confined to West Timor and is still a relatively recent activity starting around 2007. However, the manganese mining industry in West Timor has not been well documented, with only three sources of information (Dara 2014, Sahin et al 2012 and Tahu and Meak 2013). Research conducted under the GPFD project is still largely in preparation for publication however one paper has been published (Fisher, R et al. 2018) and some research findings are referred to where possible in this thesis. This chapter aims to provide an overview of the practice and outcomes of manganese mining in West Timor including its similarities and differences with other forms of ASM. It addresses three main research questions: 1) What are the current manganese mining practices and distribution in West Timor, 2) Who is involved in manganese mining and the manganese market in West Timor and 3) How does manganese mining relate to common themes in ASM?

This chapter does not provide a comprehensive analysis of the characteristics of manganese mining in West Timor, however it does aim to describe the activity, as there is a significant lack of published work in this area and manganese mining in West Timor is particularly unique for a number of reasons outlined in the following sections. The information provided in this chapter is important to give a background of manganese mining to discuss further topics including livelihood, cultural and policy issues in relation to sustainable development later in this thesis. The chapter starts

by giving a detailed description of the different manganese mining techniques and their distribution and practice across West Timor and the different stakeholders involved, since its commencement until 2017 when most of the field work was completed. I conclude with comparisons of manganese mining to other forms of ASM, particularly regarding the common benefits, negative impacts and livelihood characteristics.

3.2 Methods

The data in this chapter is the result of discussions, observations in the field, semi-structured interviews and literature research as described in detail in Chapter 2. Discussions with local geologists, mining companies and government employees at the mining departments at national, provincial and district levels, provided information on the characteristics of local manganese deposits, the geology of Timor Island, the methods of extraction, processing and exportation of manganese, as well as the current policies and legislation relevant to manganese mining. These discussions were complemented with personal observations in the field at the ten locations in each district, as well as additional sites visited in the situational analysis (see Chapter 2 for details), including observations of the type of mining, the type of manganese ore, the landscape and geological aspects and the mine site characteristics. These observations were recorded by taking photos, where permitted, and writing notes describing the characteristics of the mine sites and mining activities. Information on mining histories, the local price fluctuations of manganese, and mining techniques were also provided by the respondents (usually miners and key informants) at each location through semi-structured interviews.

Literature research, including some Indonesian publications, provided further information to support the data collected from discussions and observations. This included three key publications on manganese mining in West Timor including a report by Maxi Rihi Dara (2014), based on the benefits and negative impacts of mining in the districts Kupang and TTS; an article by Sahin et al. (2012) on natural resource management policies in Indonesia using manganese mining in West Timor as a case study; and a book by local authors Maria Tahu and Benyamin Meak (2013) based predominately on the negative impacts of manganese mining in TTU. The latter was produced by Oxfam International and the local NGO *YABIKU* (*Yayasan Peduli Perempuan Kampung*).

3.3 The Distribution of Manganese and Mining Practices in West Timor

3.3.1 Manganese and Its Uses

Manganese is a metallic element and is often found in combination with other minerals such as iron. It is the 12th most abundant element in the planet and is predominately extracted and used in the production of steel to improve the hardness and strength of metal alloys (Barceloux 1999). By tonnage, manganese is the fourth most used metal in the world, after iron, aluminium and copper (Geoscience Australia 2015). About 90% of manganese mined in the world is used to make steel (Geoscience Australia 2015). Other uses for manganese include industrial chemicals, such as potassium permanganate and dry-cell batteries. Ukraine has 24% of the global manganese reserves, followed by South Africa (22%), Australia (16%) and Brazil (10%) (Vale 2015). Global grades of manganese are typically around 30% or lower. Global sources of high-grade manganese ore (more than 40%) are diminishing

rapidly due to the increasing demand for metals while the manganese alloy market is projected to increase by 40% over the next decade (Das et al. 2011; Gulf Minerals Corporation 2015). This situation has led to an exploration of new sources of manganese ore, particularly sources of higher grades.

3.3.2 Geology of West Timor and Manganese Ore

Very high grades (50% or higher) of manganese occur in the Indonesian province of Nusa Tenggara Timur, including the island of Timor, Rote, Sabu and Flores. This area has been previously overlooked because of the difficulties of earlier strict Indonesian mining laws, as well as the remoteness and low level of infrastructure available (Gulf Minerals Corporation 2015). Manganese deposits occur frequently, although sporadically, through areas of West Timor, and is particularly common in the districts TTU and Belu (Asia Minerals Corporation 2013).

Manganese deposits in West Timor are particularly unique because of the geological history of West Timor. As Charlton et al. (2009, p. 341) describes "Present-day Timor forms part of the zone of collision between the Australian and Southeast Asian plates, and structurally the island comprises a fold-and-thrust belt consisting of imbricated sequences derived from the outer edge of the Australian continental margin, locally overlain by fragments of the pre-collisional oceanic forearc complex." The collision of the Australian and Asian plates lifted ocean bed sediments from under the sea above the ocean surface to create what is now Timor Island. During this process the different geological deposits were moved about due to the pressure and uplifting force from the colliding plates, creating complex and chaotic geological landscapes. There is still a lot of land movement, mostly due to the highly erosive soils, including

soft sediments and shales, which erode and move during the rainy season. This has meant that over time, deposits of manganese have become mixed so there are few single large deposits, as are found in other countries, but many small, scattered deposits. The manganese nodules in Timor were most likely formed in a bathypelagic environment (1000-4000 metres below the sea surface) possibly during the Cretaceous period (Audley-Charles 1965; Glasby 1978; Margolis et al. 1978).

The earliest report on the presence of manganese in West Timor was published in 1915 and stated "...on the island of Timor nodules of manganese have been observed in several places in deep-sea deposits" but no economic interest was suggested at this point (Molengraaff 1915, p. 422). Only later in the early 1980s was manganese in West Timor investigated further, when Japanese surveyors examined the land around Kefamenanu in TTU and stated that manganese was present from sea level up into the mountains. Manganese mining activity in West Timor, however, did not start until the mid 2000s at the earliest locations.

Manganese ore occurs in different forms in West Timor. It can occur as layers in between other sediments, or in a rock form which occurs as small pieces to large boulders (Figure 3.1). Manganese also forms nodules, or what is often referred to locally as *cucur* (Figure 3.2), and these nodules are formed on the sea floor when manganese particles in the water are attracted to each other or a small particle and slowly grow, possibly taking thousands to millions of years, to form round disc shapes (Hein & Petersen 2013; Maribus 2014). The ocean conditions must remain reasonably stable to allow the formation of the nodules. These manganese nodules were lifted with the sea floor when Timor Island was pushed above the surface. Because of the

way it is formed, manganese nodules have the highest grade of manganese, usually more than 40% manganese.

Figure 3.1 and 3.2: Layers of manganese and manganese nodules or *cucur*.

3.3.3 Types of Manganese Mining in West Timor

The type of mining practised to extract manganese in West Timor depends on a number of different factors including the size and distribution of the deposit, the type of manganese present (ie. nodules, layers, boulders), equipment available (hand tools or excavators), geographical characteristics (eg. river, slope and forest) and local views, values and beliefs. Manganese mining in West Timor is particularly unique as most of the manganese deposits are well-suited to artisanal or small-scale mining, in contrast to other manganese deposits worldwide which are typically very large and are only mined with heavy machinery (Figure 3.3 and 3.4).

Figures 3.3 and 3.4: Large-scale manganese mines in Groote Eylandt, Northern Australia. Source: http://www.ensight.solutions/portfolio/groote-eylandt-mining-company/ and http://www.theaustralian.com.au/business/mining-energy/bhp-billiton-to-expand-gemco-manganese-mine/ (accessed 18/06/2017)

From the semi-structured interviews conducted at the ten locations, it was reported that manganese mining in West Timor began around 2005, although most locations started mining later between 2007-2010. Mining activities peaked during 2009-2012, and began to decrease from 2012-2015, and by 2016 almost all mining activities had ceased. These results are consistent with findings by Dara (2014) and Tahu and Meak (2013).

Manganese occurs in all five districts in West Timor, and is very widespread, typically present in an estimated 50-70% of villages (Fisher, R et al. 2018). It can occur in mountainous regions or flat plains, in creeks and rivers, as well as forest, open land and land used for planting gardens. Mining has been carried out in all of these regions and landscapes, with only some remote areas not mining because of the difficulties in transporting the ore out of these locations, particularly in the wet season (Fisher, R et al. 2018). Manganese can be incredibly abundant and in a hamlet in Location 4

every member had manganese on their own land as well as access to manganese in communal land. In other locations visited, larger deposits only occur on communal land or some landowners' property. In one location villagers reported that they came across a large manganese deposit when the foundations for a new school building were being dug. Respondents from all locations often described being aware of manganese in their gardens or land before mining activities began, and that manganese rocks were put to the side of the garden or sometimes used as fencing like any other large rock. At most locations there was abundant manganese present on the surface of the soil, particularly in the earlier stages of manganese mining in West Timor, and manganese could simply be picked up or large boulders broken into smaller pieces. Manganese still occurs on the surface in a number of locations visited, especially in areas with high soil erosion, abundant manganese deposits or in creeks and rivers after floods. In some of the locations investigated respondents reported collecting manganese from the surface for the first 1-2 years before beginning to dig for manganese.

The majority of manganese mining in West Timor involves mining using hand tools only and is often referred to as "manual" or "traditional" mining, as opposed to mining with mining with heavy machinery such as excavators. Due to the widespread distribution of small manganese deposits in West Timor, mining manganese on a large-scale is often not feasible, and so small-scale, labour intensive extraction methods are far more widely practised. Attempts to mine through creating large open pits involves a high level of economic risk and engineering expertise to prevent landslides in a landscape which is naturally highly erosive. In interviews, mining

company officials and government mining departments in West Timor reported that local manganese deposits are usually small and difficult to predict, adding to the difficulty and risk in larger operations. Therefore, manganese mining in West Timor, naturally lends itself well to artisanal and small-scale mining operations.

The most common hand tool used by community miners is a metre-long metal crowbar called *linggis*, often also used for turning over the soil when preparing land for planting gardens and is used to dig for manganese between 1-8 metres deep. Most of the mines visited were dug by hand and were typically 1-3 metres deep (Figures 3.5 and 3.6) although deeper holes up to 8 metres did occur (Figure 3.7a), particularly if the deposit was increasingly abundant deeper underground. From mine visits and conversations with miners, it was observed that usually the soil and other rocks were piled to the side of the hole and the manganese carried out of the mine and stored in old rice sacks for selling to traders. A number of the locations visited manually filled in the holes after mining, using the soil previously removed, although a lot of smaller holes from 1-2 metres deep, fill in naturally over a few years (Figure 3.7b and 3.7c). It was also common to dig into the sides of creek or river banks where the soil was already exposed from water erosion. Some locations visited also rehabilitated areas after mining by planting trees, such as bananas or coconuts to prevent any erosion, particularly on hillsides.

Figures 3.5 and 3.6: Small manganese mine dug with hand tools, 2 metres deep, Kupang District.

Figure 3.7: a) larger mine dug with hand tools, 8 metres deep, Kupang District, b) and c) small mines that have partially filled in naturally.

In some locations excavators were also used to mine manganese (Figures 3.8 and 3.9). Some mining companies had access to excavators, including three of the locations we visited (8, 9 and 10), and used these to remove the top soil, or open up new deposits and then the area would be mined using hand tools. In some areas, excavators dug out the manganese and then local workers would sort through the piles of excavated soil, collecting and sorting pieces of manganese. At Locations 5 and 7, excavators were also used by the community on private land for a few months when the landowners were able to access an excavator, but this was uncommon and most locations mined manually.

Figure 3.8 and 3.9: Large mines created using excavators in TTU (Location 9) and TTS (Location 10). Right Photo Source: http://alsisblogue.blogspot.com.au/2016_02_01_archive.html

After manganese is extracted from the ground it is washed and crushed for transportation, mostly by the community miners but sometimes by the mining company if they had a washing and crushing station established. The washed and

crushed manganese is sold by villagers to traders or to a mining company in the region. Most manganese is then transported from one of three ports in West Timor (either Bolok/Tenau, Wini or Atapupu) and processed in a smelter, either in Surabaya or China, melting the manganese at high temperatures and mixing with iron to create ferromanganese which is then used to create steel (GMC 2015).

3.3.4 The Price and Market of Manganese

There are two main forms in which manganese is mined and exported in West Timor. The first is through traders who prefer to buy manganese directly from the local people and were not usually involved in the mining activities. Traders often only have exploration licences for 1-2 years, if they have any licence at all, and some had previous experience trading with local people for other resources such as tamarind or were involved in cargo transportation. These traders, described as *cukong* or illegal brokers by Dara (2014), can offer a higher price to villagers for manganese than mining companies as they have no investment in mining operations, and mostly work within the informal sector. These investors, traders and buyers operating informally were sometimes Indonesian citizens, but many were from other countries including China, South Korea, Japan, India and Australia (Tahu & Meak 2013). The second form in which manganese is mined is through mining companies who are more engaged in the mining process, and use excavators and hire local people as employees. Some of these mining companies set up washing and crushing stations and had strategic stockpiles near ports. A provincial government report stated that as of 2015, there were 122 exploration and 90 operational licences issued in West Timor, across the five districts (Dinas Pertambangan dan Energi NTT 2015), although not all were

necessarily active in 2015 (Table 3.1). As of late 2015, there were only six mining companies in West Timor with operational licences that were actively mining, and by late 2016 this had decreased to four mining companies. Other traders only had exploration licences and most of these had ceased activities by 2015. The land area allocated in both exploration and operational licences is considerable at 311,881 ha (3118 km^2), which is approximately a fifth of the land area of West Timor (15,850 km^2) (Dinas Pertambangan dan Energi NTT 2015) (Figure 3.10). Note that in Figure 3.10, mining licences do not necessarily infer active mining activities, however they do indicate the presence of manganese, demonstrating the widespread distribution of the mineral across the island and the large area covered by mining licences.

Table 3.1: Number of operational and exploration licences for manganese mining issued by district government in the five districts in West Timor as of 2015 (Belu and Malaka are combined as they are governed by the same mining department (data sourced from Dinas Pertambangan dan Energi NTT (2015)).

Licences	**Kupang**	**TTS**	**TTU**	**Belu/Malaka**	**Total**
Exploration	38	9	33	42	122
Operational	6	6	36	42	90
Total Area (ha)	81,519	56,794	90,145	83,423	311,881

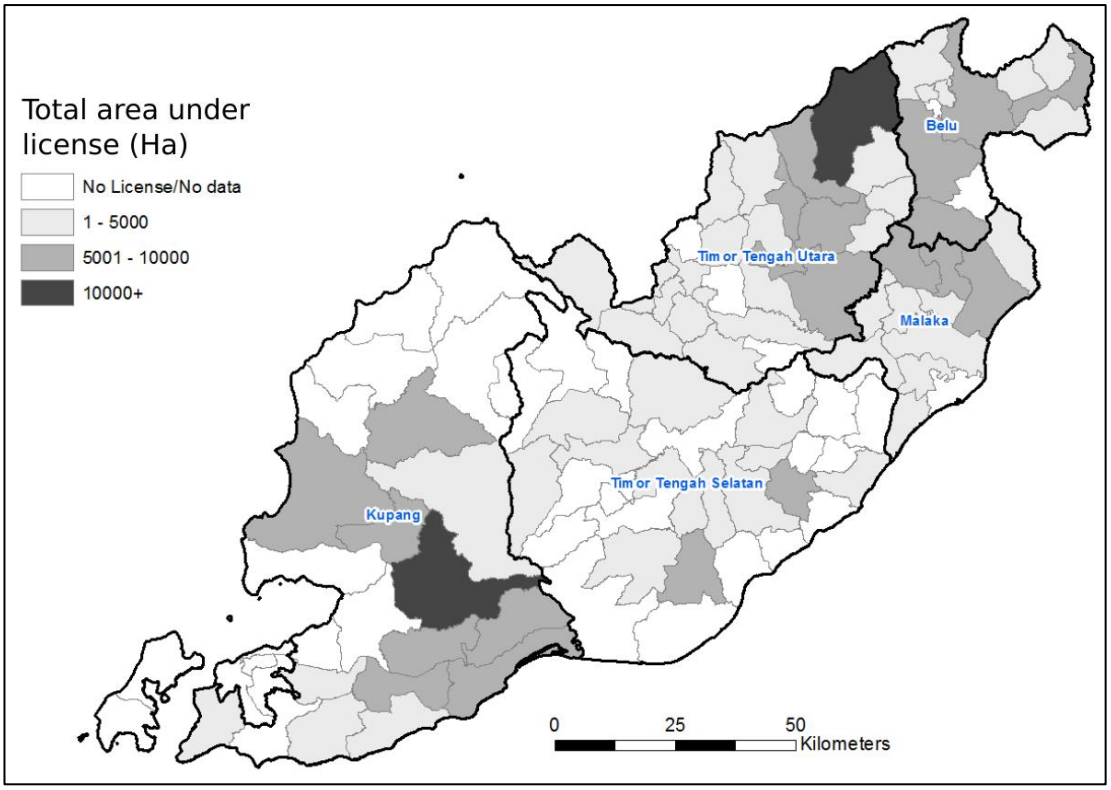

Figure 3.10: Number of hectares under current mining licences in each sub-district as of 2015, across the five districts of West Timor (DPE NTT 2015) (Taken from Fisher et al. 2018).

Some operational mining companies were also involved in additional mining activities in other parts of Indonesia. These include Soe Makmur Resources (SMR) in TTS and Anugerah Nusa Sejahtera (ANS) in TTU who set up long term mining facilities in West Timor and are still active as of 2017. They are also involved in a number of mining operations in other parts of Indonesia and have extensive mining experience. In contrast, traders typically had little or no mining experience however they usually had other trading businesses.

When manganese mining began around 2007 the price started very low, most respondents reported initially selling manganese for 200-500 IDR per kilogram (AUD $0.02 – 0.05). Some companies used a cubic system, buying manganese by the cubic

metre for around 400,000 IDR (AUD $40). Despite high global prices for manganese in 2007/2008 (Figure 3.11), mining company managers reported in interviews that the buying price started low in West Timor due to the costs and risks involved in starting new business ventures, as this was the first time that manganese had been mined and exported from West Timor. Mining companies in TTS and TTU reported that there is considerable economic risk involved when starting mining business operations as the trade links are not always reliable and the profit margin is not yet known. As these trade routes and costs for licences and transportation became clearer the price of manganese used to buy from miners increased. Miners reported the increase in traders involved in buying manganese from the local people created competition between buyers and pushed the price up, as miners sold manganese to the buyers who offered the highest price. Almost all respondents in the mining locations investigated in West Timor stated that the price of manganese had risen to 1000-1500 IDR (AUD $0.10-0.15) per kilogram by 2009.

Variations in the price of manganese are influenced by a number of factors in West Timor (Table 3.2). In more remote locations the price a trader offers may be lower than locations close to cities or harbours because of the additional costs involved in transporting the manganese out of that location. For example, respondents reported that higher prices for manganese usually occurred near the ports and cities where the mining locations are close to the company's stockpiles or where roads were in good condition. The price also varied depending on the quality of manganese; some mining companies and traders offered higher prices for manganese nodules or *cucur* because of its higher grade of manganese (Dara 2014). As mentioned above, if a

number of buyers were operating in the same location this could create competition and respondents reported that they could push for a higher price, selling only to the buyer who offered the highest price. Lower prices were also used if an excavator was involved to remove the ore. Usually an excavator would dig out the ore, placing it in large piles, which would then need to be sorted by miners as the manganese occurred as small pieces of ore mixed in with the soil. Excavated manganese sorted from the soil by miners was then sold to the mining company at a lower price usually only between 200-400 IDR (AUD $0.02-0.04) per kilogram instead of 1000-1500 IDR (AUD $0.10-0.15) if it had been dug out by hand. Using an excavator to extract the ore incurred additional costs for the mining company including the hire of the excavator, the excavator driver's wages and fuel for the excavator, which was rectified by using a lower price to buy excavated and hand sorted manganese from the miners. The duration of mining at each location, prices per kilogram and average quantity of manganese mined per day, as provided in Table 3.2, were sourced from semi-structured and key informant interviews at each location. These findings of the difference in price between manually extracted and excavated ore were also reported by Dara (2014). Respondents reported a significantly lower price was used for excavated and sorted manganese in Location 9 and 10 where excavators were used by the mining companies.

Table 3.2: Type and duration of mining, the price of manganese (IDR) and the average quantity mined per day per household in each of the ten locations (source: semi-structured and key informant interviews across the ten locations during 2015-2016).

Location	District	Type of Mining	Duration of Mining	Highest Price (IDR)	Average Price (IDR)	Average Quantity Mined per Day (kgs)
1	TTS	No Mining	-	-	-	-
2	TTU	No Mining	-	-	-	-
3	TTU	Manual Only	2009-2013	1300	1000	10-100
4	Kupang	Manual Only	2008-2013	1500	1000	50-1000
5	Malaka	Mostly Manual	2009-2011	1200	1000	10-100
6	TTU	Mostly Manual	2008-2013	1500	1000	10-100
7	TTS	Mostly Manual	2008-2013	1300	1000	50-1000
8	Belu	Excavator/Company	2009-2015	1300	1000	10-100
9	TTU	Excavator/Company	2008-Current	1500	1000	50-1000
10	TTS	Excavator/Company	2008-Current	1200	200	100-500

The global price of manganese also influences the local price of manganese between miners and traders in West Timor. The main global buyer of manganese or ferromanganese products is China, closely followed by India, and the global price of manganese is strongly influenced by the surplus and demand for manganese in these

two countries (International Manganese Institute 2014). During 2007-2011 the world price of manganese peaked (Figure 3.11). In an interview with provincial government officials, it was reported that local prices of manganese increased and buyers rushed to West Timor to take advantage of high global manganese prices. From 2012, the world price of manganese began to drop as the global demand for steel decreased and there was a surplus of manganese in China from 2014 (Figure 3.11) (International Manganese Institute 2014). Almost all manganese mining activities in West Timor ceased by 2014/2015, with only two companies still operating, one in TTS and one TTU, however the local price of manganese in these areas also dropped to 200-400 IDR (AUD $0.02-0.04) per kilogram.

Figure 3.11: Global manganese prices over past 12 years per kilogram in USD (Source: http://www.infomine.com/investment/metal-prices/manganese/all/ on 20/06/17).

3.4 The Manganese Market Chain and Stakeholders Involved in Mining

There are a number of different stakeholders involved in the extraction, transportation, sale and exportation of manganese ore in West Timor. Figure 3.12 provides a simplified version of the common paths that manganese is transported and sold through, although in some cases this may be far more complex and can differ between places and also over time. It also identifies the main stakeholders involved in manganese mining, including the miners, middlemen, transporters, traders and mining companies.

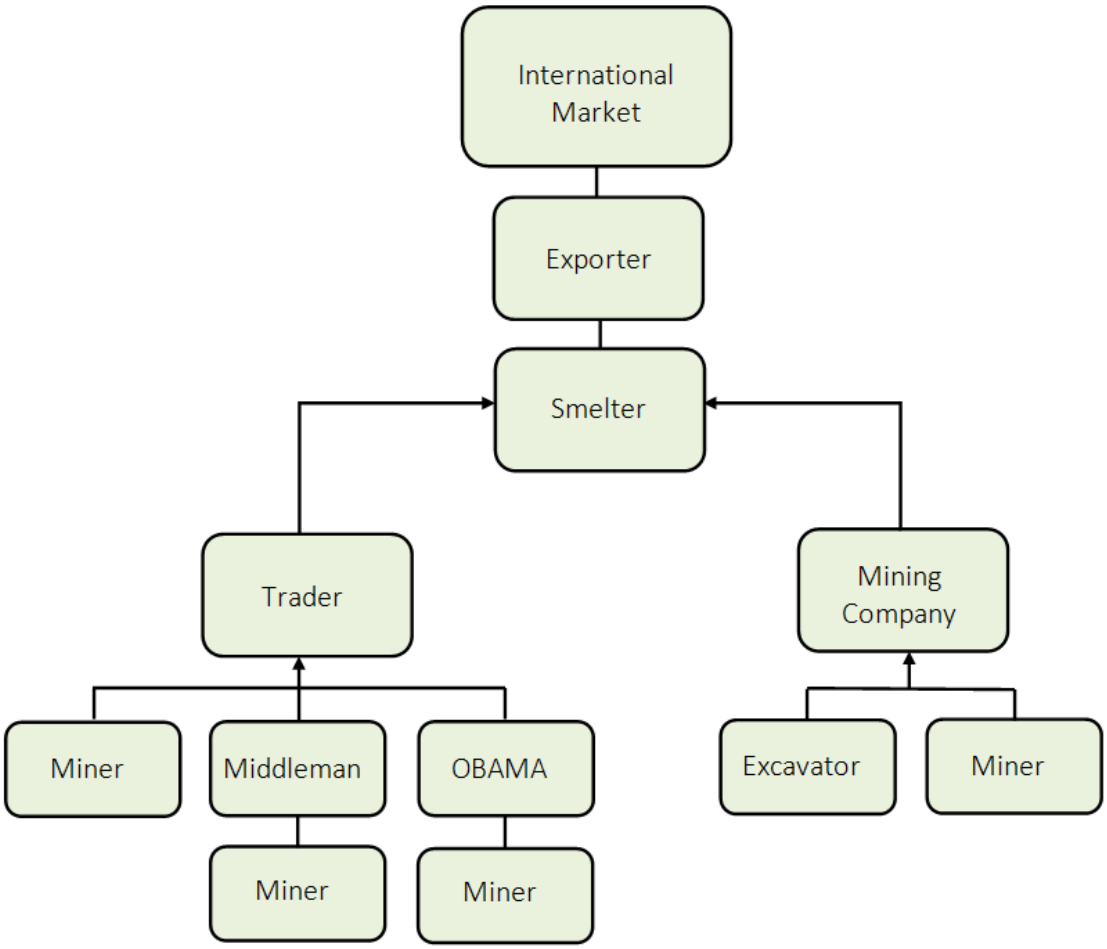

Figure 3.12: Flow chart of the stakeholders involved in the extraction, sale and exportation of manganese in West Timor (adapted from Dara (2014) with information sourced from discussions with government employees, mining company employees and key informant interviewees).

Traders and mining companies make up the two main branches of the manganese market chain. Traders often bought manganese directly from the local people, either the miners themselves, middlemen in the village or *OBAMA* (*ojek bawa mangan* – motorbike rider carrying manganese) who either mined and carried their own manganese or bought from local miners. Traders were rarely involved in the extraction of manganese. On the other hand, mining companies were usually more established, with heavy machinery and infrastructure and were engaged in the mining activities, either extracting manganese with excavators through paid labour

(usually a daily wage for the excavator driver) or buying manganese from local miners who either dug the manganese themselves or sorted through excavated soil to pick out the manganese and sell the manganese per kilogram to the mining company. Both the traders and the mining companies then export the manganese to either China or more recently to smelters in Surabaya in Java, for processing into ferromanganese which is then sold on the international market.

Miners usually worked on their own land or communal land, or on a community member's land and paid a portion of the profit to the landowner, or miners could work for a mining company (Dara 2014). Most respondents we interviewed in locations reported that they worked on their own land or communal land and sold to traders who enter the area to buy manganese. In Location 4 all respondents mined on their own land as manganese was so abundant there that almost all villagers had manganese on their own land. In other locations such as Location 3, 7, 8 and 10, the manganese deposits were more widespread and miners worked on land owned by other villagers. Some landholders worked as miners on their own land and allowed other miners to work on their land, usually sharing the profit 50/50. Some landholders rented or sold their land to mining companies, and this was the case in Location 8 and 10. One landholder reported receiving IDR 17 million (AUD $1,700) for 1.5 hectares of land to rent for five years, which the company paid in full but only worked for one year before they left when the price of manganese fell and new Indonesian mining laws were enacted (L8H1R3). Another landholder at the same location received IDR 2.5 million (AUD $250) for one hectare over one year when they rented it to the mining company (L8H1R2). In Location 10, two respondents

reported that the mining company paid IDR 100,000-150,000 (AUD $10-15) per month per hectare of land (L10H5R6 and L10H4K3).

Depending on the situation, people often mined together in family groups; husband and wives often worked together as a team, with their children sometimes present at the mine site. Young children often helped mine after school. Men and women usually performed the same tasks in mining, although sometimes in larger company managed mines where many people worked at the same site, men claimed a place in the larger mine and dug out the ore, while women collected the manganese from them, scrubbed the dirt off and crushed it using hand tools into smaller pieces for packing into bags for weighing and selling. Older men and women also reported engaging in mining but would not take on heavy labour, often only gathering manganese stones from the soil surface or in rivers and creeks. One respondent remarked, “Even if you are old and blind you can still mine manganese, as you can feel the weight of manganese is different from other stones the same size” (L4H5R4).

Sometimes local people in the village worked as middlemen, buying manganese from local miners and stockpiling it on their land until a trader with a truck came to weigh and purchase it. Middlemen were often villagers, whereas traders were from outside and usually had an exploration licence. Middlemen made a profit by selling manganese at a higher price to the traders than what they bought it for from the local miners, for example they would buy manganese from the villagers for 1000 IDR (AUD $0.10) and sell to the traders at 1200 IDR (AUD $0.12) per kilogram. This system also made it easier for the traders as they only needed to visit a few main locations in the village to pick up the manganese and not buy directly from each individual

miner. Some traders would then transport the manganese to the cities and sell it to other buyers, often to mining companies with export licences, or export it out of West Timor to China or smelters in Surabaya.

OBAMA (*ojek bawa mangan* – motorbike rider carrying manganese) bought manganese from miners and transported it out of the mining location to the cities or harbours where companies or traders had stockpiles (Dara 2014). One *OBAMA* could carry up to 100kg of manganese at a time and they usually operated in areas which were more remote or were not frequently visited by traders, such as Location 8. In Location 10, from 2010-2014, a fleet of around 200 *OBAMA* took manganese from TTS into Kefamenanu in TTU to sell as they could get a much higher price (up to 1500 IDR (AUD $0.15) per kilogram) selling manganese to traders in Kefamenanu rather than selling it to the mining company in TTS who controlled the price at 200 IDR per kilogram (Dara 2014; Tahu & Meak 2013). *OBAMA* either transported manganese they mined themselves or manganese which they bought from other miners.

It was reported by the community members, mining companies and government officials that some members of the police force and army were often involved in mining activities, sometimes acting as traders or working with traders, or requesting payments from people such as OBAMA or traders to transport manganese across district or sub-district borders. Some respondents considered the involvement of police and army officials in mining activities normal. However many mining companies and traders we interviewed were critical as it is illegal and generated additional costs requiring payments to police and army at various checkpoints when

they had already obtained government approved mining licences to transport manganese. This issue is explored further in Chapter 6.

NGOs, universities and local church organisations have also been involved in manganese mining activities by investigating mining impacts, supporting community miners and leading demonstrations against mining companies. Discussions with relevant NGOs in Kupang revealed that NGOs had mixed attitudes regarding mining. Some NGOs protested against manganese mining and have advocated against it, such as PIKUL and WALHI (*Wahana Lingkungan Hidup Indonesia* – Indonesian Forum for the Environment) to a degree, whereas others, such as Care Indonesia, see their responsibility as not to dissuade communities from mining but to help them make informed decisions about mining, and to be aware of what the negative impacts are. There is one main national NGO APRI (*Asosiasi Penambang Rakyat Indonesia* – Indonesian Community Miners Association) who represents and supports community miners throughout Indonesia, including a number of communities in West Timor from 2015. Universities have been involved in understanding the geological aspects as well as some of the social impacts of mining, although there are only short and limited reports available. Respondents in interviews reported that church organisations, both Protestant and Catholic, have been a vocal support for resistance to mining, particularly where mining companies have created local conflict. This was the case in Locations 8 and 10, where church leaders helped stage demonstrations against the mining companies present.

Other actors in manganese mining also include community members who may have chosen not to mine because they did not have access to manganese or they were not

interested in mining. Even though these community members may not have been directly involved in mining activities they may still have been affected by mining impacts. A number of respondents we interviewed were not directly involved in mining activities but had been impacted by mining, for example one shopkeeper experienced downstream benefits from mining, and some nearby villages experiencing landslides or water pollution as a result of nearby mining activities and environmental damage, and so their indirect experience of manganese mining is also included in the following chapters where relevant.

3.5 Situating Manganese Mining in the Field of ASM

Following the above description of manganese mining in West Timor, it is important to consider where it sits within the broader ASM context. Artisanal and small-scale mining of manganese only currently exists in West Timor, however it shares some similar trends with common themes in the ASM literature but also exhibits some differences.

3.5.1 Defining ASM & Manganese Mining in West Timor

At present, a global definition of artisanal and small-scale mining (ASM) does not exist, however a number of country-specific definitions do exist and are relevant and applicable on a local scale (Buxton 2013; D'Souza 2005). Generally “artisanal” refers to manual, low-technology mining performed by individuals or members of families, including women and children, and is often considered informal or illegal (D'Souza 2005). In contrast, “small-scale” refers to the use of more developed mining technology, is often licensed or considered legal and is performed in a formally

recognised or employed group of miners, however it is still executed on a small-scale in comparison to large-scale operations (D'Souza 2005). The use of the acronym ASM combines both definitions of artisanal and small-scale, and is applicable to localities or mining activities where both circumstances are present (Hentschel et al. 2002; Lahiri-Dutt et al. 2014; Veiga et al. 2006). The term “informal mining” is also used in the literature as an umbrella term to include artisanal, unlicensed, small-scale and licensed mining activities (Lahiri-Dutt et al. 2014). In contrast, large-scale mining is legally approved mining, often implemented with more advanced technology and skills than ASM, and formally employs groups of people (Buxton 2013). Large-scale mining employs approximately 2-3 million people worldwide while ASM involves around ten times more often in an informal manner (Buxton 2013).

Considering these broad terms, manganese mining in West Timor incorporates both artisanal, small-scale and medium-scale mining, all of which occur legally, illegally and mostly informally. The collection of manganese from the soil surface, for example picking up manganese along river beds and creeks after floods or heavy rain, can be defined as artisanal as it requires no digging or even the use of simple machinery. Most shallow mines (1-3 metres) in gardens or open land involving the landowner or family could also be described as artisanal. It is also often opportunistic, seasonal and a source of income to complement farming (see Chapter 4). Some forms of manganese mining are slightly more advanced, such as deeper mines (3-8 metres) that require the use of hand tools to dig out the manganese and break it into smaller pieces, and can be defined as small-scale. These mines may be larger in length or size and are often communal, involving either a landowner or if in open land would

require the agreement of clan leaders, and is accessible to members from multiple households in the community. For both artisanal and small-scale mining in a manganese mining context, manganese is sold to traders who enter the village, or otherwise transported out on motorbikes by *OBAMA*. Most manganese mining (approximately 80%) in West Timor is considered as artisanal or small-scale mining.

Some manganese mining can be described as medium-scale mining in West Timor. This form of mining often includes the use of excavators or heavy machinery, creating mines that are at least 10 metres deep or wide, and in all examples in West Timor, a mining company is involved in the mining activities to some extent. The mining company may employ local people as packers, crushers, excavator drivers and security. Medium-scale mining can involve the local community or people from nearby villages or also further afield, however mining activities are largely controlled and managed by the mining company as opposed to the local community. In this study, this type of mining is referred to as "company mining" to emphasise the influence of an external company over the management and control of mining activities. Company mining is usually legally approved and recognised although it may also interact with the informal mining sector. There are no examples in West Timor that are extensive enough to be defined as large-scale.

Whether mining is legal, illegal or informal is difficult to define, particularly with changing laws (see also Chapter 6). While mining companies, particularly those with operational licences, have obtained the correct legal documents, these documents are not always recognised by local police and army officials who often require additional payments, especially when transporting manganese across borders or

from the port. This is technically an illegal activity by the police and army, however is often overlooked or considered normal, particularly in poorer regions of Indonesia, to the frustration of a number of mining companies in West Timor. This behaviour was commonly reported by four mining companies interviewed and also by respondents at most locations. On the other hand, mining companies may have the correct documentation and licensing but may not be operating legally. For example, in Location 10 the mining company forced access onto local landholder's land without permission or payment and extracted manganese, using army officials to guard the land while it was mined, so while the company had the required government approval, their actions against the local community and their rights was illegal.

Most manganese mining in West Timor falls into the category of "artisanal informal mining". This is due to the fact that manganese mining is different to other forms of mining in Indonesia and the current mining licences available are not intended for simple, seasonal and short-term mining operations. Exploration licences were most commonly given to traders and semi-formal mining companies for manganese mining, however these are designed to allow prospective mining companies to assess the area with the intention of applying for an operational licence if the results of the exploration period are successful. Mining laws and licensing procedures in regard to manganese mining in West Timor are discussed in detail in Chapter 6.

3.5.2 How Manganese Mining Differs From Other Forms of ASM

Manganese mining in West Timor differs to some of the benefits and negative impacts commonly associated with other forms of ASM around the world.

Manganese mining also exhibits some of the push and pull factors that contribute to the growing number of people practicing ASM as a livelihood option. Some of the benefits and negative impacts of manganese mining in West Timor are identified here to place and contrast manganese mining within the global discussion of ASM. A more detailed analysis of the contribution and impacts of manganese mining are discussed in Chapter 4.

Manganese mining in West Timor differs from other forms of ASM in a number of ways (Table 3.3). As mentioned, manganese mining in West Timor is significantly different from other forms of manganese mining globally which all consist of large-scale operations because of the large size of the ore deposits. In this way, manganese mining in West Timor is distinct from other forms of manganese mining but it also differs considerably from the main issues often discussed in the literature regarding ASM. The ASM literature in Indonesia mainly focuses on ASM gold mining (Amri 2011; Beavis & McWilliam 2018; Bose-O'Reilly et al. 2010; Krisnayanti et al. 2012; Limbong et al. 2003; Meisanti et al. 2012; Nakazawa et al. 2016; Peluso 2018), which is the main form of ASM in Indonesia (Aspinall 2001) and so will be used predominately for comparison here, however there are also other types of ASM in Indonesia including small-scale mining of diamond, coal, tin and construction materials such as sand and river rocks (Aspinall 2001).

Table 3.3: Summary of the differences between ASMM and ASGM including environmental impacts, workforce, mineral value, income, social impacts, market characteristics and push/pull factors, in Indonesia.

	Manganese (ASMM)	**Gold (ASGM)**
Spread of environmental impact	Environmental impacts localised	Significant local and downstream spread of environmental impacts
Chemical pollution	No chemical use for processing	Mercury and cyanide used in ore collection and processing
Workforce (Migrant/Local)	Conducted by people local to mine region, usually with village control	Often brings a large migrant workforce with little local control
Mineral value	Low value	High value
Income	Mostly predictable	Highly variable
Social impacts	Minor conflict over borders, child labour, occasional death and injury from mine collapse	Conflict between local and migrant communities, child labour, gender inequality, increase in drug use, prostitution, crime, illness/mercury poisoning
Market	No local use, international market fluctuates	Relatively stable local and international market
Push and pull factors	Minor influence of push and pull factors	Mostly driven by strong pull factors
Sources	(Dara 2014; Fisher, R et al. 2018; Sahin et al. 2012; Tahu & Meak 2013)	(Amri 2011; Beavis & McWilliam 2018; Limbong et al. 2003; Meisanti et al. 2012; Peluso 2018)

Considerable concern is given to the environmental impacts of ASM in the literature. These are perhaps not as relevant or as serious in manganese mining in West Timor, and any environmental impacts such as deforestation and erosion tend to be localised (Fisher, R et al. 2018) (Table 3.3). Due to the widespread practice of ASM gold mining, mercury pollution is a significant issue in many countries, and it is rated

as the second highest mercury polluting activity worldwide (Siegel & Veiga 2010; Telmer & Veiga 2009). Mercury pollution and sedimentation from gold mining can cause significant local and widespread impacts (Beavis & McWilliam 2018). Other environmental issues associated with ASM include erosion, sedimentation, deforestation of protected areas, biodiversity loss and pollution, particularly from chemicals used in refining processes (Buxton 2013). These environmental impacts not only degrade the environment but can impact on other livelihoods. For example, small-scale gold mining negatively impacted cocoa production and farmer's livelihoods in Ghana, due to the pollution, degradation and loss of land that the mining created (Boateng et al. 2014). Often those involved in ASM do not often have the means or knowledge to address or alleviate the environmental issues associated with ASM activities (Buxton 2013). The environmental impacts of small-scale manganese mining in West Timor, as found in this study and described in more detail in Chapter 4, are not as severe and can be more easily managed than the environmental damage commonly associated with from other forms of ASM such as gold mining with its significant contribution to mercury pollution. The extraction and simple processing of manganese does not require the addition of any toxic chemicals, deforestation is rare, and erosion can be mitigated.

As discussed previously in this chapter, most manganese miners in West Timor are local people, mining within their own village and farming community (Table 3.3). This is not often the case in other forms of ASM because mineral deposits are not usually so widespread and sporadic, and so in other ASM examples miners are often outsiders who travel to locations with ore deposits and do not necessarily have any

connection with the land or community in that area (Jønsson & Bryceson 2009). This is often a source of conflict with tension arising between outsiders and the local community, and outsiders are not often concerned with the negative impacts that mining might be causing to the local environment and community (De Theije & Salman 2018; Meisanti et al. 2012). As most miners in West Timor mine on their own land or communal land, any conflict reported by respondents was minor and mostly due to discrepancies over borders.

Manganese is a low value mineral unlike other commonly mined ASM minerals such as diamonds and gold which are high value and can be associated with higher levels of crime and conflict (Buxton 2013) (Table 3.3). There is a reasonable degree of predictability in manganese mining, the results each day do not differ significantly and the benefits are slow but generally steady, as described further in Chapter 4. Artisanal and small-scale manganese mining does not require any investment as equipment is simple and people often mine on their own land, or only pay fees as a portion of their profit. High-value minerals can also be associated with violence or conflict, such as the use of diamonds to fund rebel movements in Angola and Sierra Leone (Le Billon 2008). As manganese is a low value mineral, manganese mining is not associated with high levels of risk, conflict or violence but can support steady local growth and economic development. Only when mining companies rent or buy land for manganese mining has conflict erupted as large sums of money are involved and not equally distributed, and the authority over the land can be held by a clan and not by individuals, which can lead to multiple people fighting to claim ownership to receive benefits, as was the case in Location 8 and 10 as described in Chapter 4.

The involvement of children and women in ASM and the negative impacts they experience are also not as extreme in manganese mining as in other forms of ASM. Child labour is a significant issue in ASM because of the widespread and severe risks and hazards involved, which may result in death, injury and disease (ILO 2005). Children, as young as six years old, are involved in arduous physical activities such as heavy lifting and digging, often working in narrow mine shafts and tunnels (MMSD 2002). Women and children in ASM communities may also be susceptible to prostitution, drug and alcohol abuse, and violence (Buxton 2013).

The impacts of mining on women and children are not as severe in West Timor for a number of reasons (Table 3.3). Because women miners in West Timor mine within their own traditional farming communities they are not as vulnerable to risks such as violence and prostitution that can be associated with ASM. Respondents reported that children in West Timor are not forced into mining but often help in mining activities alongside their family as they would in other livelihood activities such as farming. Generally children look for manganese on the surface after school hours and the family gives a portion of the money for them to use. In West Timor, both male and female respondents reported that women are often given the responsibility of managing the household finances, and so they have some degree of autonomy and power over family expenses that may not be the case in other countries.

Generally the health impacts from mining were less severe in manganese mining than in ASGM in Indonesia (Table 3.3). There have been a number of deaths and injuries reported from mine collapse in West Timor, however this has become less common as awareness has developed regarding the risks of tunnels and shafts that are not

reinforced or structurally sound (Tahu & Meak 2013). ASGM is associated with mercury use which can have significant health impacts on miners, mining communities and also populations exposed to mercury released into the environment (Bose-O'Reilly et al. 2010; Kristensen et al. 2014; Nakazawa et al. 2016). Children are more vulnerable than adults to harmful chemicals such as mercury and cyanide, which may result in more severe health conditions (Gibb & O'Leary 2014). Although women's roles may be diverse in ASM, they are generally involved in processing and waste removal, and so they are exposed to more toxicity (Eftimie et al. 2012). As manganese mining does not involve any processing using toxic chemicals there is not exposure to dangerous substances like mercury. However at larger mine sites, such as in Locations 8, 9 and 10, where the manganese ore may be combined with other toxic minerals such as lead and uranium, there may be increased exposure to these dangerous substances, although this is yet to be investigated.

The main factors identified in the literature which drive the uptake of ASM include the need for alternative sources of income during difficult periods or simply to survive (push factors), as well as the global increase in value and demand for minerals (pull factors) (Buxton 2013; Veiga et al. 2006). Push factors can be caused by loss of employment or financial crisis, conflicts such as war, and natural disasters including famine, all of which can push people from their prior livelihoods to seek alternative or new forms of income to survive as either a temporary or more permanent change (Buxton 2013). Pull factors can include the discovery of ore deposits or the increase in demand and price, which entice people to engage in ASM because of the high benefits that can be received from practicing ASM. For example, gold mining often

has strong pull factors where people rush to an area where gold has been discovered in the hope of making a fortune quickly (Jønsson & Bryceson 2009).

In West Timor, strong push and pull factors were not a key driver of engagement in manganese mining, as is often the case in other forms of ASM (Table 3.3). Based on the results of this study there were a few minor push factors, including crop failure and lack of livelihood options, however no major push factors such as significant conflict, financial crisis or natural disasters were present. Pull factors were more influential than push factors for manganese mining in West Timor but were still minor. Respondents reported that they engaged in manganese mining as there were few other livelihood options and opportunities for income generation in rural areas. Manganese mining provided a favourable opportunity to increase family income and cover household costs. However for most respondents, the benefits of manganese mining were not significant enough to leave their farming livelihoods and mining was mostly viewed as a seasonal or opportunistic livelihood option to practice in conjunction with farming. The livelihood aspects of manganese mining are covered in more detail in Chapter 4.

In summary, generally the benefits from manganese mining are more stable than other forms of ASM including gold mining, and the negative impacts, such as pollution, conflict and exposure to mercury, are less severe. While manganese mining falls into the category of ASM it is not associated as directly with some of the common push and pull factors and negative impacts that other forms of ASM are widely concerned. However manganese mining as an informal activity in West Timor and many other forms of ASM in Indonesia, are largely unrecognised and are generally

not supported by governments despite the potential this sector has to contribute to poverty alleviation and sustainable development (Hilson & McQuilken 2014; Siegel & Veiga 2009; Tschakert 2009), which is discussed further in Chapter 6.

3.6 Conclusion

In assessing the origins and forms of artisanal and small-scale manganese mining (ASMM) in West Timor from 2007 until 2017, it was found that manganese is a globally sought after ore which exists in a high-grade in West Timor in widespread, sporadic and alluvial deposits. Manganese mining is largely managed by local communities and mining techniques are mostly manual and can be defined as artisanal and small-scale, and almost always informal. Medium-scale mining also exists at a number of locations where a mining company is present, and in these examples heavy machinery may be used but is less common than ASMM managed by local communities. Manganese mining differs significantly from other forms of ASM, including that the income is typically more stable and predictable, it did not develop through strong push factors compared to gold mining, and the negative impacts were less severe. The next chapter investigates the benefits and negative impacts of manganese mining as a livelihood in West Timor as viewed by local communities.

Chapter 4: Manganese Mining as a Livelihood Strategy

4.1 Introduction

Artisanal and small-scale mining has the potential to contribute to poverty alleviation, livelihood diversification and sustainable development (Fisher, E et al. 2009; Hilson 2016; Kamlongera 2011; Lahiri-Dutt et al. 2014). Most of the research to date has focused on ASM gold mining that has significantly different characteristics to other forms of ASM including manganese mining. Manganese mining in West Timor is also a relatively new livelihood, starting in most locations around 2007-2008. The few studies that have been conducted on manganese mining, including the papers by Dara (2014) and Tahu and Meak (2013), suggest that while there may be negative impacts associated with manganese mining such as environmental degradation, there are also a number of potential livelihood benefits, including increased food security and income, that require recognition and further study.

This chapter focuses on local perspectives and values regarding manganese mining as a new livelihood option in West Timor. The main research question is: How is manganese mining viewed as a livelihood strategy in West Timor, what associated benefits and negative impacts are of concern to local communities and how can manganese mining contribute to sustainable development? Within this main research question there are three following questions: 1) What is the current livelihood context in West Timor and how does manganese mining combine with other existing livelihood strategies? 2) What assets are used in ASMM and what is the vulnerability context? and 3) How are the livelihood benefits and negative

impacts of mining experienced through local perspectives and values, and does this differ between community and company mining?

Firstly, the current livelihood context in West Timor, including livelihood options, assets and vulnerabilities such as food insecurity, limited infrastructure and low levels of education, is assessed. Secondly, manganese mining is analysed in the context of livelihood assets and vulnerabilities. How artisanal and small-scale manganese mining (ASMM) can combine with other existing livelihoods, particularly farming, is investigated. Finally, the benefits and negative impacts of both ASMM and company manganese mining, as perceived by local communities, are investigated and compared across the ten locations.

Within this study, perspectives are defined as what is viewed as the positive and negative impacts of mining, as explained previously in Chapter 2. For example, mining may be viewed as positive because of the increased income generated from selling manganese, whereas erosion and illness may be viewed as negative impacts caused by mining. Local perspectives towards mining may have developed from personal experience, observations or through discussion with others.

In contrast, in this study values are defined as what is important to become, either in aspiring for something new or protecting what already exists. In the context of mining, one may aspire to improved education and income from mining may help achieve this. On the other hand, the activity of mining may cause destruction of sacred sites and their protection may be regarded as crucial in sustaining cultural identity. Therefore, values are divided into aspirations, what one does not possess but what one desires to have which engaging in mining can make possible, and what

to protect, what one already has which is threatened by mining and requires protection. The concept of values in this study is similar to that presented in Schwartz (1994), where values are placed on a bipolar dimension, with one extreme as values that favour change and new direction, and the other extreme as values which seek to conserve and protect current practices and ways of being.

In this study, perspectives and values are understood as inherently different with perspectives as rational views and values as emotional ideals. However, perspectives and values are also very much connected and cannot be presented or analysed separately. For example, a respondent may remark that mining has positively contributed to their living standards however this depends both on their personal perspectives and their values combined. Therefore, this chapter does not seek to present perspectives and values separately, but as combined intellectual and emotional aspects which influence decisions to engage in mining.

4.2 Methods

The results in this chapter are predominately based on semi-structured interviews with miners and community members within the ten communities, although it also includes some in-depth interviews with key informants, such as village and district government administration staff, as described in detail in Chapter 2. Respondents were asked to elaborate on the positive and negative aspects of manganese mining which they had either experienced, observed or were concerned or aware of, and how mining as a livelihood was combined with farming and whether the two livelihoods were complementary. Interview questions also included the skills and

knowledge required to engage in mining and how mining as a livelihood activity was situated within the livelihood vulnerabilities faced by rural communities.

The sustainable livelihoods framework (SLF) (Bebbington 1999; Scoones 1998) was used to assess the current livelihood situation, and investigate manganese mining as a livelihood strategy, particularly in the current livelihood context and in combination with farming livelihoods in West Timor. The SLF is not applied as an in-depth livelihood analysis but used as a guiding framework to assess the main components of mining livelihoods, as expressed by local communities regarding different assets used and current vulnerabilities present such as food insecurity. The current issues of livelihoods, poverty and development in West Timor are based on the existing literature. The few reports which exist on manganese mining in West Timor, namely Dara (2014) and Tahu and Meak (2013), were used for comparisons of the research findings where applicable.

4.3 The Livelihoods Context in West Timor Prior to Manganese Mining

This section assesses the present livelihood situation in West Timor, including the livelihood options, assets and vulnerabilities that rural communities experience, and the livelihood strategies and outcomes commonly employed, excluding manganese mining. The livelihood context is given broadly to illustrate the general livelihood issues across West Timor using the existing literature. The livelihood situation is initially described without manganese mining to illustrate the situation before or without mining as a livelihood opportunity.

4.3.1 Livelihood Strategies in Rural West Timor

Subsistence agriculture is the main livelihood in West Timor and approximately 75% of the working-aged population rely on agriculture as their main livelihood (Suharyo et al. 2007). A livelihood is defined as "the capabilities, assets and activities required for a means of living" (Chambers & Conway 1992, p. 6). Subsistence agriculture has been described globally as "...a livelihood strategy where the main output is consumed directly by the household, where there are few if any purchased inputs and where only a minor proportion of output is marketed" (Barnett et al. 1996, p. 3). Different types of farming, including swidden agriculture, are practiced in West Timor and common seasonal crops include corn, rice, cassava and vegetables, and small livestock, including pigs, goats and chickens (Benu & Mudita 2017; Suharyo et al. 2007; Tjoe 2016). Although these forms of crops and livestock are commonly produced for household consumption they are not considered reliable forms of income (Tjoe 2016).

Other common livelihood activities besides farming in West Timor include selling food items such as *tempe* and sweets, weaving textiles, timber production (usually teak or mahogany); non-timber forest products such as honey, candlenut and tamarind; providing transport such as *ojek* (motorcycle transport), or driving buses and cars; fishing either from coastal waters or freshwater ponds; salt production or ownership of a kiosk or village stall that sells everyday needs such as coffee, sugar, rice and tobacco (Blyth et al. 2007; Cunningham, A et al. 2007; Tjoe 2016). Livelihood options which provide regular income in rural communities are generally limited to

working as a teacher at the local school or as a civil servant in local government offices (Tjoe 2016).

The other livelihood activity is migrant work, usually working overseas in Malaysia, and has become increasingly common in the last decade. Growing numbers of workers from rural villages in NTT travel legally or often illegally, to Malaysia as TKI (*Tenaga Kerja Indonesia* – Indonesian workers) to find employment there, commonly working on plantations, in factories or as maids, and sending back the money earned to families in the village to pay for expenses such as education, food, building materials and transport (Mirsel & Manehitu 2014; Tjoe 2016). Workers overseas are incredibly vulnerable, especially if working illegally, and migrant work is often associated with exploitative and dangerous working conditions (Larsen et al. 2013). While migrant work provides an income source it can expose workers to high risks and dangerous situations (Mirsel & Manehitu 2014).

In West Timor, the ability to intensify agriculture is restricted by what has been described as the "Timor Problem" (Ormeling 1956), which identified low and irregular rainfall, low soil fertility and high levels of erosion as the main agricultural challenges in West Timor. These issues are still present and are potentially increasingly exacerbated by climate change related impacts (Tjoe 2016). A report on the development of business in West Timor by Suharyo et al. (2007), found the limiting factors to be low economic potential, low availability and quality of infrastructure, low productivity of labour and low quality of human capital. Tidey (2012) observed that the provincial town Kupang has limited national and international trade, with no prominent industrial or tourism sectors. Intensification

of agriculture can be limited due to negative environmental and business factors (Suharyo et al. 2007). Agricultural livelihoods are mostly seasonal as farming is restricted in the dry season and so other forms of income are often sought during this time (Benu 2003; Tjoe 2016). Livelihood choices for rural communities in West Timor are generally limited, and the most promising strategy suggested has been to diversify out of farming into supplementary alternatives (McWilliam 2002).

4.3.2 Assets in Rural Agricultural West Timor

In the SLF, assets are divided into five main categories including human, social, natural, physical and financial (Bebbington 1999). Human capital refers to health, nutrition, education, knowledge and skills, and the capacity to work. Social capital includes networks and connections such as neighbourhoods and kinship, formal and informal relations of trust and support, shared values, behaviours and rules, and collective representation, participation and leadership. Natural capital refers to natural resources such as land, produce, water, aquatic/marine resources, forest products, wildlife, food and fibres, as well as biodiversity and environmental/ecosystem services. Physical capital consists of infrastructure, such as transport, roads, vehicles, shelter and buildings, water supply and sanitation, energy, communications, as well as the tools and technology used for agriculture or other forms of resource production. And lastly, financial capital refers to savings, pensions, wages, credit and debt both formal and informal.

Human capital in West Timor includes traditional knowledge and skills, education and health. Traditional knowledge and skills regarding farming and animal husbandry are strong and widespread. Other skills include those used in weaving, midwifery,

cooking, construction, transport (eg. driving buses, trucks and motorbikes) which may be used as livelihood ventures to supplement subsistence farming. Formal education at schools, colleges and universities is particularly low in West Timor, compared to other regions of Indonesia, and significant numbers of adults are illiterate (Food and Agriculture Organization 2010). In a livelihoods study by Tjoe (2016), illiteracy ranged between 9-60% of household heads in three communities in West Timor. Factors that limit completion of education include income for transport and school equipment (books, uniforms, stationary), distance to the nearest school (approximately 50% of high schools in West Timor are outside of the village (Badan Pusat Statistik 2014)) and the need for children to contribute to household and farm labour or income generation (Jones et al. 1998).

Social capital in West Timor is particularly influential in a livelihood context. Village communities are based on traditional kinship relations creating complex social cohesiveness (McWilliam 1989). In rural areas, social connections are based on reciprocal relations following cultural obligations and customary law (McWilliam 1989). Social structure including precedence determines responsibilities and connections, including power over decisions of and access to natural resources. Households can call on social connections in difficult times for income or increase access to resources (Tjoe 2016). There are also a large number of local and international NGOs that support vulnerable groups such as Care Indonesia, PIKUL and Oxfam.

Physical capital in rural West Timor, such as roads, telecommunications, housing and utilities, currently constrain opportunities for rural development (Blyth et al. 2007).

Approximately half of the roads in West Timor are rated poor (about 60%) and many villages are not accessible by car during the rainy season (Food and Agriculture Organization 2010). Location 1 and 2 in this study were only accessible by foot during the rainy season. Transporting goods to local markets is not often cost effective due to poor roads and the distance to market places (Tjoe 2016). Access to reliable water sources in the dry season or drought periods is an ongoing and increasing issue, with more than 70% of households without adequate access to clean water in TTS (Food and Agriculture Organization 2010; Widiyono 2008).

Natural capital, particularly land and access to resources, is critical for rural and agricultural livelihoods. Most people (more than 80%) in West Timor are given land to farm through traditional kinship relations although average land size inherited is decreasing as the population increases (Food and Agriculture Organization 2010). Degradation of natural resources in Timor is occurring due to climate change, erosion and increasing population pressures (Monk et al. 1997). Farming land varies in quality where infertile soils and low rainfall can make farming particularly challenging and not highly productive (Benu 2003).

Financial capital is low in West Timor, with more than 25% of the population living below the poverty line, the average annual income in TTS is US $300 (Food and Agriculture Organization 2010; World Food Programme 2015). Financial assets are often held in livestock such as cows and pigs, which are used for traditional ceremonies or sold for cash (Food and Agriculture Organization 2010). There are a number of microfinance programs in West Timor that can provide some effective financial assistance in rural areas (Rozali 2007).

4.3.3 Current Livelihood Vulnerabilities in West Timor

As most of the population are subsistence farmers (Suharyo et al. 2007), there are a number of vulnerabilities associated with pursing a livelihood in this area including climate, natural disasters and access to resources. The main vulnerabilities in West Timor are droughts and floods, and damage caused to crops and livestock by pests and diseases (Blyth et al. 2007; Food and Agriculture Organization 2010). These events directly affect the ability to produce food, and can create widespread food insecurity and malnutrition (Food and Agriculture Organization 2010; World Food Programme 2015). The frequency and severity of floods and droughts has also increased with climate change in West Timor, especially in the past 20 years with local communities reporting seasons more difficult to predict and weather events more extreme (Hornidge & Scholtes 2011).

As well as unpredictable climate events, there is the recurring *musim lapar* or hungry season in West Timor. This is a period of food shortage, usually between October-January, before crops are ready to harvest and the previous year's produce is running low (Muslimatun & Fanggidae 2009; Tjoe 2016). A study in the districts Kupang and TTS found that between 35-58% of households experience difficulty in obtaining food during the hungry season and are forced to take up coping strategies which included selling assets, reducing expenditure on health and education, decreasing frequency and amounts of food intake, and collecting wild food sources (Food and Agriculture Organization 2010). The study also found that 10-40% of the coping strategies used were "erosive" in that they deteriorated future resilience and ability to access food, such as selling farming land to cover other expenses.

As increased pressure is placed on natural resources, there is also growing reliance on purchasing basic needs. Tjoe (2016, p. 266) study of 629 households across three locations in West Timor found that "Daily needs are increasingly dependent on money and local communities are struggling to allocate their time and energy into cash income activities, food growing and social gatherings, especially for those whose family members have left the village for work or study." Not only are households more time limited and dependent on cash income to cover education, health and basic living costs, but also that these costs are increasing. As food insecurity is a widespread issue, almost half of household income is spent on food, followed by social events, such as weddings, funerals and traditional ceremonies, as well as fuel, coffee, transport, education, clothing and farming inputs (Food and Agriculture Organization 2010).

The vulnerabilities presented in this section, including climate change, increasing floods and droughts, seasonal food insecurity, pests and diseases, declining natural resources and increasing living costs, are all common challenges faced by rural communities in West Timor in undertaking their livelihood activities. How manganese mining has been adopted and adapted into existing livelihoods, with consideration for the assets and vulnerabilities present, is examined in the following section.

4.4 Manganese Mining as a Livelihood Strategy

This section investigates manganese mining as a livelihood strategy taking into account the current livelihood situation presented in the previous section that gives context to why manganese mining is a valuable rural livelihood. The assets required

to engage in manganese mining, including natural, human, social, physical and financial, are presented and the vulnerabilities of manganese mining as a livelihood strategy are discussed. The following section focuses specifically on combining mining and farming livelihoods in West Timor.

4.4.1 Assets Required for Manganese Mining

Manganese mining has become a common, widespread and significant livelihood option for rural communities in West Timor since 2007. Engagement in manganese mining as a livelihood strategy involves natural, human, social, physical and financial requirements, with varying degrees of importance.

Natural capital in this context predominately refers to access to manganese on either individual, community, landholder or community land and is essential to engage in manganese mining. Manganese is a valuable, widespread and abundant natural resource in West Timor occurring within many rural regions. It is limited as it is a finite resource which unlike crops or livestock, cannot be propagated or made more plentiful. It can only be gathered from where it naturally exists and so where it occurs determines who has access to it. The value of manganese is influenced by its quality, for example nodules of manganese are usually the highest quality generally consisting of more than 55% manganese as described in Chapter 3. Mine characteristics such as the depth of the ore, remoteness of mine and accessibility all determine whether mining in that location is an economically viable option. Respondents reported that manganese did not have a financial use previously in West Timor however many local people now recognise its potential to contribute to livelihood outcomes as one respondent commented “Mining is a good thing as

people can use their natural resources to help improve their livelihoods, otherwise if they didn't mine manganese it would just be sitting in the ground and not doing anything, it's better if we can use it to improve our lives" (L3H2K4).

Manganese mining does not require high levels of human capital such as education and skills. Manganese mining is not gender specific and no education is necessary (Dara 2014). As one respondent commented "Mining is good as even people with a low education can work and get money to improve their livelihoods" (L9H1R5). Manual labour and heavy lifting are an advantage although not essential as manganese can be simply collected from the soil surface, particularly in river beds. No skill training is required to mine, only the ability to distinguish between the heavier manganese rock and other black rocks.

Manganese mining does not require high levels of social capital however kinship relations and shared community resources and land increased availability of manganese to some members of the community. Community land was often available to mine at most locations studied. Respondents commented on the importance of working together and maintaining harmony when mining. For example, if individuals did not have manganese on their land it was common for them to mine on a family member's land.

Physical capital, in particular roads and transport vehicles, are critical in trading manganese. Although the transport of manganese was often the responsibility of traders, in some locations miners had to transport manganese out from the mine site, either by physically carrying manganese on foot, or loading horses, motorbikes or light trucks to take the manganese to sites where they could sell it to traders.

Roads are crucial in the trade of manganese, and although people often carried manganese from their mine site to their house, roads were required into the village or to larger mine sites for traders to purchase and transport manganese out to the cities or ports. Some hamlets were unable to sell manganese from their village due to the lack of road infrastructure or only during the dry season when trucks were able to access mining locations or village stockpiles. In terms of mining manganese, only basic hand tools are required to mine manganese, including metal crowbars, buckets to carry manganese and old rice sacks to pack and hold manganese, all of which are also used in farming livelihoods. Access to excavators, motorbikes or trucks increased the ability to mine and transport manganese.

No financial capital is required to engage in extracting manganese if there is ore available and accessible. Because of this, mining was seen as a positive option as no financial input was needed. In some cases landholders charged a percentage of the profit from manganese sold if miners chose to mine on their land.

In summary, only access to manganese and the ability to transport and trade manganese were vital assets required to engage in manganese mining. This led to manganese mining becoming a popular, valuable and widespread livelihood option. However, there are a number of vulnerabilities which limit mining livelihoods in West Timor.

4.4.2 Manganese Mining and Vulnerabilities

As manganese mining does not require the input of many assets as a livelihood option, there is not a high level of risk involved in engaging in mining. However, the

main mining livelihood vulnerabilities of concern to respondents across the mining locations was the fluctuating price of manganese, the presence of traders, access to the manganese global market and Indonesian mining laws, which all contributed to the unreliability of mining as an ongoing livelihood option. Manganese mining also creates vulnerabilities to other existing livelihoods and this is discussed under negative impacts in section 4.7.

As presented in Chapter 3, the price of manganese varied at the local level across the mining locations but also over time from when mining began around 2007 until it largely ceased in 2013. The price of manganese is largely dependent on global prices and demands, as indicated previously in Figure 3.11, but also by local conditions, such as competition between traders, remoteness of the location and the quality of manganese. Respondents across the mining locations commonly reported that more stable prices, and particularly prices that were at least 1000 IDR (AUD $0.10) per kilogram, would make manganese mining a more reliable and worthwhile livelihood option. That manganese is predominately controlled by global demand meant that rural miners did not often have access or knowledge of the global market and their own bargaining power. Low and fluctuating prices, especially when the local price fell below 1000 IDR (AUD $0.10) per kilogram, created vulnerability where respondents were not able to assume an estimated profit as there was usually no set price, and sometimes had to sell manganese for much lower than expected.

As the manganese market is largely a global market, miners are wholly dependent on traders who are connected to international buyers, as there are no local uses or market for manganese, unlike gold for example that is frequently bought and sold

locally for jewellery or other uses. In addition, traders would not always visit locations frequently or consistently and so miners reported having mined lots of manganese but had no one to sell it to, or that they did not mine any manganese and then had none to sell to traders when they did arrive. Manganese mining as a livelihood option relies strongly on the reliable and regular presence of traders.

Because manganese is largely traded on a global scale responding to global demands, particularly from India and China, the market can rise and fall unpredictably. This was experienced in West Timor as described in Chapter 3, where global demand caused a search for new sources of high grade manganese ore from 2007, however excess manganese in the global market from 2013 caused prices to drop, traders to leave West Timor or switch to trading other products and mining activities to cease in most areas. Respondents frequently commented that they did not realise that the market would suddenly drop and they would no longer be able to mine. This especially impacted those who had invested significantly in mining as a livelihood, for example by taking out a loan to buy a motorbike to transport manganese or had ceased other livelihood options such as farming, to focus solely on mining.

Mining is also a vulnerable livelihood in Indonesia, particularly in the form of artisanal and small-scale mining, as it is not strongly recognised or supported as a livelihood option by both the existing legal framework or common discourses in the government arena (Spiegel 2012). This is an issue discussed in detail in Chapter 6, however it is raised here to note that minerals are under the ownership of the state and therefore, unlike other natural resources such as timber, it is illegal to sell manganese without a licence regardless of whether it was extracted on privately

owned land. Licences for ASM in Indonesia are available however are difficult for community members to attain due to the high costs and administrative requirements involved, and also the existing tendency for governments to support large-scale mining opportunities over ASM (Spiegel 2012). No ASM licences were issued for manganese mining in West Timor, despite a number of respondents having applied. That manganese mining was not supported or recognised as a viable and valuable rural livelihood by various levels of government, both in the legislation and agenda at the local and national levels was a significant vulnerability outlined by respondents, as well as the fluctuations in price, and instability of the market and inconsistent presence of traders.

4.5 Livelihood Diversification - Farming and Manganese Mining

As most of the rural population in West Timor rely on agricultural production for subsistence livelihoods, many respondents reported incorporating manganese mining with their existing farming livelihood activities. This section investigates the compatibility of the two rural livelihood options as experienced across the mining locations studied, including how the livelihood activities were combined seasonally and also geographically and financially as a livelihood strategy.

Mining and farming livelihoods were combined in a number of ways, as indicated in Table 4.1, where a small number of respondents chose to focus on mining only, others only on farming, and for the majority combining both livelihoods together. Approximately half of the respondents across the locations reported engaging in both farming and mining without a preference for either livelihood. As one respondent commented, “From farming we get food and from mining we get money”

(L3H3R4). Most of these respondents reported reducing time and energy in farming livelihoods, growing only what they needed for food and not for income, and using spare time after farming to mine for income.

Table 4.1: Number of respondents who reported engaging in mining and farming livelihoods, either in combination or only choosing one livelihood option, for each of the ten locations from 2008-2017. Data sourced from semi-structured interviews.

Location	**L1**	**L2**	**L3**	**L4**	**L5**	**L6**	**L7**	**L8**	**L9**	**L10**	**Total**
Number of respondents	5	5	11	19	8	8	17	10	16	11	110
Mining only	0	0	0	0	0	1	1	0	2	0	4
Mostly mining, some farming	0	0	0	4	3	0	3	1	5	0	16
Mining and farming equally	0	0	7	15	4	4	9	4	7	4	54
Mostly farming, some mining	0	5	4	0	1	3	3	4	1	6	27
Farming only	5	0	0	0	0	0	1	1	1	1	9

A number of respondents across the mining locations engaged in mining activities but stated that farming was their livelihood priority (Table 4.1).

There were a diversity of reasons why people across locations got involved in mining. In Location 3, most respondents reported taking up mining only when their crops

failed, but ceased mining in good farming years. One respondent from Location 9 commented “Mining is very hard work but there are no other options at the moment so we have to mine” (L9H1R14). One woman (L10H4R9) in Location 10 did not want to mine as she felt that it was dangerous and preferred farming to mining. She started mining with the sole intention of completing the house, and once the house was completed returned to farming only. There were only a small number of respondents across the locations who chose not to engage in mining at all (Table 4.1). These respondents could have mined in their village had they wished to, however chose not to due to their beliefs (as was the case in Location 1), reported preferring farming or had other livelihood options such as teaching.

Other respondents embraced mining as a new livelihood opportunity and chose to favour mining over farming. Particularly in Locations 9 and 10, many respondents reported farming infrequently and spent the majority of their time and energy mining. Some respondents at these locations where heavy machinery was used and a mining company was present, chose not to plant crops at all, and relied solely on the income from mining to cover their food and other expenses. While this approach generated more income, particularly when the price of manganese was high, respondents in Location 9 reported that when the price of manganese dropped to 400 IDR (AUD $0.04) per kilogram they had no crops to return to and had to mine intensively to make enough income to cover their food requirements.

Respondents who combined farming and mining livelihoods reported switching between the two livelihoods both in a geographical, temporal and economic context. Mining activities can occur directly on agricultural land. In some cases, respondents

explained how when they turned the fields over for planting they would collect manganese pieces opportunistically. Similarly, others explained that after they mined a section of land it was as if they had turned the soil over ready for planting and so took the opportunity to plant a crop in the mined area. In this way, mining and farming activities occurred on the same piece of land. Many respondents also commented that the land became more suitable for farming after manganese was removed from the soil, which is discussed more in section 4.7. In Location 7, larger mined holes were later rehabilitated into ponds to farm fish and the water used for crops in mined areas that had been converted into terraced market gardens. In both Locations 4 and 7, it was common for coconut and banana seedlings to be planted in mined areas.

In a temporal context, mining activities could be conducted strategically in the farming calendar to make use of less intense periods of the agricultural season. The seasonal calendar (Figure 4.1) illustrates how mining activities were incorporated into the farming seasons at each of the locations that engaged in mining and was constructed from data provided in respondent interviews. Respondents across these locations reported that each year mining activities were the main focus from August to October when farming was quiet and the hungry season (*musim lapar*) began. Mining activities were mostly opportunistic, such as picking up pieces of manganese from the surface or searching in riverbeds after floods, from November to March when farming activities required more effort to prepare the land for planting, and then planting crops and harvesting from March to June. Mining activities returned as a focus during mid-late harvest time.

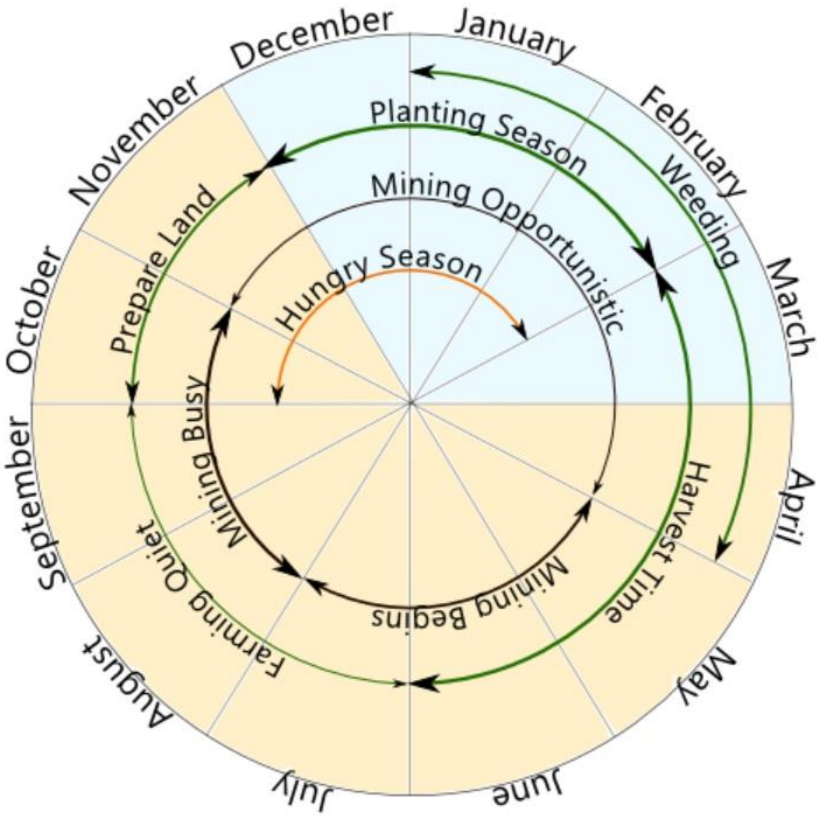

Figure 4.1: Seasonal calendar of the changes of farming (green) and mining activities (black) throughout the yearly seasons, with wet (blue), dry (brown) and hungry season (*musim lapar*), developed from respondent interviews.

In an economic context mining provided income which eased the pressure on farming activities to provide sufficient produce for the household. Obtaining income from other livelihoods is often difficult in West Timor and may only be seasonally possible as explained earlier in this chapter. Many respondents commented on the usefulness of receiving income from mining, especially when other sources of income were not available. Respondents frequently reported that they engaged in mining because it was a quick and easy form of income generation, compared to farming which may take several months to produce sellable produce and has various risks involved

including drought, pests and diseases. Mining also contributed funds that could be directed into farming livelihoods to reinvigorate farming activities, such as purchasing livestock or farming land. Respondents in all mining locations commented that they mined more intensely during the hungry season when the produce from the previous harvest was running low so that they could use the income from mining to buy food so that they would not need to ration their harvest or eat the seeds they were saving to plant the crops for the next season. The following section investigates the benefits of manganese mining including how the income from mining was used by different respondents.

4.6 Benefits of Manganese Mining

This section gives detail to how the income from mining was used by different respondents and why they engaged in mining to seek particular benefits depending on their values. As discussed above, engaging in manganese mining required minimal assets to seek the potential benefits. Types of benefits discussed include income at the household level, as well as non-financial contributions, such as the acquisition of new skills and employment, and benefits experienced on a community level.

4.6.1 Household and Individual Income Uses and Benefits from Manganese Mining

All respondents interviewed in all mining locations reported that they engaged in mining for income generation. How much income respondents were able to make and how they used the income differed depending on the mining situation and household and individual values. Table 4.2 indicates the average income from mining per day across the eight mining locations, while Table 4.3 shows some of the main

uses of income from manganese mining at each of the eight locations where mining occurred. Although a small number of respondents in Location 2 mined in areas outside of the location, it is not included in this section for analysis as no mining activities occurred within Location 2. It should be noted that the data collected relating to the use of income from mining was not intended to be assessed quantitatively and is included only as a general indication of income use, to provide links to respondent's values and their views expressed regarding the benefits of manganese mining.

Table 4.2: Average mining income per day in IDR/AUD for each mining location (3-10) based on the average price and quantity mined per day (Location 1 and 2 not included as no mining occurred there) from 2008-2017. Data sourced from semi-structured interviews.

Location	Type of Mining	Highest Price per Kg (IDR)	Average Price per Kg (IDR)	Quantity Mined per Day (kgs)	Range of Mining Income per Day (IDR)	Range of Mining Income per Day (AUD$)
3	Manual Only	1300	1000	10-100	10,000-100,000	1-10
4	Manual Only	1500	1000	50-1000	50,000-1 million	5-100
5	Mostly Manual	1200	1000	10-100	10,000-100,000	1-10
6	Mostly Manual	1500	1000	10-100	10,000-100,000	1-10
7	Mostly Manual	1300	1000	50-1000	50,000-1 million	5-100

8	Excavator/Company	1300	1000	10-100	10,000-100,000	1-10
9	Excavator/Company	1500	1000	50-1000	50,000-1 million	5-100
10	Excavator/Company	1200	200	100-500	100,000-500,000	10-50

Table 4.3: Respondents' use of income from manganese mining across the nine mining locations (Location 1 and 2 not included as no mining occurred there). Data sourced from semi-structured interviews.

Location	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Number of Interviews	16	20	10	10	19	13	16	8	112
Income usage									
Every day subsistence needs	15	20	10	10	19	13	16	8	112
School costs	10	11	10	7	11	10	12	4	75
Ceremonial		4	10	1		1	2		18
Livestock	2	4		6	4	4	7	1	28
House goods		1			4		1	1	7
House		18			7	3	9	3	40
Motorbike		12			4	1	7	5	29
University costs	1				5	1	6	1	14
Land purchase		1					2		3

Use of mining income in all locations included every day subsistence needs such as coffee, sugar, rice, cooking oil and soap (Table 4.3). Income was also often used for covering school fees and school related costs such as uniforms, books, stationary and

travel expenses. Money required to meet household every day subsistence needs and food is not high, and so respondents who mined minimally, earning approximately IDR 10,000-100,000 (AUD $1-10) per day from mining, could only afford to use mining income to purchase every day needs, cover school costs or use the funds for occasional community ceremonies such as weddings, funerals or sacred house rituals.

Income from mining was helpful in supporting children completing education and was commonly reported across all mining locations. A number of respondents indicated that more children were able to finish their education because of the income from mining. One 18 year old male respondent mined in the afternoons on the way home from school and used the money he earned to pay for school related costs. He explained "I felt very lucky to be able to mine, if I could mine again I would use the money to pay for school fees to finish my education" (L4H2R12). In Location 5 all respondents reported that some income from mining was spent on ceremonies, as while this location is Catholic people still maintain many traditional animist rituals.

Those that mined more frequently and were able to sell larger amounts of manganese received much higher income from mining. On average, higher income from mining ranged between IDR 50,000-1 million (AUD $5-100) per day and was only reported in Locations 4, 7, 9 and 10. These respondents were able to purchase livestock, household goods, improve their houses, buy motorbikes, and pay for university education. Regarding livestock, chicken and goats were commonly bought, and sometimes pigs and cows if there was a significant amount of income. Household goods typically purchased included furniture, kitchen utensils and electronic items

such as mobile phones, televisions and fridges. Improvements to respondent's houses often included upgrading a dirt floor to a cement foundation and replacing grass thatched roofs with corrugated iron. If income from mining was plentiful respondents sometimes purchased motorbikes or invested in university education, usually for one of their children. A small number of respondents were able to purchase farming land, such as rice fields, with income from mining. These respondents had either rented their land to mining companies or dealt as middlemen between village miners and outside traders, and so earned significantly higher income from mining than miners. In addition, a small number of respondents also used the money from mining to buy generators, open a village shop, purchase farming equipment and fishing gear, and connect to electricity. Only a few respondents reported investing the money from mining in savings accounts.

Location 4 was particularly abundant in manganese and all respondents had manganese on their land. As evident in Table 4.4, most respondents in Location 4 used the money from mining to improve their houses and buy motorbikes. In this location, manganese ore was abundant and close to the surface so mining was relatively easy compared to other locations and respondents reported earning as much as IDR 1 million (AUD $100) per day from mining, although this high income was not achieved regularly by respondents. One respondent from Location 4 commented, "We don't aspire to be rich like people in Kupang, we still want to live like village people but we want to be able to improve our house and buy a motorbike and cover our every day needs" (L4H5K2).

The benefits from mining at Location 7 were different from other locations as respondents included both miners working on individual or communal land in the village and others who were employed by or rented out land to the mining company at Location 10. Miners working within the village were able to make enough income for every day needs, household items, school fees and house improvements. However, those who purchased motorbikes worked for or rented land to the mining company in Location 10. Location 7 also had a significant landowner who used the profits from mining to fund community projects as described at the end of this section under community benefits.

Location 8, 9 and 10 all had mining companies operating so that income was received from multiple sources including from selling manganese, from wages through employment by the mining company and also from selling or renting land to the mining company. This also meant that the income earned from mining was far more variable than the other locations without mining companies, and the benefits not as equally spread. This led to higher levels of conflict between community members, particularly in Location 10, as described in the following section. In Location 8, a few respondents rented out their land to the mining company and were able to purchase motorbikes, pay for university studies or improve their house. The other respondents worked as miners and only received enough income to cover every day needs and school costs. The mine at Location 9 was communal land so there were no landowners however the price of manganese was relatively high for a number of years so that miners were able to produce enough income to purchase livestock, pay for university costs, buy motorbikes and improve their houses.

Location 10 had the most variation in income from mining. The price the mining company used to buy manganese was set permanently at 200 IDR (AUD $0.02) per kilogram which was the lowest reported at any of the locations. The head of one of the hamlets (L10H4K3) commented that significant amounts of income were received by landowners and company employees who were able to build houses and invest in other businesses such as cattle farming and opening shops, however miners received a very low price for manganese. Those who worked as *OBAMA*, ferrying manganese illegally out to buyers in Kefamenanu the district city of TTU, were able to improve their houses and buy motorbikes. Miners, however, generally could only earn enough to cover every day needs and school costs. The head of the village (L10H1K2) also commented that the benefits from mining were unevenly experienced in the village and that only the company employees benefitted substantially from mining.

In summary, the income from mining varied widely across the mining locations, determining what benefits could be sought. It is interesting to note that higher income was not experienced evenly in Locations 8, 9 and 10 where mining companies were present, but rather at Locations 4 and 7 where manual mining managed by the community was predominant.

4.6.2 Non-financial Benefits From Mining

Although income from mining was the main benefit from mining, respondents also reported various non-financial benefits from engaging in manganese mining. Income from mining indirectly eased local vulnerabilities such as conflict over local resources, food insecurity and debt. A respondent from Location 9 reported decreasing local

conflict over resources, remarking “There were issues before mining with people stealing pigs and goats from each other as people didn't have enough but this stopped when mining began as people can earn money and don't need to steal” (L9H3R2). Income was also used to alleviate hunger including seasonal and irregular periods of food insecurity and household debt. “Mining was really helpful when our crops failed and we needed to buy food” (L8H3R8) and “We now don't go hungry in the dry season, particularly when it’s a dry year, and don't go into debt from all the family ceremonies” (L9H3R2). Some respondents were able to improve human capital from employment and training by mining companies, such as skills in operating heavy machinery.

Another benefit of mining was local employment. Given it had become increasingly common to leave the village to seek work in Indonesian cities or work illegally in Malaysia previously, manganese mining provided a local source of work where villagers returned from employment in cities and even other countries, preferring to live and work within their own community. As one respondent said, “People have become more independent from mining and can work in the village, we no longer need to leave to find work elsewhere” (L4H4R16). Another respondent from Location 7 remarked “People became closer during mining as they worked together and more people stayed in the village as they didn't have to leave to find money” (L7H3R1). Manganese mining was not only viewed as a safer option than migrant work, but also valued as it kept families and communities together.

An indirect benefit was the improvement of farming land from mining activities. A number of respondents reported that mining improved the quality of the land for

farming because of the removal of manganese from the soil. Particularly in Location 4 where the manganese ore was very abundant and widespread, and also in Location 7 where the ore occurred as a concrete-like sheet under the soil surface, respondents commented that the extraction of manganese improved the suitability of the soil for farming purposes. One respondent (L4H5R5) in Location 4 showed us an area where he previously could not grow bananas and papaya but after mining the soil was cool and loose enough for these plants to grow. In Location 7, we were taken to a site that had previously been difficult to grow crops in because of the layer of manganese below the surface. This area after mining has now been converted into productive market gardens.

Other indirect benefits included increased wellbeing and a sense of independence. One respondent commented, “Mining brings positive changes in the village, there are new houses, a new church, people are more independent and active, they have a better education and are proud” (L7H2R9). It was common for respondents to remark that mining improved people’s independence and confidence, as community members were able to use their own natural resources, time and energy to improve their living situation and contribute to community-led development. There is an underlying view that rural communities, particularly in eastern Indonesia, are backwards, uneducated and unable to provide for themselves, a discourse which is described further in Chapter 6. Mining gave some people an opportunity to challenge this and feel like they could “fit in” to a national identity or prove that they were capable of providing for themselves. For example, one respondent from Location 4 commented, “I want to show that we can make a change with the money from

mining, so that we are no longer seen as poor and helpless, and instead that we can look after ourselves and be independent and look well off" (L4H5R3), while another respondent from the same location remarked "Mining helps us be independent and we don't need to ask for help from the government as we can provide for all our own needs" (L4H5R1).

Respondents at other locations also felt that mining contributed to increased empowerment in the community. In Location 7 one respondent said "People in the village have changed from mining, they have become more talkative, stronger, braver and more active" (L7H2R8), and another respondent remarked "Mining has brought good changes, people feel more confident and independent as they can make enough money to support their own needs" (L7H2R11). Some felt that mining was empowering because the community members themselves controlled how, where and when they mined. A young respondent from Location 9 had previously worked for a construction company but preferred mining as he was able to work as he wanted to, as he explained "Mining is good as you can work independently, when you want to stop you can stop or if you want to work harder you can get more money, it's up to you" (L9H1R13). Another respondent said "We were really happy when we started mining, it was like a new job and we could think about our future" (L4H5R6), indicating that mining provided new opportunities and possibilities that were otherwise not available.

Although not a specific focus in this study, manganese mining was also specifically beneficial for women. In West Timor the household finances are generally managed by women, as Cunningham, C (1967, p. 63) observed "There is a tendency for women

to hold the purse strings" and McWilliam (1989, p. 29) wrote "By and large, it is women who control the finances of the household. Men are typically thought to be irresponsible with money..." During interviews men often explained that they gave the money from mining to their wives to manage for household needs. Many female respondents across the locations spoke positively of mining as it provided additional income for every day household needs and food. According to one respondent money from mining provided opportunities for women to further studies, saying that "More people went to university when we were mining and most of the university students from this village are women" (L7H3R1).

4.6.3 Community Level Benefits from Manganese Mining

As well as individual and household level benefits from mining, there were various benefits experienced at the community level. In Location 7, a prominent landholder used the profits from mining for a number of village projects including building a new church and paying for university fees for village students. At this location one respondent reported "The houses and roads are better and there is better access to the centre of the village now. More people have electricity to their own houses" (L7H3R5). Another respondent at the same location stated "There are lots of changes in the village because of mining, the church is a symbol of the changes from mining and there are new houses and more motorbikes" (L7H1R7). Occasionally traders improved the roads in the village that they traded with so they could access manganese stockpiles. Sometimes they would also help out with transport, ceremonies and connecting the village to electricity and water.

In Location 4 a portion of the price from manganese sold to traders was used for community projects managed by the village administration. In two of the hamlets the money was used to build churches. Other community projects included repairing the village roads and village administration buildings. Respondents from other locations reported that there were no community benefits organised by the village administration from mining, however some village administration interviewed said they would support community benefits from mining in the future.

Mining companies are also under contract to deliver social benefits to the community as a part of Indonesian mining agreements (Devi 2013). In Location 8, respondents reported that the mining company did not deliver any additional benefits for the community, other than improving the road they used for transporting manganese out of the mining location and employing members of the village. The mining company in Location 8 only operated for two years before mining activities ceased and the company left. The mining company in Location 9 also did not deliver any community benefits according to the respondents interviewed, apart from donating livestock for ceremonies and initially giving money to the customary village leaders. The mining company in Location 9 worked more informally with the local community, mostly acting as buyer and was only occasionally involved in mining activities such as boring for new ore sources.

The mining company in Location 10 gave multiple benefits to the local community, particularly to the hamlet where the most intensive mining activities were situated. Some of the benefits undertaken by the mining company included offering university scholarships to village students, donating generators, delivering drinking water and

transporting children to school on a bus. The head of one of the hamlets (L10H3K5) pointed out that these benefits ceased when the company stopped working in the village and suggested that it would be more sustainable if the company invested in building infrastructure which would provide longer term benefits such as connection to electricity or constructing wells. The *kepala desa* in Location 10 described the mining company's community benefits as like "giving lollies to children" meaning that the company had no vested interest in sustainable community development but would only be involved as far as required to win over the community's support. For example, delivering potable water to the village was useful however the mining activities destroyed a number of springs and polluted the river water so that it was no longer suitable for washing or drinking. When the company left the village no longer received water so that while the negative impacts of the destroyed springs was permanent the company's efforts to provide water as compensation were only temporary. The company also built a road to the lower hamlet but its main purpose was for the company and not the community, and the company guarded the road and denied us access to the lower hamlet.

In summary, there were a range of ways in which respondents used the income from mining at the individual level, including every day subsistence needs, education and improvements to housing, depending on the income amount they were able to attain. There were also multiple benefits from mining experienced at the community level, with improvements to village infrastructure, and varied across locations depending on the local situation. There were also non-financial benefits from mining reported by respondents, including increased independence and wellbeing.

4.7 Negative Impacts of Manganese Mining

This section investigates the negative environmental and social impacts of manganese mining of concern to respondents depending on their perspectives and values, across the eight mining locations. As described in Chapter 3, the negative impacts of manganese mining in West Timor are different to other common forms of ASM, particularly gold mining, because manganese mining does not require any processing of the ore on site using toxic chemicals, manganese is a relatively low value mineral and most mining was performed by individuals on their own land. Negative impacts reported by respondents are grouped into environmental (erosion, pollution, deforestation and destroyed springs), and social impacts (accidents, sickness and conflict). Cultural and spiritual impacts are examined in Chapter 5.

The type of negative impacts and their severity reported were different mostly dependent on whether the mining was community driven and undertaken manually using hand tools only (Location 3, 4, 5, 6, and 7) or more intense where a company directed the mining activities and heavy machinery was used (Location 8, 9 and 10). Table 4.4 provides an overview of the different type of negative impacts reported by respondents in the eight locations where mining occurred. Location 2 is not included as no negative impacts from mining were reported and respondents were only involved in mining that occurred outside of Location 2. The negative impacts reported by respondents in Table 4.4 are not a comprehensive representation of what negative impacts may exist from mining, but indicate the negative impacts that respondents were aware of, had experienced and were concerned about. Note that there are three scales of severity; “none” where respondents reported there were

no impacts, “minor” where respondents reported the impacts were easily within their capacity to address, of minimal concern and temporary, “moderate” where respondents reported the impacts required attention and outside assistance, and “major” where respondents reported the impacts were outside of their capacity to address, ongoing after mining activities had ceased and possibly irreversible.

Table 4.4: Scale of the negative environmental and social impacts (none, minor, moderate and major) from manganese mining as reported by respondents in semi-structured interviews across the eight mining locations.

Location	L3	L4	L5	L6	L7	L8	L9	L10
Number of Interviews	16	20	10	10	20	13	16	13
Environmental	None (15)	None (20)	None (7)	None (10)	None (20)	None (1)	None (14)	None (1)
Erosion	Minor (1)		Minor (3)			Major (12)	Minor (2)	Major (5)
Pollution						Major (1)		Major (8)
Deforestation								Moderate (10)
Springs destroyed								Moderate (3)
Social	None (13)	None (14)	None (6)	None (9)	None (14)	None (6)	None (7)	None (1)
Accident	Minor (3)	Minor (2)	Minor (1)	Minor (1)	Minor (5)		Moderate (6)	
Sickness						Moderate (3)	Minor (1)	Moderate (7)
Conflict		Minor (5)	Minor (3)		Minor (2)	Moderate (5)	Moderate (6)	Major (13)

A large number of respondents commented that there were no environmental or social impacts, and in some cases this was due to the fact that negative impacts were minimal, particularly when mining manually. It also indicates that even if the negative impacts were present they were not of high concern. Predominately community-led manual mining was present in Locations 3-7, which was associated with lower negative impacts, with the exception of one respondent in Location 5 and one in Location 7, who used an excavator for mining for a short period of time on their land. Note that more negative impacts and also impacts of higher severity were reported in Locations 8, 9 and 10 where mining companies were strongly involved in the mining activities and heavy machinery was used.

4.7.1 Environmental Impacts

There were a number of environmental impacts reported from manganese mining, including erosion, pollution, deforestation and the destruction of springs. This section describes how these impacts were of concern to respondents. Particular attention is given to respondent's perspectives on using an excavator for mining as the use of heavy machinery causes significantly more intense environmental impacts. Whether mining improved the soil quality for farming is also discussed as the removal of manganese from the soil may allow crops to grow better, a result that is particularly relevant to farming communities.

The most common environmental impact from mining was erosion. Soil erosion is particularly high in West Timor, as there are naturally high levels of soil movement (Ormeling 1956). Erosion was more commonly reported when mining took place on slopes and was far more severe, often occurring as landslides when heavy machinery

was used to mine. An erosion study carried out in West Timor by Nuban (2015), indicated that erosion caused by manual manganese mining was low and mostly insignificant when compared to the high erosion rates which occur naturally. Reports of water and air pollution, deforestation and destruction of springs only occurred in Locations 8, 9 or 10 where heavy machinery was used for mining and mining activities were intensive.

Location 4, 6 and 7 did not report any negative environmental impacts of concern. Most respondents explained that this was due to the fact that they mined manually and were careful not to disturb trees or mine on steep slopes. Manual mining is slower than mining with an excavator and so environmental impacts can be observed and prevented before they become a significant issue. In Location 4 and 7 it was common to rehabilitate mined areas with banana or coconut trees to stabilise the soil. We were not able to view the mine sites at Location 6, however at Location 4 and 7 mined areas were almost imperceptible. After 3 years of no mining activities, most holes had naturally filled in and were covered with wild vegetation or had been planted in purposefully. Particularly at Location 3, 4 and 7, there was concern among respondents to mine in a method which did not cause environmental damage and undermine their other natural resources. As a respondent (L7H2R8) in Location 7 commented, “We might get piles of money from mining with an excavator but how can we use that when the land is destroyed?”

There were examples, which we witnessed at places we visited but did not include as central in this study, where manual mining was intensive and had created significant degradation of the environment. At some of these mine sites, holes were dug as deep

as eight metres (eg. Figure 3.7a in Chapter 3) and fertile top soil was mixed with deeper layers, degrading the soil quality, and in some cases rendering it unsuitable for farming. One respondent at Location 7 observed this at another location outside the village, explaining "They mined up to five metres deep in their garden so the bottom soil was mixed with top soil and so it isn't good for growing vegetables anymore" (L7H2R3). It was also common to see mining along river banks which can quickly exacerbate existing erosion rates, leading to instability of watercourse structure and increased sedimentation. At some mine sites, it was clear that some larger trees had been negatively affected by manual mining activities, or in some cases had died. While these negative impacts can exist from manual mining they are also easily avoided if mining activities are prevented near established trees and in vulnerable sites such as slopes and river banks.

As evident from Table 4.4, the negative environmental impacts reported by respondents at Location 8, 9 and 10 were more severe than at the other locations where mining was predominately manual and community-led. At Location 8, the mine was situated on a steep slope adjacent to a hamlet of approximately fifteen households. Even though the mining activities were only carried out for a couple of years, the damage caused by the excavators on the steep slopes has led to ongoing erosion and landslides, so that one household had to move elsewhere and a number of other houses are currently at risk as the mined slope continues to erode after mining activities have ceased. The mined land had previously been used for food gardens and grazing land for cattle, but after mining the soil became too damaged and unstable to be used for agricultural purposes. As one respondent remarked, "The

company used an excavator on our land and now it's all damaged from landslides and we can't use it for planting gardens anymore" (L8H1R6). It is not within the community's ability to restore this land and the mining company left without rehabilitating the land. The head of the hamlet (L8H1K1) commented that the river at the base of the hamlet became polluted where the mining company washed the manganese ore, and this caused issues with water quality particularly downstream in the next village.

There were also environmental impacts in Location 9, however these were not as severe as Location 8 or 10, as there was only one main mine site situated on a flat area with little vegetation. Even though the mine site was large, approximately 300 metres long, 50 metres wide and 10 metres deep, the environmental impacts were contained and limited to the mine site. Most of the mining at this location was done manually however excavators were used to remove soil so that miners could access the ore more easily.

The most severe environmental impacts were reported at Location 10. There were a number of large mine sites at this location which were predominately mined using heavy machinery. The land was on a steep slope and some areas had previously been used for farming. Landslides continue to be an issue despite the company's attempts to stabilise the hillsides. During the mining activities, the river at the bottom of the village became highly polluted, turning black. The water was not suitable for household use and there were a number of reports of cattle dying from drinking the polluted water. A number of springs and large trees were destroyed on the hillsides where excavators were used. In a conversation with the mining company manager

he explained that they had tried to rehabilitate some of the hills slopes but the tree seedlings had all died. One respondent remarked, “The ground becomes too hot and dry after mining, the grass has stopped growing there and the land is no longer suitable for planting gardens” (L10H1R2). While the river is no longer polluted after mining activities have ceased, other negative environmental impacts, such as loss of springs, deforestation, and degradation of soil quality and stability remain as ongoing issues outside of the community’s, and perhaps even the company’s, ability to address effectively.

Due to the extensive environmental damage caused by heavy machinery, there were varying views across the locations about whether excavators should or should not be used to mine manganese. Table 4.5 provides an indication of the views about whether an excavator should or should not be used at each of the eight locations where manganese mining occurred. Generally, those who were against using an excavator were not necessarily against mining altogether but were often open to mining manually.

Table 4.5: Respondent’s views from semi-structured interviews on the use of an excavator for mining manganese in the eight locations where mining was present.

Location	**L3**	**L4**	**L5**	**L6**	**L7**	**L8**	**L9**	**L10**	**Total**
Number of Interviews	15	14	9	8	19	9	N/A	6	80
Excavator use	0	0	2	3	6	1	N/A	2	14
No Excavator	14	14	4	4	13	8	N/A	3	60
No Preference/Unsure	1	0	3	1	0	0	N/A	1	6

In Location 3, the use of an excavator had been offered by a trader who worked with the community however the elders decided that because of the steep slope that the mine site was located on and the close proximity to the village, it would be too dangerous and they refused the use of an excavator. As indicated in Table 4.5, almost all respondents were against using an excavator in Location 3.

Views at Location 5 and 6 were more varied than Location 3 however most respondents were against the use of an excavator. Respondents at both locations explained that they did not want to damage the land and the trees, and that using an excavator would also incur additional costs to use. Some respondents at Location 6 were supportive of using an excavator if particular conditions were met such as a good selling price for manganese, only using the excavator on flat land so that erosion was minimal and that the elders and community were also supportive of the decision. In Location 7, most respondents were against the use of excavators to mine manganese. This village has productive land as it is situated in a higher rainfall region and food gardens are interspersed with forested patches.

In Location 8 almost all respondents were against using an excavator. As the mining company had used excavators to mine on the steep slopes in this village the respondents had direct experience of the negative impacts caused by excavators, as described above, and could compare it to the relatively minor impacts associated with manual mining that they had been engaged in before the company started mining. Only one respondent was open to using an excavator but only if it was on open, unused land that was not close to people's gardens or houses.

The question of using an excavator was not particularly relevant to the mining situation in Location 9. As the mine site consisted of one large, deep deposit on flat, sparse land, the negative impacts experienced at other locations using an excavator such as landslides on steep slopes, deforestation and destruction of springs, were not experienced here.

In Location 10 where the mining company had used heavy machinery at multiple locations, the views on using an excavator were varied. Most respondents were against using an excavator as the selling price of manganese was much lower, it degraded farming land and also destroyed forest and springs. There were a couple of respondents who were open to using an excavator but said that a higher price would need to be negotiated.

The impact of mining on soil condition was also a common concern expressed by respondents as to whether mining improved the soil quality, whether soil quality deteriorated or whether soil quality remained the same as before mining (ie. no change) (Table 4.6). Whether mining negatively impacts soil quality is a critical issue for communities in West Timor as most miners were also farmers, and often mining activities took place on their farming land.

Table 4.6: Respondents views regarding the impact of mining on soil condition across the eight locations where mining occurred. Data sourced from semi-structured interviews.

Location	L3	L4	L5	L6	L7	L8	L9	L10	Total
Number of Interviews	13	19	7	7	19	9	N/A	6	80
Soil Worse	4	0	2	2	3	7	N/A	5	23
No Change	5	2	3	5	8	1	N/A	1	25
Soil Better	4	17	2	0	8	1	N/A	0	32

In Location 3, 5, 6 and 7 views were mixed as to whether the soil improved after mining, deteriorated or stayed the same. The majority of respondents at these locations reported that mining either had no impacts or that mining improved the soil, so that in their views mining was not a negative activity regarding soil quality. When respondents commented that mining had improved the soil, they described the soil as becoming looser or cooler so that it was easier to plant into and did not lose its moisture content quickly. A few respondents that reported that the soil quality decreased after mining commented that even though they were mining manually some of the holes were up to 7 metres deep so that the top soil was mixed with the bottom soil making it unsuitable for farming. Other respondents commented that the soil was not as good but was still suitable for farming, with some deciding to leave the area fallow for some time before farming again to allow natural regeneration.

Location 4 was different from the other locations in that no respondents reported that the soil fertility declined after mining and the large majority of respondents commented that the soil quality actually improved after mining. The manganese ore deposit at Location 4 was widespread and abundant so that almost each household had manganese on their land. The high abundance of manganese in the soil at this location prevented the growth of bananas and other food plants in particular areas, so that it was common for respondents to notice an improvement in their food crops after removing manganese from the land.

Whether the soil improved or not after mining at Location 9 was not a relevant question as the area was open land and not used for farming or forestry. The mine was still active so respondents had not experienced what the longer-term impacts of mining at that site may be.

At Location 8 and 10 where excavators were used by mining companies, the majority of respondents reported that the soil condition worsened significantly after mining. A number of respondents remarked that they were no longer able to use the land for farming and that even grass struggled to grow at and around the mine sites.

4.7.2 Social Impacts

Generally respondents reported that there were no or only minor negative social impacts concerning accidents, sickness and conflict associated with mining for Locations 3-7 where only community-managed mining took place (Table 4.4). In Locations 8, 9 and 10 where mining companies directed mining activities negative

social impacts were more commonly reported and were also of higher concern, particularly conflict and illness.

At Location 3, 4, 5, 6 and 7 several accidents were reported by respondents. At Location 4, one respondent reported that soil fell on one miner but they recovered, and another respondent commented that stated that soil buried a miner who they rescued but later died. At Locations 3, 5 and 6 there was only one minor accident reported at each location where the injured person recovered after soil and rocks fell down on them. At Location 7 five respondents separately reported the same death where a tree had become unstable from mining and on a windy day it fell killing a miner beneath it when he was working. While some of these accidents were serious they did not deter people from mining however some respondents commented that they mined more carefully after witnessing or hearing of mining-related accidents, such as one respondent from Location 3 who remarked "I felt happy mining at the beginning as I could get money but I was also worried as I had heard stories from other villages of people being buried so I was careful how deep I mined" (L3H3R10). There were no accidents reported at Location 8 or 10, and only minor accidents in Location 9, and this may be due to the fact that most mining involved an excavator and miners mostly sorted through piles of excavated soil.

Sickness such as respiratory ailments (eg. coughs) and skin conditions were reported at Locations 8, 9 and 10 where heavy machinery were used and the mine sites were larger, more open and exposed. Respondents at these three locations commented that during the dry season the mine sites became dusty and people developed respiratory ailments. Water contamination from washing manganese in local water

sources at Location 8 led to serious skin conditions for downstream communities who had to find new water sources and received no health compensation. Negative mining impacts at Locations 8 and 10 not only affected miners and the wider local community but also neighbouring villages.

Ill health from mining activities was not reported at the other locations where mining activities were mostly manual. Health and sickness is often interpreted with spiritual meaning in West Timor and a number of respondents commented that they did not get sick because the spirits and earth were supportive of mining activities. People felt that they were safe and healthy because they had performed the correct rituals and approaches, a belief which is described further in Chapter 5. As one respondent remarked "The ceremonies kept us safe when we were mining so nothing bad happened to us" (L5H1R4).

While manganese is an essential element for humans and an important part of our diet, it is toxic in high concentrations (Crossgrove & Zheng 2004; Santamaria 2008). Manganese toxicity, or manganism, occurs through overexposure to manganese, most often derived from inhalation of dust or fumes containing high levels of manganese, or from the consumption of water polluted with manganese (Barceloux 1999; Dorman et al. 2006; Kondakis et al. 1989). When manganese uptake exceeds the speed at which the body can eliminate manganese, an accumulation of manganese in the body can occur which may impair mental functions, possibly leading to the development of manganism, as well as inhibiting iron absorption and transport (Barceloux 1999; Dorman et al. 2006). Children are considered a vulnerable population in regards to manganese toxicity, as high levels of manganese may impair

long-term neurodevelopment and cognitive abilities (Erikson et al. 2007; Weiss 2000).

Some mining activities may lead to manganese toxicity, particularly for miners and labourers in smelters, although those living near mining activities may also be affected (Bowler et al. 2006; Chandra et al. 1981; Wennberg et al. 1991). Levels of manganese in the environment and their effect on the resident population have not yet been investigated in West Timor. A number of studies have been conducted in the Molango Mining District in Mexico, to determine the health impacts on local residents from manganese mining. Mining activities, carried out by the Autlán Mining Company over 50 years, include open pit extraction and smelting to refine the ore (Catalán-Vázquez et al. 2014). Blood manganese concentrations of local residents, were confirmed as high (7.5–88 μg/L) and associated with an increased risk of cognitive deficiencies, mostly caused by manganese dust (Santos-Burgoa et al. 2001).

Minor conflict was reported by respondents at Locations 3, 4, 5 and 7. At Location 3 one respondent commented that “Some people mined on other's land without asking permission but left when the landowner became angry and asked them to leave so it was not a major or ongoing issue” (L3H3R12). In Location 4 conflict was related to misunderstanding of borders between hamlets or rights to communal land, both of which were solved without difficulty by elders. In Location 5 minor conflict reported by respondents related to issues of people mining on each other’s land without permission which was solved through customary governance systems, and conflict between the main trader and other illegal traders who attempted to buy manganese from the village without a permit. At Location 7, conflict concerned

where miners could mine and who had access to particular areas, which was resolved by elders in the village.

Conflict was more serious and common at Locations 8, 9 and 10 where mining companies were involved in the mining activities. At Location 8 conflict related to the designation of borders between landholder's land particularly when renting land to the mining company, as well as conflict between the local community and the mining company regarding mining activities causing extensive negative impacts for the community without ample benefits. Conflict regarding borders was resolved through discussion with the elders in the village, although it can be more heated when larger amounts of money are involved.

The considerable negative impacts caused by mining activities directed by mining companies created a point of conflict between the local community and the mining company at both Location 8 and 10. Mining companies were also the main buyers of manganese at the mining location and could set the ore price, whereas other locations often had multiple traders visiting so that miners would only sell to traders who offered the best price. Where mining companies controlled the mining activities and price, there were significant negative impacts and low benefits for the majority, with only a few benefitting substantially in the community causing another point of conflict regarding unequal distribution of benefits. Many respondents reported that the mining companies did not deliver what they had promised in benefits to the community and the negative impacts were worse than anticipated. Some issues were not able to be resolved between the community and mining company, and church leaders and various NGOs became involved in demonstrations against the mining

companies and local government for inaction. A number of demonstrations took place a few weeks after our initial visit to Location 10 in 2015.

Some respondents at both Locations 8 and 10 suspected the mining companies of purposely generating conflict between community members for their own benefit, a tactic that was used by the Dutch during colonisation to destabilise systems of power and then favour those who worked with them. These respondents reported that if landholders did not want to rent or sell their land to the mining company, the mining company would not acknowledge their ownership of the land and instead seek written permission from another family member, usually through bribery. This led to heated internal conflict sometimes becoming violent, and some of which still creates tension several years after mining activities have ceased.

Conflict was experienced both between community members and also between the community and the mining company in Location 10. One respondent spoke of how he fought for his family's land against other families and also the mining company. In 2009 the mining company started renting land and asked to rent his family's land however he refused, wanting to continue to use it for farming. A neighbouring family then attempted to claim that the land was theirs and wanted to use it for mining. The case went to court in the district city and the respondent lost the land as the family attempting to claim were backed by the mining company. The case then went to the provincial city and the respondent's family won. The land ownership was challenged twice more in Jakarta but both times the respondent's family won. These court cases took place over four years from 2009-2013. In 2015, new management had taken over the mining company and the respondent was approached by the new mining

company, asking to mine on his land. The mining company offered IDR 100,000 per hectare per month to mine on his land. He refused as the price was too low and he had spent four years defending the land for farming purposes. The mining company then got permission from a second cousin and while the family was in dispute over this, the company used military to guard the land while they mined the manganese there. The company knew that the respondent was the landholder as they went to him first, but after he refused they sought approval from a relative who did not have the right within the customary governance system to give permission. The company took all the manganese from their land without any financial compensation and now the land is highly erosive and no longer suitable for farming. This respondent remarked “Our land is now very damaged from mining and we can't use it anymore for farming. The company used army officials from Jakarta to guard while they take manganese from our land with no compensation” (L10H2R8). Another respondent (L10H2R7) had a similar experience where the new mining company in 2015 forced entry onto his land and mined manganese without giving any compensation. Both of these respondents asked us to tell their story as they felt that they were helpless in gaining compensation for what they have lost, describing their struggle against the mining company as like “trying to fight the sun.”

As the mining company in Location 10 offered the lowest price recorded in West Timor for manganese, community members transported manganese out of the location on motorbikes to other locations such as Kefamenanu, where they could sell manganese there to traders at a higher price. Legally the ore in the location belongs to the mining company who has the licence to mine in that location, and so it is

technically an illegal activity for community members to transport ore out of a mining company's licensed area and without their permission, to sell to another buyer. This situation created much conflict between community members transporting manganese out and the mining company when the police became involved and confiscated and destroyed their motorbikes, leaving many of the people with significant debts and jail sentences.

4.8 Balancing the Livelihood Benefits and Negative Impacts of Mining

Manganese mining provided a number of benefits as a new livelihood, however it was also associated with some negative impacts. This section investigates how respondents viewed whether the benefits from mining outweighed the associated negative impacts.

A number of respondents did not experience mining as a strongly positive or negative activity. One respondent from Location 10 commented "The benefits and negative impacts from mining are balanced, it just depends on how people choose to use the money from mining" (L10H2R7). Another respondent from this location was also uncertain whether mining was positive or negative, "There is better connection to electricity now but I'm not sure if overall the changes in the village from mining are better or worse" (L10H1R4). There were also some respondents who chose to stay unbiased such as the head of the hamlet for Location 10 who commented "As the *Kepala Dusun* I have to stay neutral but there are people in my hamlet who are pro and against mining" (L10H3K5). Generally though, respondents felt that whether mining was positive or not depended on how wisely the money from mining was used. Another respondent from Location 10 commented "If money is used for

building a house or sending children to school the money is used well and has good outcomes, but otherwise whatever you spend it on will break or disappear as if you never had it" (L10H4R1).

There were a number of respondents who felt that mining interfered with their identity as farmers and farming livelihoods. A respondent from Location 8 remarked "Even manual mining isn't that good as its changed local people's perspectives about farming, it interrupts the long term planning of farming" (L8H3K4). Farming is a cyclical, often communal activity, with the focus on producing food and now more recently income as well if possible. Some respondents felt that mining was similar to gambling. Mining has a significantly different focus in that only money can be gained from mining which led some to engage in mining as an almost addictive activity without any clear goal in mind for the benefits.

The importance of maintaining cultural identity as farmers was strong for some respondents. "We have always been farmers and our ancestors were farmers too but now we have started mining but the results from mining don't seem like it is enough compared to what we receive from farming" (L10H1K4). Another respondent from Location 10 commented "Working in the garden doesn't disturb nature, this is the first time we have ever mined. Because we are farmers we don't know what the impact of mining might be later on. It is better to focus on farming as everyone has land for farming but not everyone has manganese on their land" (L10H3R5). Interestingly this respondent valued farming over mining because it brought equal benefits to the community in Location 10 where mining there was the widest gap between those who benefitted significantly and those who did not. One respondent

from Location 5 remarked “Mining isn't a good thing as it isn't what we have done traditionally and it causes environmental damage, but we need money so we mine anyway” (L5H2R7). This comment reveals that while the respondent felt uncomfortable about mining, they were willing to mine still as there was a need to generate income.

There were respondents though who felt that the benefits from mining were not worth the negative impacts. This was most frequently expressed by respondents in Locations 8, 9 and 10 where mining was company-driven and heavy machinery was used. In these locations respondents commented that the benefits from mining are short-lived while the negative impacts are long-lasting. As a respondent from Location 8 commented “The negative impacts are much more significant than the benefits from mining. The money from mining has already gone but our land is still damaged” (L8H1R3). The negative impacts of most concern were ongoing social tension and conflict, as well as environmental damage. One respondent (L10H2K1) from Location 10 remarked “There are more negative impacts than benefits from mining here, it is really hard to fix all the family relationships. People smile on the outside but on the inside there is still a lot of hate. Now we ask, should we fix the land first or our hearts?”

Many felt that the income from mining could have been better spent and invested in long-term outcomes. Some respondents felt that the money from mining was energetically “hot” (see Chapter 5) and so long-term benefits were not possible from mining income. Others said that it was possible to ritually “cool” the income from mining if a ceremony was performed, so that the benefits would not disappear. And

some respondents simply stated that they did not expect mining to suddenly cease as suddenly as it did, they anticipated mining would be an ongoing activity that they would be able to constantly engage in for income when they needed it, so they did not use the income strategically.

4.9 Conclusion

This chapter has demonstrated that manganese mining has been incorporated as a new livelihood strategy in West Timor, most commonly alongside existing farming livelihoods for income generation with minimal asset requirements. Manganese mining assists rural populations in coping with vulnerabilities such as crop failure from pests, diseases or poor weather conditions, food insecurity and increasing daily living costs.

The results indicated that there were a range of benefits and negative impacts from mining experienced by rural communities in West Timor. The diversity of experiences derived from both the different ways in which mining is organised, for example community-led or company-driven mining, and also from respondent's perspectives and values on an individual level and also collectively as a community. The results demonstrate a significant trend for community-led manual mining to contribute to more sustainable outcomes, including more evenly distributed benefits in the community and concern for environmental impacts, while company-driven mining involving heavy machinery was commonly associated with far more severe negative impacts. Perspectives and values regarding mining were also dynamic in that as respondents experienced mining their understanding and views of manganese mining as livelihood shifted, potentially leading to different approaches if mining to

returns to the same degree in the future. The next chapter investigates how local beliefs are applied to and are changing in response to manganese mining in West Timor.

Chapter 5: Mining, Ritual Practice and Beliefs

5.1 Introduction

This chapter investigates how contemporary local beliefs influence decisions and approaches to manganese mining. In West Timor, natural resources such as water, forests and rocks are not considered mere commodities for trade and economic purposes but exist within diverse and meaningful socio-ecological systems (McWilliam 2001). The question of how local communities negotiate using manganese for economic purposes within their spiritual belief systems is thus a valid area to consider when investigating the role of manganese mining from a community perspective. Understanding local spiritual beliefs regarding natural resource management is also vital in designing appropriate and sensitive policies and legislation (Berkes 2012; Palmer 2015). This chapter examines how local belief systems in West Timor are applied to manganese mining across the ten field locations, addressing the three research questions; 1) What beliefs and concepts of the sacred are related to manganese mining activities, 2) How are rituals used to influence the outcomes of manganese mining, and 3) Does manganese mining stimulate cultural renewal and cultural loss? Firstly, a background to belief systems in West Timor is provided focusing on key Austronesian cultural features. Secondly, negotiating mining within spiritual relationships to the earth as a living being are investigated. Thirdly, concepts of the sacred and how they influence mining activities are analysed. Fourthly, the use of ritual practice and systems of spiritual reciprocity

to manage and guide mining activities is discussed. Lastly, how manganese mining leads to transformation or renewal of local beliefs is investigated.

5.2 Methods

This chapter is largely based on data from semi-structured and in-depth interviews conducted with miners, community members, and clan and ritual leaders as outlined in Chapter 2. In semi-structured interviews, respondents were asked about their beliefs regarding sacred places and the qualities of manganese, and how this influenced their experience of mining, and how their beliefs may have changed as they engaged in mining. In-depth interviews explored particular themes such as the use of ritual practices, the spiritual qualities of manganese (eg. connection with water cycles, protective energy), and cultural transformations in belief systems as livelihoods have changed over recent decades. No ceremonies were observed for manganese mining because mining was not strongly active at the time of fieldwork, however observations of other rituals were recorded. Relevant Austronesian and Timorese cultural features published in the literature were used to provide background context and analyse the findings in this chapter.

5.3 Austronesian Cultural Features in West Timor

Archaeological and genetic evidence suggests the earliest modern human colonisation of Timor Island occurred around 50,000 years ago (Horridge 2006; Karafet et al. 2010). Around 4000 years ago the Austronesian culture and languages reached eastern Indonesia, including Timor Island, from present day Taiwan, Cambodia and Vietnam, through the human migration termed the Austronesian

expansion (Bellwood 2007, 2011; Gray et al. 2009; Horridge 2006). The Austronesian migration brought to Timor Island languages, agricultural systems including rice farming, domesticated animals such as chickens and dogs, textile and pottery techniques, and belief systems and ritual practices, much of which are still evident today (Bellwood 2011; Donohue & Denham 2010; Lansing et al. 2011; Spriggs 2011).

The majority of West Timor's contemporary population are the *Atoni Pah Meto* (Original People of the Dry Land), and for the last two hundred years they have expanded west and north from the eastern ranges of central west Timor (Fox 2006b). The *Atoni Pah Meto* population consists of approximately 750,000 people from at least 400 separate origin groups or *kanaf* that each identify with a particular rock outcrop or *faut kanaf* as their place of origin (Fox 2006b). This cultural group practice shifting cultivation and are referred to as the mountain people or *Orang Gunung* by some Kupang City dwellers, and are known as the *Dawan* by their *Tetun* neighbours (Farram 2004). The *Tetun* are the second largest cultural group in West Timor, and are also known as the *Belu* by the *Atoni Pah Meto* (Farram 2004). The majority of the *Tetun* live in Timor-Leste, however there are significant populations in the east of West Timor. Other smaller cultural groups include the *Kemak* and *Marai* or *Bunaq* people who live on either side of the East/West Timor border but are usually incorporated with the *Tetun* although there are significant differences in their languages and customs (Suparlan 1985).

Timor still holds a number of Papuan-derived languages which remain despite the higher prevalence of Austronesian-based languages such as *Tetum/Tetun*, *Dawan* (*Uab Meto*), *Mambai*, *Galoli* and *Kemak* (McWilliam 2007). In Locations 5 and 8 the

Papuan-based language *Bunaq*/*Marai* is mostly spoken with some *Tetun* and they are a matriarchal/matrilineal society, however their cultural features are distinctly Austronesian. All other locations (1, 2, 3, 4, 6, 7, 9 and 10) are linguistically and culturally Austronesian-based, and are known as *Atoni Pah Meto*, and are referred to in the literature as the *Atoni*, *Meto* or *Dawan* people.

The main Austronesian cultural features in Timor which are relevant to the management of local natural resources, include viewing the earth as a living animate being, the notion of sacred forces and places, and conducting ritual practices including sacrifice as a form of reciprocity and communication with the spiritual realm (Bovensiepen 2011; McWilliam 2001; Palmer 2015). These cultural features are described in the following sections in relation to manganese mining. As with the majority of Austronesian societies, the Timorese belief system is centred on spirit animism and ancestor worship (Fox 2006a; Newton & Barbier 1988; Palmer 2015). Animism is the understanding that "natural beings possess their own spiritual principles and that it is therefore possible for humans to establish with these entities personal relations of a certain kind—relations of protection, seduction, hostility, alliance, or exchange of services" (Descola 1992, p. 114). In animism, the seen world is related to the unseen world, all life is interconnected, people are intimately linked to their families and ancestors, as well as nature, and power is sought to control the dynamics of everyday life through ritual, and divination is used to understand the forces which influence wellbeing, such as the cause of sickness or death (Van Rheenen 2011). Animism is not a set of passive beliefs but an active way of being in the world, in communication and in relationship with nature and the supernatural

realm (Ingold 2006). The following sections describe how relationships to the earth, concepts of the sacred, ritual practice and systems of spiritual reciprocity, all of which are aspects of animism, are actively engaged and applied to manganese mining.

5.4 Spiritual Relations to the Earth and Mining

This section begins by describing local relationships to the earth in West Timor, using published literature on relating to the earth as a living animate being that has agency and responds to human actions, in Austronesian cultures in eastern Indonesia. Mining the earth within a belief system that regards the earth as a living animate being is then presented, describing how approaches to manganese mining were adapted to consider the earth's response to mining activities.

5.4.1 The Earth as a Living Being

In Timor, the land is often referred to as a symbolic compass based on the form of a body, with the east as the head and the west as the feet (McWilliam 2006b; Traube 1986). The north and south are referred to as the left and right side respectively. The sacred "rock and tree" is a core symbolic pairing in Timor, and the pairing is often used in ritual speech and symbolises the cosmic union of earth and sky, "Our Mother who is rock/Our Father who is tree" (Traube 1986, p. 14). The land also resembles the elements of the human body, with rocks symbolising bones, the earth or soil as flesh, water as blood or milk, and forest and grasses as arteries and hair (Palmer 2015; Sujana 2014). Rocks are considered as "the bones of the earth" in West Timor as they give the land its integrity, form and strength (Maemunah 2015; Sujana 2014).

In this way, the earth is a body and natural resources are regarded as parts of the body that make up a living whole being.

The earth is also regarded as a highly multi-faceted supra-social landscape which is "created by and still governed through complex interactions between spirits, humans, animals and other physical objects and forces" (Palmer 2015, p. 1). The land is acknowledged as having "agency", meaning that it is alive, responsive and has its own desires and preferences which need to be acknowledged and tended to by humans (Allerton 2009; Bovensiepen 2014). People are placed within nature and interact with nature so that they are able to "see, experience and participate in the hidden secrets and the hidden beauty of the enchanted and sacred realm that gives and sustains their meaning of life" (Kehi & Palmer 2012, p. 468). This connection with the earth is an intuitive relationship based on emotion rather than rational reasoning alone, which is still "full of fascination, wonder, mystery, awe and enchantment" (Kehi & Palmer 2012, p. 447). This enchanted and interconnected relationship to the earth and nature is the foundation of everyday activities, livelihoods, life-cycle events and cosmologies.

The earth as a spiritual being is referred to as *Uis Pah*, or God/Lord of the Earth, forming a complementary partner with *Uis Neno,* God/Lord of the Sky. Together they form a whole being and are "the ultimate recipients of ritual action" and "the primary metaphor of totality" (Traube 1986, p. 67). While the earth is the being *Uis Pah* it is also "alive" with ancestors, spirit owners and other spirit beings. These spirits can appear through dreams or signs interpreted as their messages. They are separate from the earth in that they have their own identity but at the same time are

representatives of *Uis Pah*. Spirit ancestors are often seen as a metaphysical bridge between the living and spirit world, and messages are given to the spirit ancestors, usually through ritual speech and ceremony, to deliver to the higher deities (McWilliam 1989). Bovensiepen suggests that while the ancestors, *lulik* (spiritual force or energy) and land spirits are conceptually separate, "they are implicitly treated as transformations of each other and their combined presence in the land makes up its powerful potency" (2011, p. 50).

As in other Austronesian societies, Timorese culture acknowledges the interrelationship of different forms of life and holds a strong emphasis on place (Fox 2006a; McWilliam 1989). The landscape itself is animate; it contains masculine and feminine qualities and is alive with complex interactions between humans, animals, spirits, ancestors and energies (Palmer 2015). Not only are the spirits and spiritual energies interconnected, but they are also embedded geographically in the landscape. The earth as a being expresses itself through but also as spirits and ancestors, animals, and energetic forces. The earth is seen as "inspirited" or "alive", and the boundaries between spirits and spirited places are not obvious; more often emphasis is placed on the relationship between beings and places rather than distinguishing them as separate identities (Allerton 2009). Spirited places are considered energetically powerful and may be referred to as sacred and are often places where rituals are performed.

Ritual centres in particular are considered as powerfully charged places, and are connected to other spirited places, creating a strong and complex geographical network across the landscape. Annual and periodic rituals are held in these centres,

which bring the community together to engage in ceremonial activities. Ritual centres are also the core of ritual knowledge, holding the full account of a community's history and social connections between clans and shared ancestors (Traube 1986). *Tamkesi* is the ritual centre for the *Biboki* kingdom in TTU and still holds a powerful position as the source of spiritual power to the surrounding lands. The ritual leader of *Tamkesi* explained in an interview (L2H1K1) that the land in and surrounding the ritual centre is considered sacred and all natural resources, unless planted by humans, are protected and cannot be removed, including manganese, as this would disrupt the connectedness of the land which gives it its power. *Wehali* is the ritual centre for the whole of Timor and is located in the south central coast in the district of Malaka. *Wehali* is considered "female land" and is a totally matrilineal area, where all land, property and houses belong to women (Fox 1996, p. 11). Historically, all other central powers in Timor recognise "the authority of the centre (*Wehali*), of the earth and the mother who alone could legitimise the peripheral position of the male realms (outer ritual centres)" (Fox 1996, p. 12). Ritual centres are thus the height and heart of spiritual power and cultural knowledge, and where communication with the earth as a living being is most powerful.

5.4.2 Mining and Respecting the Earth as a Living Being

Many of those interviewed in locations studied who were against manganese mining live by the understanding that the earth is an animate and interconnected being, and that their wellbeing is dependent on the wellbeing of the earth. In this perspective, mining is not viewed as an appropriate or positive activity as it degrades the wellbeing of the earth. Not all communities in West Timor still adhere to a belief

system where the earth is “alive”; Christianity, particularly in Protestant regions in West Timor, has largely replaced earth-centred spiritualities to varying degrees. However Location 1 and 2, and also a number of respondents from multiple locations, chose not to mine so as not to cause spiritual harm to the earth. This section investigates the views and beliefs of those who chose not to mine because of their respect and desire to protect the wellbeing of the earth and their relationship to the earth as a living being.

There is an understanding that the power and wellbeing of the earth resides in its interconnectedness and existence in its natural condition. Some respondents believed that mining physically and also energetically disturbs and disorders the natural state of harmony and wellbeing of the earth as one respondent explained “mining turns the land upside down so when you ask for something it cannot happen as it isn’t in its original state and can’t perform the communication anymore. Mining damages the area so that you can no longer ask for things from it, like rain or protection, because it is broken and the links of power are disconnected” (L9H1K4). Mining disrupts the connections between places and beings in the landscape, and “it lets all the power out of the land, as if there isn’t anything to hold the power in the earth” (L9H1K4). In this view, mining directly disrupts and damages the energetic connections in the landscape, which give the land its power and wellbeing to which people depend.

The earth was described not only as a single being referred to as “The God of the Earth (*Uis Pah*)” but as “the connectedness of all the *Usif* (leaders), *Tobe* (elders) and all the ancestors, plants and animals together” (L9H1K4). Therefore, the earth is

viewed as more than a single entity, it is the combination of people, ancestors, plants and animals in relationship together. Mining thus also impacts not only the geographical landscape but all who dwell on the earth, both metaphysical and physical, and the realms between.

The power of the land exists in the land itself but also in the attendance and management of it, it exists through relationship between people and place. When people engage in mining the land, the connection between people and place is lessened so that "they no longer have their power in the land, if they want to ask for rain it won't happen" (L9H1K4). A number of respondents said that digging holes into the earth is taboo; "it is like creating wounds in the body of the earth" (L9H1K4). In this view, mining creates a different relationship between people and the land, their power is no longer being invested into the earth, such as in farming, but they are only taking out resources from the land and not giving anything back to replace what they have taken.

Not only is the power of the earth degraded by mining, but also the ability for people to access this power is lessened; "when people become money orientated they become weaker spiritually and lose their connection to the power of the land" (L9H1K4). Manganese itself possesses a power which is long lasting when it is in its natural state in the earth; "the power of manganese can last forever in the land, but the benefits from mining are very short compared to the previous power of manganese when it was in the ground" (L9H1K4). Mining thus removes the power given by manganese, it disrupts the interconnectedness and natural state of the earth which gives it its strength, and it also changes the relationship of people to the

land so that they can no longer access the power of the earth for nourishment or protection.

In Location 1 mining was considered unnecessary and selfish. The King explained that they recognise there is no need to mine, “the earth already gives us everything that we need to live and live well. To take manganese to sell for money is greedy and disrespectful of what the earth already offers us” (L1H1K2). In Location 1, there was a focus on humbly accepting what had been given by the earth, rather than taking and asking for more. When asked whether he had noticed any signs of climate change, the King replied that they do not complain or criticise any aspects of the weather, but gratefully accept what occurs, understanding that what happens is meant to be. In this view, gratitude takes precedence over greed and respect is given to other beings, both seen and unseen, who also inhabit the landscape, and establish relationships built on respect and care.

In the views presented here, it is demonstrated that mining is detrimental in maintaining the wellbeing of the earth and continuing a meaningful and healthy relationship to the earth. Although not all respondents adhered to these views, for those that did these beliefs were central to their decision not to mine. There was a conscious choice to not engage in mining and instead place a higher value on protecting the earth and maintaining its wellbeing, rather than to pursue economic benefits from mining. The next section describes concepts of the sacred and their influence on manganese mining.

5.5 Mining Sacred Rock and Sacred Place

5.5.1 Concepts of the Sacred in Timor

Sacredness is a central concept in Austronesian cultures and is referred to as *le'u* (sacred, forbidden from *Uab Meto*), and also *luli* or *lulik/lulic* in other parts of Timor (McWilliam 2001; McWilliam et al. 2014). *Lulik* is a strong vital force or energy which requires vigilance (Bovensiepen 2014). When infused with this powerful energy, many things can become *lulik* including "a range of objects, places, topographic features, categories of food, types of people, forms of knowledge, behavioural practices, architectural structure and periods of time" (McWilliam et al. 2014). *Lulik* can be roughly translated as sacred, forbidden or prohibited (Bovensiepen 2014; Traube 1986), but it is not just limited to an association with holiness or the sacred, it also includes and eludes to "the spiritual cosmos that contains the divine creator, the spirits of the ancestors, and the spiritual root of life including sacred rules and regulations that dictate relationships between people and people and nature" (Trindade 2011, p. 1). In this way *lulik* is fluid and creative; it is both a noun and a verb, ever present and active, and has the ability to create and destroy life (Bovensiepen 2014).

Objects may be considered *lulik* such as sacred swords, spears and ornaments (Traube 1986), and are often passed down by family members and held within the clan sacred house and used in ceremonies. *Lulik* also exists in the landscape and is related to particular landmarks such as rivers, rocks, hilltops, springs, forest groves and trees (Bovensiepen 2014; McWilliam 2001). Some *lulik* places are where ancestors were born, settled or where they were buried (Bovensiepen 2014). *Lulik*

places are treated with respect and fear, resources cannot be removed or disturbed in these places such as cutting down trees, hunting animals or removing rocks or soil, and generally these places are avoided (Bovensiepen 2014; McWilliam et al. 2014).

Lulik is powerful; it may hinder, causing disease, accidents, death or madness or it may help, for example many East Timorese credit their victory of independence against Indonesian occupation to the use of *lulik* power (Bovensiepen 2011). *Lulik* is also a "source of life, productivity, fertility, and good health" (Bovensiepen 2014, p. 130) which can be channelled through positive relationships with *lulik* places and objects, to create beneficial outcomes. To avoid the danger of *lulik* but also receive its benefits one must establish "...a *relation of distance*, a boundary between things" (Traube 1986, p. 143), so that "...the right balance between distance from and proximity to *lulik* land" is maintained (Bovensiepen 2014, p. 131). Therefore, the closeness to *lulik* is critical in determining the influence of *lulik*, and so notions of boundaries or prohibitions are necessary to manage *lulik* effectively. *Lulik* guides social interactions and obligations, acting as a source of morality for example in the carrying out of prohibitions (McWilliam et al. 2014; Trindade 2011).

Lulik is also situated in the village, and is not limited to "wilder" places, such as mountain tops or forests. Each clan group belongs to an origin rock or rock outcrop, which is considered the birth place of that ancestral line and gives them their shared ancestral name or *kanaf* (McWilliam 2006b). These sites are considered sacred and are not disturbed as it would bring misfortune to the members of that clan group. Within each hamlet or village there are also sacred or ritual houses, usually one for each origin or clan group, which are used to prepare for rituals and to store

ceremonial objects and sacred ancestral possessions such as swords, disks, necklaces and cloth (Hicks 2008).

Lulik is maintained and exists through relationship. It is not necessarily only the physical place or object that is considered sacred but the relationship between people and place which is powerful. The interaction and maintenance of this relationship brings the sacredness into existence and gives it meaning and form in the present. Thus, while the protection of sacred places and objects may be important, it is understood that it is the ongoing, active relationship to the sacred which creates and determines its strength and significance in contemporary reality. The concept of regarding and interacting with the sacred in whatever form it takes, creates a particular type of relationship and way of being which informs life in a very different way than only viewing reality and the physical world as inanimate.

5.5.2 Manganese as a Sacred Rock

Most respondents were not familiar with manganese before mining began, whereas others, particularly in locations with lots of manganese ore, had noticed it before in the environment as significantly different to other rocks in its appearance and weight. Some respondents mentioned that small pieces of manganese were sometimes used as slingshot ammunition for hunting birds or rounded to make bullets for guns during the past century, some of which I saw in a village near Soe. A few individuals reported that manganese was used by warriors and headhunters for energetic protection in earlier times and pieces of manganese were sometimes kept in the sacred house to protect it. A cultural leader at a ritual centre in TTU still keeps pieces of manganese hidden in particular places to protect the land.

In Locations 3, 5, 6, 8, 9 and 10, approximately half the respondents described manganese as being *le'u* (sacred). This did not necessarily mean that manganese should not be used or mined, but that manganese was recognised as being sacred and should be treated with due respect. The reasons for determining manganese as sacred were varied; sometimes it was due to its physical characteristics such as shape and weight, or to its ability to appear and disappear, or that it came from the earth and had a spirit owner. As a rock, manganese was sometimes referred to in interviews as *Tulang dari bumi* or "the bones of the earth" (L3H3R13, L9H3R1, L10H2K1, L10H4R1) but more often it was given its own category and was described as "the marrow in the bone" (L1H1K1, L2H1K1, L7H4R12) or "the oil/fat of the earth" (L1H1K1, L9H1K4, L9H2R11, L9H3K2), differentiating manganese from other "normal" rocks because of its occurrence in unusual forms such as round disc shapes, heavy weight and dark hue.

For some, manganese was only regarded as sacred when it occurred in sacred places, or only particular manganese rocks were sacred, especially if they were regarded as having "spirit in them". No respondents in Location 4 or 7 described manganese as being sacred, as both of these communities are Protestant and it is considered false or wrong to pray to rocks or the earth instead of a Christian god. In other locations, the concept of what is sacred was relatively fluid and respondents had different perceptions of what they considered sacred and why. This variability in views was not only present in describing manganese as sacred but also in determining sacred places in the landscape.

Some respondents described manganese as sacred because of its physical characteristics. Sometimes particularly large or unusually shaped pieces of manganese were considered sacred. Manganese can also attract lightening and was sometimes called *Faut keneno* (lightening rock) or *Kenfuan* (fruit of the lightening). Manganese is significantly heavier than other rocks, as a manganese motorbike transporter commented, “Manganese is sacred. Look at our broken motorbikes, manganese has the power to break things which are strong” (L10H4R1).

Some respondents spoke of manganese as having an energetic power. This power was often described as being protective, “hot”. “The strength of the earth comes from manganese, even a small piece of manganese is stronger than a large rock” (L9H1R5). In a number of locations the land was described as becoming too cool and unbalanced after mining as the heat, strength and weight of the earth had been removed. The removal of rocks weakens the earth’s structure, so that after mining “the land will become too light and will blow away” (L7H2R8) as if “there is nothing to hold the body of the earth together, it will erode and wash out to sea” (L1H1K2). Manganese is viewed both as a rock that holds the structure of the earth together, and furthermore, as a powerful and unique element of the earth.

Manganese is also thought to have metaphysical properties, such as its connection with rain, the ability to energetically provide protection and most commonly reported by respondents the ability to appear and disappear. The belief that manganese had the ability to materialise and disappear was particularly common across all locations, leading some to determine manganese as sacred because of this, or that it had a spirit owner who controlled the occurrence of manganese not only

geographically but also temporally. Many believed that manganese appears at certain times of the day; consistently respondents across all mining locations reported that manganese was abundant in the morning, disappeared at midday and returned in the late afternoon. It was also commonly expressed that manganese would reappear in areas that had been previously mined. People would often mine in one location and fill in the hole, only to reopen it the following year and find the area full of manganese again, leading them to believe that it had been refilled by the spirit owner.

Many respondents believed that manganese disappeared due to the behaviour and actions of those mining. “When you mine manganese you have to be careful, you have to be quiet and respectful. You shouldn’t shout otherwise the manganese will disappear. If you create trouble or shout or make jokes with other people you won’t find any manganese” (L10H1R2). A number of respondents, particularly in Location 10, commented that manganese disappeared on the land when there was conflict or disputes regarding access or ownership of the land and its resources. How the money from manganese was used also influenced whether it continued to appear; “If you spend the money from manganese wisely and well like giving it to people who need it and to the church the manganese won’t disappear, only if you spend it on wasteful things like alcohol then manganese will disappear” (L10H2R7). In Location 6, snakes were believed to be the spirit owners of manganese and were interpreted as good signs if they were found in a mined hole. “It is important to take the snakes out of the holes but you must be careful and not hurt or kill them as they are the spirit owner. If you hurt them you will become crazy like one of the men did here and the

manganese will disappear. It is a good sign though if there is a snake in your mining hole, it means you will get a lot of manganese" (L6H1R7). In this way, respondents chose to act in particular ways to prevent manganese from disappearing.

In Locations 5, 8 and 9, manganese was also associated with water and also more specifically with rain. Concern about mining was voiced by those who spoke of the connection between manganese and rain. Manganese was said to attract clouds and rain, but after mining, particularly in Location 9, respondents noticed a decline in rainfall which some attributed to the removal of manganese in the landscape. "Now that manganese has been taken out of the ground the rain no longer reaches those hills anymore and it is much drier there" (L9H2R11). Manganese was described by some respondents as aiding the cycling of water, by attracting clouds and also contributing to the evaporation of moisture in the soil. These respondents commented that mining had disrupted the usual weather patterns, "because we have mined all the natural signs for weather prediction (such as the flowering of particular plants or specific patterns of thunder) have disappeared or become confusing and are not clear like before" (L9H2R11). In this view, mining negatively impacts natural rain cycles so that there is less rain and weather events are less predictable.

Manganese was also considered sacred if a particular rock was felt to hold spirit. Once when walking to Location 1 along a dry riverbed, my cultural guide and I came across a large, round and smooth manganese rock. We held the rock and he commented that it had spirit in it and that it felt different to the other pieces of manganese we had found in the river. A respondent from Location 4 remarked that,

“Sometimes when you dig manganese the big pieces feel like they have spirit in them but we can still mine it and sell it” (L4H2R13). Other respondents were more cautious and did not take manganese that they thought held spirit, often for fear of disturbing and angering the spirit and the ramifications that may follow.

Others felt that manganese was not sacred stating “if manganese was sacred people would die from mining it” (L9H2R10). Within this view, having power to cause harm or death is a definitive feature of something that is sacred. As many people were able to mine and sell manganese without harm befalling them, manganese was not considered sacred by them. However, others felt that the unique energies and qualities of manganese rendered it sacred but safe to mine with respect, sometimes requiring rituals, and others avoided mining sacred pieces of manganese but were open to mining manganese they considered not sacred.

5.5.3 Sacred Places and Mining

Particular places are considered sacred for multiple reasons in West Timor, for example they may be considered energetically powerful and dangerous, are the place to give ritual offerings or are the burial grounds of ancestors. Sacred places are often regarded as vital features of historical, cultural and spiritual significance. Because of this, local communities had to decide whether to mine and how to mine near and within places of spiritual importance.

Concepts of what was considered sacred in the landscape differed across the locations. In the Protestant Locations 4 and 7, some parts of the land were still regarded as having “agency”, although to a lesser degree than other locations which

were not Protestant. Again, this varied considerably between individuals at these locations. Some felt that no part of the land was sacred in that it had any particular power or spiritual energy, whereas others were quite aware of particular places that felt different and felt scared and wary at these places, particularly at certain times of the day. There was only one account though in Location 4, of a sacred place being avoided when mining. The miners in that area kept away from the top of a particular sacred hill, but felt safe mining around its base.

In Locations 1, 2, 3, 5, 6, 8, 9 and 10, there were much stronger concepts of the land having agency and being regarded as sacred. Some areas considered sacred were protected from mining, but other sacred areas were subjected to mining as long as the appropriate rituals were followed. Location 9 provides a comprehensive example of different types of sacred places within the same region and how this influenced approaches to mining.

Oepuah mountain at Location 9 is acknowledged as a significant sacred site by the local communities and the broader kingdom of *Biboki*. *Oepuah* mountain looms up out of the sea and is surrounded by ricefields on one side and the sea on the other. Nothing can be taken from the sacred mountain, no trees can be disturbed and no wood or rocks can be removed. *Oepuah* mountain is the feminine counterpart to the masculine summit (*Tapenpah*) in *Tamkesi*, the ritual centre for the *Biboki* kingdom, and together these two sacred landmarks are energetically linked across the landscape to form a connected spiritual-geographical pair. *Oepuah* mountain protects the sea and *Tamkesi* protects the land. "*Oepuah* mountain is connected to *Tamkesi* so that if the *Usif* (high customary leader) dies in *Tamkesi* then their body

will disappear and travel through [the energy line] to *Oepuah* mountain and go through there to the sea. *Oepuah* mountain is like a gateway for bodies to pass out to the sea (L9H1K4).” *Tamkesi* is the centre of many different energy paths that spread out across the kingdom and into neighbouring domains.

The energy path which joins *Tapenpah* and *Oepuah* also connects *Uptasi* - the rain from the sea and *Uptimu* - the rain from the land. This energy line between the two sacred landmarks is used to call for rain from the sea or rain from the centre. “When they want to pray, for example for asking for rain, and it doesn’t happen then they need to go to *Tamkesi* and do the ceremony there, it’s like the connection has been cut and the prayer wasn’t able to travel to *Tamkesi*. When they do a ceremony all the significant places between where they are to *Tamkesi* are spoken, to bring the energy of all these places and their message to *Tamkesi*” (L9H1K4). The energy path can be severed if the geographical landscape is disturbed or damaged, preventing communication of the intentions of ritual prayer reaching the spirit world.

The mine site at this location was directly on the energy path between these two sacred landmarks. Some respondents were concerned that the mine site would disconnect communication between the two sacred mountains and messages in ritual prayer, such as asking for rain, would no longer be able to travel so that rain from the sea could not be called to the land and vice versa. “There are spirit animals that live in the earth between *Oepuah* and *Tamkesi* and they are responsible for taking the messages from the ceremonies between these two places. The animals from the bottom in *Oepuah* will tell the next ones on the chain, in each sacred spot along the connection until they reach *Tamkesi*, and it works in the other direction

too” (L9H1K4). Miners described seeing spirit animals in the mine site, such as large white spirit birds and double-headed snakes, and when this occurred they would perform a ritual sacrifice to prevent any danger from occurring.

The mine site at Location 9 was also considered sacred but not as sacred as *Oepuah* mountain which could not be disturbed. This mine site was one of the largest we saw in West Timor because of the size of the deposit. It was located on open, disused, communal land and miners came from surrounding villages to work there. Even though the mine site occurred on the energy line that connected the two sacred landmarks, the customary leader of the *Biboki* kingdom and the local clan leaders gave their permission for people to mine in that location. However, not all were in agreement of mining there. One ritual leader (L9H2R11) disapproved of mining on that site, but as the leader of the *Biboki* kingdom had permitted mining activities there, he felt that he could not argue with the decision, but was concerned that there will now always be issues with rain in that region.

While some respondents felt that the mine site was not sacred or of particular cultural or spiritual importance, a number of respondents had different connections to and experiences of the land at the mine site. One respondent (L9H1R4) described the mine site as being sacred because they occasionally heard gong sounds near the mine site and saw lights coming down from the hills nearby, indicating that the God of the Earth was present there. One respondent (L9H3R2) said that the area was sacred because people frequently had dreams with signs about the land there, while another respondent (L9H1R13) felt that the mine was sacred because manganese appears and disappears in the mine site. Another respondent (L9H3R1) remarked

that he was unsure why the mine site was sacred but felt that it was special and that the elders had always considered the mining area sacred.

The head of the local hamlet, an elderly man aged 71 (L9H3K2), reported that the mining area was sacred and had been considered sacred long before mining began in 2007. He recalled a storm which occurred in 1982, where lightening struck the area during the night, where the mine site is now located. The ground caught alight and glowed for about five minutes, and the next day the area smelt like sulfur and all the rocks on the surface were black. It is possible that the lightening strike ignited the mineral deposit, causing the ground in that area to glow. Although this event was unusual, the head of the hamlet was open to mining at that location, explaining that the manganese was no longer sacred as it had been "given to them by the land" when they asked for permission to take it through the appropriate rituals. When asked about local sacred areas he commented, "There are lots of sacred places here, like the mangrove area, you can't take anything from there. The sacredness of the sea is usually stronger than the sacredness of the land as the sea is more dangerous and takes more people, the land is friendlier than the water. You can compromise with the land but not with the sea, it's much stronger." Places are regarded as sacred for different reasons, which infer unique and particular forms of sacredness.

Respondents were asked at this location why particular places in the landscape were considered sacred. One respondent (L9H1K4) replied, "You know that a place is sacred when all the hairs on your arm rise, because it contains a magical power or energy and this makes it sacred. These sacred places usually have plants, animals, rocks and water together." Another respondent (L9H1R13) said that all the hills and

mountains in Timor are sacred because they all have spirit guardians. “There is a large rock nearby and there is a spirit person that sits there. If you try to take manganese from there they will ask for it back.” At the same location, a ritual leader (L9H1K4) explained that the danger or sacredness of the land depends on the person and their personal experience, feelings and relationship to particular sacred places.

Mining can destroy sacred sites. At Location 7, the main mine site where the company worked was situated on a steep hillside bordering a small hamlet. The mine site was directly below a sacred site, which included a large rock used for birthing rituals and as the offering place for newborn’s placenta. The mining activities were particularly destructive as the company used excavators on the steep slope, which destabilised the soil, causing the large rock to slowly slide down the hillside into the creek below the mine site. The large rock is now partly submerged in landslide material and no longer functions as a sacred site in birthing ceremonies. Respondents at this location said that they were not aware of the extent of the damage that using excavators on the hillside might cause, having had no previous experience with mining activities on that scale and expressed regret at what had befallen.

There are a number of sacred and significant sites, particularly in TTU, Belu and Malaka, where mining is not permitted. This includes the clan rock and spring (*Faut Kanaf* and *Oe Kanaf*), often present within each village or surrounds, where local villagers trace their lineage to. Ancestral burial grounds are also protected against mining activities, and sometimes old village settlements on rocky and hilly escarpments. As described previously, ritual centres in numerous customary domains are protected from mining, as well as other natural resource garnering such

as timber collection, to maintain and protect the energetic integrity. Decisions to protect these sacred places are made collectively by elders, clan leaders and ritual specialists, and are communally accepted and respected. Key informants explained that if individuals were caught mining on sacred land where mining was not permitted, they would incur a fine, often an animal, food and money as compensation and requirements to perform a ritual to apologise and amend the spiritual "stealing" of resources from the sacred land.

Decisions regarding mining on sacred land can also occur on an individual level. One respondent (L3H3R11) in Location 3 chose not to mine on his land because of the spiritual forces there. Although there was manganese on his land and it could be seen on the surface, the land there held a strong and powerful energy. He explained that the previous family that had lived there had moved elsewhere after the wife began to suffer from mental illness, and they felt that the land was strange and not friendly. When he bought the land unusual events began to happen, his wife did not feel safe there and his son often saw a spirit man entering their house. He decided to do rituals each year on the land, asking in ritual prayer that the spirit there looks after them and does not disturb them. Since then the land has felt safer however he feels that it would not be wise to mine manganese there as it would be spiritually disrespectful and unsafe to do so. Another landholder chose to prevent mining on his land, fearing the negative spiritual repercussions that may be directed not at the miners extracting manganese, but at himself as the landholder responsible for looking after the land. In this way, decisions regarding mining sacred places can be made by landowners at the individual level, depending on what they feel is appropriate.

5.6 Mining with Rituals, Sacrifice and Systems of Reciprocity

5.6.1 Rituals, Sacrifice and Reciprocity in Timor

Rituals and ceremonies are performed to maintain balance and order, and to promote well-being and renewal, sometimes using sacrifice as form of reciprocity. Ritual practices can be "...complex displays, involving oratory, percussive music, song, dance, collocations, sacrificial offerings, food distribution, and feasting" (Traube 1986, p. 178). Palmer (2015, p. 15) describes ritual practices as "...a critical mode of communication with the spirit world which honours and renews the relationships on which all life depends." The concept of sacrifice is essentially based on a reciprocal relationship between humans, or the physical, living realm, and spiritual entities, or the metaphysical, divine realm. Sacrificial practices have been described as a bond of "mutual indebtedness" between the human and the divine realities (Valeri 1985, pp. 66-67). Here sacrifice represents the importance of reciprocity at the intersection of the physical and metaphysical realms, expressed within ritual practice.

Ritual practice is also a form of communication with the unseen realm. Communication is vital to interpret unfortunate events or sickness, and to ensure new activities are accepted or approved of by the ancestors, spirits and higher deities. Prayers, divination of events through interpreting signs in nature and dreams, visions and the reading of sacrificed animal's intestines are some of the methods of communication with the unseen world (Nordholt 1971; Palmer 2015). Through their behaviour and characteristics animals, plants and physical elements also relay messages from the spirit world (Palmer 2015). Sickness is often interpreted as a

message from the ancestors, communicating that they disagree with an event, which can be understood by a *dukun* (traditional healer) and resolved through correct and specific ritual practice.

Depending on the context, rituals often involve the naming of significant sites and reciting of the key clan lineages, as important places are associated with particular clans. The reciting of clan lineages reinforms connection to place and also precedence, which is fundamental in determining what responsibilities belong to different clans. Ritual prayer, a higher form of local language in verse (*natoni*), is used to communicate the purpose of the ritual to the ancestors, spirits and higher deities, informing them of the proposed activity and asking that they give their permission, and that good results ensue safely. Animal sacrifice, usually involving chickens, pigs, cows or buffalo, form the basis of giving life to the spirit realm. Blood, for example from the sacrificed animal, is observed as "a cooling agent and an offering in prayer and traditional forms of sacrifice" which is used "to ensure the success of ritual as well as more secular development projects" (McWilliam 1994, p. 70). Blood and sacrifice can transform heated or potentially dangerous states to "tamed" and calmer circumstances. This is referred to in ritual prayer as *manikin ma oetene,* to make it cool and fresh, inferring safety and fertility. Blood is not always a "cooling" agent and can also be used to create heat and danger. In the case of resistance to marble mining in TTU, the brutal sacrifice of a chicken and the careless spilling of its blood and alcohol on the mine site was intended to bring misfortune on the marble mining company (L6H3K1). In this case, the words *maputu malala*, to make hot and burning, were used to promote danger and destruction. Other offerings are also given

alongside the sacrificial meat, including betel nut, money, jewellery and cooked food. Ritual practice acknowledges that the spirit world has the ability to influence the outcome of planned activities in everyday life and also for more significant life events, as Traube observed "that rites influence the cosmic order is a collectively held, publicly enacted assumption (1986, p. 135)."

Communication through ritual is essential to avoid adversity and to make safely available metaphysical power for human purposes. Taking natural resources without permission or from sacred places, or errors in ritual procedure can result in sickness, misfortune such as famine, crop failure and even death befalling the offender or their family, as a result of angering the local spirits and ancestors or by creating imbalance or disharmony (Campbell-Nelson 2003; Kehi & Palmer 2012; Nordholt 1971). Ritual opening and closing provides access to spiritual or energetic power and "tames" this power so that it can be channelled and directed for specific benefits. This can involve "opening the mouth and the door to the sacred and enchanted realm" followed later by the ritual closing (Kehi & Palmer 2012, p. 448). Opening/closing rituals are also used to lift bans on particular resources or places (Hicks 1996), such as "opening" sacred forest so that natural resources can be taken safely at specific times. Rituals for opening sacred forest may be performed sometimes once a year, or once every 3-5 years and usually allow the collection of forest resources for only 1-2 weeks. The ban is then reinforced, signified by the placement of the skull of the animal sacrificed in the initial "opening" ritual, usually either a buffalo or cow skull on a tree at the entrance to the sacred forest.

Reciprocity is a key element in Timorese culture where "social processes are embedded in and expressed through a complex of reciprocal gift exchange" (McWilliam 1989, p. 217) which extends into the spiritual realm. The maintenance of kinship ties, particularly through marriage alliances and social obligations, is essential in Timorese societies, as these networks provide important physical and social support (McWilliam 1989). The principle of reciprocity is "to maintain stability of the balance of life" (Nordholt 1971, p. 140). Ritual specialists, traditional healers (*dukun*) and elders are trusted by society to cultivate and maintain the reciprocal relationships between the physical and spiritual realms (Palmer 2015). The strong interconnectedness between both realms creates an inclusive sociality based on reciprocity, providing the concept of the cosmos as a living being, where the balance and well-being in one realm influences the other, so that cultivating and tending these spiritual and socio-ecological relationships becomes essential (Palmer 2015).

5.6.2 Mining with Rituals and Sacrifice

Rituals and ritual sacrifice were applied to manganese mining in West Timor in Locations 3, 5, 6, 8, 9 and 10. Manganese mining did not occur in Locations 1 and 2, and respondents in Locations 4 and 7 are Protestant and no longer perform rituals, and if so rarely overtly. What rituals were used, when they were conducted and how often, as well as why they were applied differed across these locations.

Rituals communicate intention and acknowledge the spiritual source of natural resources, and this communication may be viewed by the community as critical to the success of mining ventures. An example of the revered power of rituals was heard in Location 6 when mining first began. A prospecting investor arrived and took some

black rocks from the village to test whether it was manganese, however a buyer confirmed that it was not manganese and did not purchase it. The people in the village felt that it was manganese but that its true quality was “hidden” by the spirits from them and that they needed to first acknowledge the source of manganese so that it would be revealed to them. The clan leaders in the village collected a pile of black rocks they thought were manganese and performed a ritual over the rocks, sacrificing a red and black rooster, and sprinkled the blood mixed with water from a sacred spring, over the black rocks. The next day a buyer arrived and they showed him the pile of black rocks they had collected, which he identified as manganese and he bought all of it. The original investor returned on hearing that there was manganese and has worked with them since. Respondents described this story to us to indicate the importance of ritually acknowledging the spirit source of manganese in order for it to be given to them.

At this same location, the investor was using boring equipment to determine the location of manganese deposits, but the machinery broke down. The elders explained that the equipment had stopped working because a ritual had not been performed to ask permission to expose and give up the manganese in the land. A ritual was performed and the boring activities resumed without further issues. The head of the village reported that after this event the investors always respected the elder’s decisions regarding *adat* (customary practices) and also participated in ritual ceremonies. Similar accounts were given at other locations regarding the importance of using rituals in mining to solve or prevent particular issues from occurring. These

anecdotes illustrate the importance of rituals to respondents in influencing positive mining outcomes.

Some respondents explained that rituals for mining were similar to the rituals used for agriculture, whereas others said that it was more similar to those used for opening and closing sacred forest. As mentioned in the methods unfortunately no rituals conducted specifically for mining were observed or recorded during the field work as mining activities had mostly ceased. Even though we were not able to observe rituals for mining activities, accounts from respondents at different locations suggest that there were similarities and also differences in rituals for mining across the locations. Rituals differed in regard to where they took place, who was involved, what was sacrificed and how often the ceremonies occurred.

At most locations one large ritual at the beginning was carried out, involving most of the community or at least those who wished to mine. In some locations, a large ritual was performed each year, such as at Location 9 where mining ceased during the wet season and the large mine site had to be excavated to remove fallen soil and reopen the mining area. At smaller sites, usually only family members and landowners were involved in the ritual. Sometimes individuals would conduct a ritual independently when something unusual happened such as an accident, a bad dream or sign, or the manganese was running out. One woman (L8H1R6) at Location 8 said that she gave betel nut and food to the spirits during the day at her mine site every time she worked there, to acknowledge their presence and her mining activities.

Rituals are a form of communication and are used to inform the spirit world of the intentions of planned activities and ask for their permission. Communication may

also occur through dreams and may prompt a ritual offering. One respondent described, “If you have a good dream you will find lots of manganese the next day especially if you dream of it being in a particular place” (L9H3R9). So the spirit world can aid or help mining ventures through communicating in dreams. But dreams are not always positive and may be a method of asking for what has been taken. “It will often be clear what we need to do from the dream, and dreams are ways of the God of the Earth communicating that it is ‘hungry’ and that we need to do a sacrifice” (L9H3R9). In this way the land has agency, it can provide assistance but also requests what it needs.

Accidents, although sometimes understood as caused purely by carelessness or bad luck, are often interpreted as retribution by the land and spirits for doing something wrong and not respecting or attending to their needs. Accidents causing injury or even death, can occur as a result of performing a ritual incorrectly, mining in a sacred place or taking a piece of manganese that houses spirit. One respondent described the power of the wrath of the land, “Even a small hole can kill you if the God of the Earth is angry” (L9H1R4). Another respondent (L3H3K3) in Location 3 spoke of a dream where the spirit owner told him that it was wrong to sacrifice a goat for manganese as goats kick up the rocks and dirt. This respondent had previously performed a ritual with a goat sacrifice, and later he was hit by a rock when he was mining and a woman was half buried when a mine collapsed on his land, to which he blamed the use of a goat as ritual sacrifice and corrected it with the sacrifice of a pig. Accidents in mining as unusual events are thus interpreted as methods in which the spirit world communicates its anger or punishment for negligence and disrespect.

There were a number of components within rituals used for mining including traditional prayer (*natoni*) to communicate the intention of mining, involved the sacrifice of animals, reading signs, the ritual offering of food, betel nut, money and other objects to the spirit world, and the sharing of food between those involved in the ceremony. Rituals for mining were often led by the elders, clan leaders or Tobe, and in some locations the Kaiser/Raja or King was also involved. Following the initial prayer, offerings are given, which may include the sacrifice of an animal. Sacrifice is a significant aspect of rituals for manganese mining. "Sacrifice cools down the land so that no unexpected hot energy will enter that place which can make it dangerous" (L9H1K4). Usually at larger mines more animals were sacrificed or those of higher value such as pigs and cows. Chickens were often used in family or individual ceremonies.

Usually rituals were carried out at the mine site, and the blood of the sacrificed animal was spilt directly onto the ground where mining was intended to take place. However rituals were not always performed directly at the proposed mine site. In some situations it was adequate to do a ceremony at the ritual centre or at a significant sacred site which was energetically connected to the mine sites. This was the case at Location 3, where one main ritual was held at one of the sacred sites, which was connected to the land within the village.

After sacrifice, the animal's entrails are read to see whether the intended mining activities are supported or not by the spirit world. It is important that before the ceremony that the community understands and is in agreement regarding the mining activity and there are no points of conflict or significant issues. This is referred to as

nekafmese, ansaufmese literally “same heart, same mind”, inferring the meaning of being in unity, coming together as one, so that all are in agreement and desire the same outcome. Those leading the ritual read the signs in the animal’s entrails, interpreting specific characteristics depending on the type of animal, such as the number of folds of flesh or the presence of scarring or tissue. If a good sign is found than mining can go ahead as planned. If a bad sign is given there needs to be further consideration before mining can be undertaken. At Location 5, one respondent (L5H2R7) described that a bad sign does not necessarily mean they cannot mine, but that the results from mining would not be particularly beneficial, for example that there would not be much manganese and they would not get lots of money even if significant effort was applied. Others interpreted bad signs as indication that there was not unity in the community and that discussions about the proposed mining activities needed to be held so that everyone was in mutual support of the activity and any concerns or issues resolved. Another animal could then be sacrificed and the entrails read to re-determine whether mining could go ahead. In this situation, the entrails are read to signify not only the approval of the spirit world but also the cohesion and unity of the community, which is recognised as a fundamental aspect in ensuring a venture being successful and without conflict.

A number of different rituals took place at Location 9 and are described here to give examples of the types of ceremonies carried out for mining activities. As the mine at this location is large and at the border of two villages, the initial ceremony was significant and involved the wider community. At this initial large community ritual, a black and red female pig was sacrificed as the spirit of the land at the mine site is

female. It was not uncommon at other locations to use a black pig for mining ceremonies, as black was the main colour associated with manganese. The mine site is predominately mined by hand with individual groups working in their own small mining pits within the larger mining area. In addition to the initial ritual, some groups also performed individual ceremonies in their own private mining pits. At this location, respondents usually sacrificed three chickens in the individual ceremonies, described as *maun metan*, *maun mntasa*, *maun muti* (black chicken, red chicken and white chicken). The black chicken was given to the local spirit guardian and ancestors, the red chicken to the God of the Earth (*Uis Pah*) and ancestors, and the white chicken to the God of the Sky (*Uis Neno*). After sacrificing the chickens, members of the individual mine pit ate the meat together and shared it with those in neighbouring mining pits. Sometimes this ceremony would be repeated if the manganese started to disappear.

Often the mining companies or investors would participate in the mining rituals by giving animals to be sacrificed, as well as alcohol, money and food. One respondent commented that investors received most of the benefits from mining instead of the local people because the investors were the ones that had given the animals for sacrifice and the land acknowledged this. The participation of mining companies and investors in mining rituals, however, was appreciated by the local people as it indicated the importance of an outsider working together with community on their local terms, respecting their customs and beliefs. If excavators or boring equipment for determining ore characteristics were used, often villagers would ask the mining

companies or investors that a ritual was done prior to their use so that the machinery would not break down and there would be good results for all involved.

Not all respondents felt that rituals were required before mining. In Location 4 and 7 where the majority of the population are Protestant, rituals for agriculture and life events are no longer performed. There was a group of respondents in Location 7 who explained that before mining they had said prayers, killed a pig and eaten it with the elders at the mining location but denied that it was *upacara adat* (a traditional ceremony). So even though they had adopted Christianity, letting go of their former traditions several decades previously, there was still a need to meet at the intended mining location with the elders, kill a pig and share it together, but also felt that they could not call it a traditional ceremony as this meant they were not following the church. In Location 10, Protestantism has been accepted and traditional ceremonies are no longer carried out for farming. However, when faced with the opportunity to mine, many felt that ritual practice was required to ask permission to take manganese from the earth. As a respondent explained, "Manganese was created by God as everything was, but the God of the Earth is the caretaker of manganese so we need to ask the earth for permission when we mine" (L7H2R2). It is interesting to note that while villagers in Location 10 no longer performed rituals for farming as they attended church, for some, the act of mining, specifically taking something from within the earth, required a return to former traditions where the earth was acknowledged.

In the Protestant Locations 4, 7, and 10 it was more common to pray and donate a percentage of the money from mining to the church, as a form of asking permission

and giving thanks for the benefits from mining, rather than performing customary rituals. At Location 10, ceremonies were occasionally performed for mining but not as widely in Catholic areas, and views on following Protestant or traditional ways were mixed in this community. Giving donations to the church is also a form of reciprocity, offering thanks to a Christian God, who in some cases, is also understood to represent the ancestors and the earth.

5.7 Transforming Beliefs in Response to Mining

As values transform in response to cultural and societal change, so do beliefs, spiritual concepts and ritual practices. This change can be viewed as a loss of previously held morals or ways of adapting to new situations and opportunities. Manganese mining as a new livelihood activity fundamentally requires a different way of interacting with the earth and its resources than farming does. In some circumstances ritual practice and spiritual cosmologies provided a moral framework to accept and guide mining as a new opportunity, while others noted a loss and change in beliefs, and furthermore in some circumstances mining motivated a return of old beliefs and spiritual practices. This section investigates observations by respondents about the cultural loss and transformation in beliefs in response to manganese mining.

5.7.1 Loss of Connection to the Spirit World and Diminished Sacred Significance

There has been a gradual loss in the significance of sacred places, ritual practices and customary power in West Timor through the impact of international trade, colonisation, Indonesian systems of governance, Christianity and current

globalisation (Campbell-Nelson 2003; McWilliam 2001). Many respondents were aware of the cultural losses and change that have occurred in response to these events and contemporary issues, including manganese mining, to various extents in different regions. Some of the changes include the loss of concern and care for the earth in everyday activities. “In the beginning if you just wanted to move a rock you needed to ask permission, but that doesn’t happen anymore” (L9H1K4). Other losses include diminished significance of spiritual power in sacred places. In Protestant Location 4 a respondent (L4H5R7) remarked that “Before 1970s there were some places with strong energies that people were scared of but now no one believes in that anymore.” At the same location, another respondent (L4H2R9) commented “There are lots of sacred places here, there are big trees and big rocks in the village where people used to do ceremonies a long time ago, but I haven’t seen anything special happen there so it’s no longer valid, people can mine there if they want to.” These two statements demonstrate the change that has occurred to the importance of sacred sites, in this location because of the acceptance of Christianity, allowing mining to occur where in previous decades it may not have been. Many respondents were not concerned that mining may contribute to loss or changes in their beliefs. One respondent (L9H2R11) felt that there was still significant interest by community members in being culturally engaged, “Cultural loss might be happening but there are still people who want to know and learn about the cultural ways.”

5.7.2 Adapting Beliefs to Mining as a New Opportunity

Although the loss and transformation of previous beliefs can be viewed negatively, for some, changing their previous spiritual morals provided a flexibility to adapt to mining as a new opportunity. As one respondent (L9H3K2) in Location 9 explained,

> "At the beginning we thought that manganese was sacred and we were a bit scared of mining as we believed that manganese is the 'oil of the earth' [the sweetest or richest part of the earth] so if you take it out and sell it then we thought that maybe our ancestors would become angry with us for taking it out but then we started to think if manganese is in the earth what is it actually doing there, what is its purpose in the earth? Nothing. But if we take it out and sell it then we can improve our livelihoods."

A respondent (L4H5R7) at Location 4 stated that "Before mining we just stepped on manganese, it was worthless, but now it has a function and value." In both of these views, manganese is no longer viewed as having a particular purpose in its natural state, and to allow mining is to open up to new livelihood opportunities. In the Protestant Location 7, a number of respondents justified mining through the biblical story where Jesus made rocks into bread, inferring that it is acceptable to sell rocks from the earth to provide food to eat. At Location 7 a respondent (L5H1R4) commented that "Normally digging holes in the earth is seen as taboo, but as we have done rituals this activity is ok but we still need to be careful." These comments indicate how mining is accepted and held within contemporary religious belief systems, where cultural change is not necessarily perceived as a negative event.

5.7.4 Mining Reinvigorates Cultural Practices and Beliefs

In some cases, mining provided an opportunity to consider contemporary cultural practices and beliefs. For example, in Location 10 because of the acceptance of Protestant Christianity, farmers no longer carried out agricultural rituals, however a number of respondents felt that mining required ritual prayer and sacrifice to the God of the Earth, and not only a Christian God as they were taking resources from within the earth. In this location, mining stimulated the return of ritual practice relating to natural resource use, and the acknowledgement not only of a Christian masculine god, but also of a feminine earth-based being. In the Protestant Location 7, a respondent (L7H2R2) expressed concern for the impact of religion saying, "Christianity makes a border between us and the earth. Why can't we ask for permission [for mining] and respect the earth as our ancestors did?" He was not against mining but felt that through the Christian religion only the masculine god was acknowledged and that the feminine earth god had been forgotten. He felt that a return to previous belief practices, particularly in regards to mining could be beneficial commenting, "Our ancestors lived in nature and everything was related to each other, so maybe we need to go back to those rituals."

5.8 Diversity in Beliefs, Transforming Beliefs and Mining

The beliefs presented in this chapter indicate a diversity of responses to manganese and mining activities, across the ten locations. Referring to the perspectives, values and beliefs conceptual framework provided in Chapter 2 (Figure 2.4), there were some respondents who viewed manganese as a commodity and others who respected manganese as a sacred object. In Location 1, the belief that the whole

landscape and all manganese was sacred was so strongly adhered to that it prevented any mining from occurring. In addition, the strong resistance to mining in this location was due to the locally held view that mining irreversibly damages the wellbeing of the earth and the connection of the community to the earth.

There are views that mining, in any form whether on a small-scale by communities, or on a large-scale by companies, is driven by a particular worldview and set of values, and that these ideologies have broader implications outside of mining. As Merchant (1989) described, in reference to the start of larger mining operations in early Europe, "As long as the earth was considered to be alive and sensitive, it could be considered a breach of human ethical behaviour to carry out destructive acts against it" (p. 3), illustrating that the view of the earth as an animate being was key to its protection, which was the case in Location 1. Furthermore, she wrote "Sanctioning mining sanctioned the rape and commercial exploitation of the earth" (1989, p. 41), and to accept and embrace mining required a complete overturning of the previous moral framework and values which viewed the earth as a nurturing mother.

Natural resources in West Timor are increasingly viewed as commodities and are losing their spiritual significance, including sacred forests (McWilliam 2001). In some cases mining may be contributing to a loss in spiritual connection to natural resources but changes in belief systems are occurring regardless, for example through the introduction of Christianity and globalisation, and so mining as a new livelihood was not viewed by some respondents as challenging existing beliefs. The cyclical worldview framework provided in Chapter 2 (Figure 2.3) shows how beliefs can change within a worldview in response to engaging in a new activity. Many

respondents spoke of being wary taking up mining at the beginning as they were worried what spiritual consequences may ensue. However, after deciding to mine and cautiously attempting mining activities with the appropriate spiritual considerations, many respondents found that they did not experience any negative spiritual ramifications, such as illness or death, and thus on reflection, felt that mining was an activity that the spirit world approved of and so continued to engage in mining manganese. Transformations in belief systems through mining were not always positive, as experienced in Location 8 where mining with an excavator caused a sacred birthing rock to tumble to the bottom of the valley. In this situation, the community chose to mine however on reflection found that the negative impacts of mining irreversibly damaged a sacred site, leading most respondents in that location to prohibit mining with an excavator.

For the majority of respondents from Locations 2, 3, 5, 6, 8, 9 and 10, mining was negotiated within a belief system that viewed manganese as both a commodity and a sacred object. Rituals, sacrifice, dream interpretations, unnatural signs, and keen observations of manganese were all applied to determine whether mining was an acceptable activity and if so in what form. The previous sections presented the diversity of ways in which respondents viewed manganese as sacred or chose to incorporate rituals to negotiate the extraction of manganese. The Protestant Locations 4 and 7, did not view manganese as sacred, although a number of respondents were more cautious, but tended to view manganese as a commodity that they could use for economic gain. In these Locations though, most respondents felt that it was still important to recognise that manganese came from God, and

donations to the Church were frequently given and even churches were built from the profits of manganese, to show gratitude to God for providing for them.

The diversity of beliefs was both present across the locations but also within locations, for example as evident in Location 9 with different respondents reporting various ways in which manganese and the earth was considered sacred. Higher customary leaders were both powerful in supporting mining, in both Locations 6 and 9, and also in preventing mining, as was the case in Locations 1 and 2. Their beliefs and decisions determined mining outcomes across whole kingdoms. However, there was also a strong level of autonomy at the household level for individual landowners to make decisions about mining on their land, based on what they felt was appropriate, such as the landowner (L3H3R11) who prevented mining because his land was sacred and dangerous or the landowner (L3H3K3) that repeated the ritual with a pig sacrifice instead of a goat.

Belief systems were also used to assist in adapting to a new livelihood. Existing ritual practices and spiritual moral frameworks that were relevant for agricultural livelihoods, were applied to manganese mining in order to make it safe and ensure that good results proceeded from mining activities. This study provides an example of how existing spiritual practices can be applied to new situations to assist in adapting to and accepting new life experiences, and in this case new livelihood opportunities.

5.9 Conclusion

This chapter investigated local beliefs, specifically spiritual connection to the earth, concepts of the sacred and ritual practice, which relate to manganese mining in West Timor. There was a significant diversity of beliefs across the locations, which led to different responses to mining, with two locations choosing not to mine, and the majority of locations and respondents engaging in mining but within a spiritual moral framework that took into consideration manganese as sometimes sacred, sacred places and using rituals and ritual sacrifice as a form of reciprocity. There was also transformation of locally held beliefs, where both mining was influenced by existing beliefs and beliefs were transformed by engaging in mining. In some cases, spiritual significance was lost, as in the example of places becoming less sacred, whereas in some situations mining motivated the return of previously practiced rituals. This chapter follows from the findings of Chapter 4, that there is a diversity of responses to mining, in this case based on varying belief systems, and that these beliefs are fluid in that they can change in response to new opportunities. The next chapter concerns mining policies and legislation, and ways in which governance can best incorporate and support the diversity and dynamic nature of locally meaningful beliefs in mining.

Chapter 6: National and Local Governance Systems for Sustainable Manganese Mining

6.1 Introduction

Mineral resources and mining activities in Indonesia have historically been managed and controlled at the national level for national purposes (Wiriosudarmo 2001). The mining industry in Indonesia has supported the national economy, military development and international relations (Devi 2013). However there have been minimal benefits from mining delivered at the local level, and often communities experience the most severe environmental and social impacts from large-scale mining operations (Ballard 2001). Previous chapters in this study demonstrated how ASM, and in this case manganese mining, can be utilised as a livelihood strategy where local communities manage their mineral resources for local benefits, indicating that sustainable outcomes from ASM are possible.

This chapter investigates how manganese mining is currently managed through national and local governance systems and how it can be improved to support sustainable development. The three research questions covered in this chapter include: 1) What national policies and legislation govern manganese mining activities in West Timor, 2) How do local governance systems influence manganese mining activities in West Timor, and 3) What changes need to occur to enable manganese mining to contribute to sustainable development in West Timor? Firstly, current national policies and legislation relating to mining in Indonesia are presented,

focusing on their influence in shaping manganese mining outcomes in West Timor. Secondly, indigenous identity in Indonesia and rights to resources is discussed, particularly in the nation's approach to development, to illustrate the disconnect between high levels of authority and local perspectives and values in the field of natural resource management. Thirdly, local customary governance systems are examined in relation to the management of manganese mining. Lastly, this chapter identifies opportunities at the national and local level to support manganese mining for sustainable development.

6.2 Methods

This chapter combines data from field interviews, community forums and published literature, and synthesises the research from Chapters 3, 4 and 5. Field data includes information from semi-structured interviews with key informants, including government officials at all levels of government and customary leaders, and also with local miners and community members, as outlined in Chapter 2. Information was also drawn from two GPFD program community forums in West Timor that discussed mining issues, including obtaining mining licences, with community members. Interviews with government officials in the mining departments at district, provincial and national level involved discussions regarding past and current mining policies and their influence on the extractive industry in West Timor and Indonesia. Interviews with customary leaders, local miners and community members, provided information on local approaches to the allocation, use and management of manganese within the community, and views on national mining policies where relevant. Information from published literature included peer-reviewed articles,

reports and policy documents, relating to the governance of natural resources, including minerals, in Indonesia.

6.3 Government Policies and Regulations for Manganese Mining

6.3.1 Decentralisation, Mining Licences and Manganese

As presented in Chapter 1, there is a strong national approach to the governance of mineral resources in Indonesia. The mining industry has had, and continues to play, an important role in Indonesia's national economy (Devi 2013; Wiriosudarmo 2001). Because of this, mineral resources have been governed as a national interest and priority, under policies which have typically enabled higher levels of government to exert considerable authority with often minor regard for local concerns (Aspinall 2001; Devi 2013). This approach largely followed the Dutch colonial system that provided government and elites exclusive rights over resources for the development of the national economy (Ballard 2001). Although this approach has strengthened the nation's economy, military power and political relations, the contribution of mining to local development has been negligible. Local communities often experience the most severe negative aspects from mining activities, including land and resource dispossession, environmental degradation and health impacts (Ballard 2001; Wiriosudarmo 2001). This has led to increasing concern for local communities, with calls by NGOs, academics and activists, for better local outcomes from mining, such as adherence by mining companies to Corporate Social Responsibility (CSR) and environmental impact assessments such as AMDAL (*Analisis Mengenai Dampak Lingkungan*), as well as the decentralisation of mineral governance and support for artisanal and small-scale mining (Ballard 2001; Devi 2013; Spiegel 2012). AMDAL

follows the version of weak sustainability outlined in Chapter 1 whereby mining activities are acceptable if the negative impacts are minimised and the benefits maximised.

In the context of manganese mining in West Timor, legislation regarding the decentralisation of mineral governance and systems of issuing licences are particularly relevant. The relevant laws and licencing regimes for commercial and small-scale mining in Indonesia are presented in Table 6.1.

Table 6.1: Mining legislation and licences for commercial and small-scale mining in Indonesia as of 2017 (Devi 2013; Spiegel 2012; Wiriosudarmo 2001)

Legislation	**Description**
The 1945 Constitution (*Undang– Undang Dasar 1945*)	Article 33.3 – "*land and water and natural resources therein shall be utilised for the greatest benefit of or welfare of the people*"
Law 11/1967	Basic Provisions of Mining
Law 22/1999	Regional Autonomy (Decentralisation)
Law 40/2007	CSR and Community Development
Law 4/2009	Mineral and Coal Mining (Revision of Law 11/1967), including Export Ban on Unprocessed Minerals
Law 55/2010	Supervise and Enforce ASM activities
GR 27/2012	Environmental Permit (AMDAL)
Law 23/2014	Local Government (Recentralisation to Province)
Licences	**Description**
IPR (*Izin Pertambangan Rakyat*)	Permit for People's Mining (ASM) (Article 8.1, Law 4/2009)
WPR (*Wilayah Pertambangan Rakyat*)	Area for People's Mining (ASM) (Law 22/2010)
IUP (*Izin Usaha Pertambangan*)	Licences for Commercial Mining - Exploration and Operation/Production (Law 4/2009)

The decentralisation of mineral governance was a product of Law 22/1999 concerning Regional Autonomy, where the authority to issue mining licences was devolved from the national to the district level (Table 6.1) (Wiriosudarmo 2001). While district level governments had the authority to issue mining licences, they were required to do so within the national policies and legislation. Decentralisation of resource governance was aimed at bringing government programs to the local level to meet local needs and conditions, however its ability to achieve these outcomes has been questioned by academics and government staff (Duncan 2007; Li 2002; Sahin et al. 2012).

When manganese mining began in West Timor, the authority to regulate mining activities and issue mining licences was held by district level governments under Law 22/1999. Prior to manganese mining however, mining activities in West Timor were minimal. The mining industry was mostly limited to construction materials such as sand and gravel by local companies, as well as a number of attempts at marble mining in several districts by mining companies (Campbell-Nelson 2003; Dinas Pertambangan dan Energi NTT 2015). When manganese mining in West Timor began around 2007, it expanded quickly across the island to become the most widespread and common form of mining ever practiced in West Timor. The rapid uptake of mining activities by local communities and the sudden influx of many investors challenged local governments to respond quickly to a growing industry, on a scale not previously experienced. There was a need to regulate mining activities and the trade of manganese, but the existing legal framework was not designed for a scenario

such as this and nor was it utilised effectively to manage the manganese mining situation.

There are two main licences for company mining activities; an exploration licence and an operation licence. In contrast the licence *Izin Pertambangan Rakyat - IPR* (Permit for People's Mining) covers ASM activities within a *Wilayah Pertambangan Rakyat – WPR* (Area for People's Mining), so that individuals and groups can hold a licence for mining within a designated ASM region (Table 6.1) (Devi 2013). No IPRs were issued in West Timor for manganese mining for reasons discussed in the following section, only exploration and operation licences were issued for traders and companies involved in manganese mining.

Typically, exploration licences are issued before operation licences and are for the purpose of a mining company to undertake an investigation stage for activities such as geological mapping and mineral sampling, including the completion of a feasibility study, to inform mining activities with an operation licence (Devi 2013). Exploration licences are typically 2-3 years in length but can be longer. After the exploration phase is complete the mining company can apply for an operation licence which permits construction activities, mining, processing, purification, and the transportation and sale of mined products. Operation licences are generally given for 10-20 year periods (Devi 2013; Dinas Pertambangan dan Energi NTT 2015).

However, manganese mining activities in West Timor rarely involved experienced mining companies with long-term investments. Rather the majority of mining activities were undertaken by community miners and manganese was bought by traders at the mine sites and transported out to the cities and ports. Community

miners did not need to undertake geological mapping or mineral sampling as manganese was discovered opportunistically and there was minimal risk or input required to warrant feasibility studies. Therefore, neither the exploration or operation licences were appropriate for regulating the mining situation. Without the authority to rewrite the legislation, the four districts of West Timor (there are now five as of 2012) issued both exploration and operation licences to the mining companies and traders in an attempt to regulate manganese mining activities. But these were not appropriate for the mining situation and moreover the district governments ignored the existing IPR licences specifically designed for ASM.

Each district in West Timor had a different approach to supporting and regulating manganese mining within the existing legislation. The two districts TTU and Belu, were particularly prolific in the issuing of mining licences for manganese mining which included a total of 33 and 42 active exploration licences in TTU and Belu, according to a government report published in 2015 (Table 3.1) (Dinas Pertambangan dan Energi NTT 2015). Similarly, 36 and 42 operation licences were issued and active for TTU and Belu respectively in 2015. TTS district was far more restricted and only had nine exploration and six operation licences active in 2015. Kupang District initially supported mining activities with 38 exploration licences and six operation licences active in 2015 but within the same year called a moratorium on all mining activities in the district. In 2015, a total of 311,881 ha (3118 km^2) of land across the four districts was under a mining licence, covering approximately a fifth of the total land area of West Timor (15,850 km^2) (Dinas Pertambangan dan Energi NTT 2015).

In the district of Kupang, in response to the rapid and mostly unorganised approval of many mining licences, the Bupati head of the Kupang District, ordered a ban on all manganese mining activities in 2012. This included artisanal and small-scale mining by local miners as well as mining activities by mining companies. In a discussion with the Bupati, he explained that the decision to halt all manganese mining activities was made with the understanding that manganese had the potential to create economic growth and development if managed appropriately. He compared the manganese mining situation to the sandalwood industry highlighting that both are local natural resources that have the potential to create economic development in a rural context. However, the unsustainable mismanagement of sandalwood in West Timor has meant that it is no longer a profitable industry and that manganese mining should not follow the same fate.

There were a number of concerns raised by NGOs, mining companies and government employees in regard to the issuing of exploration and operation licences for manganese mining. Concerns included the incompatibility of the type of mining licences with the mining situation, the problem of overlapping licences (*tumpang tindih*) or licences falling within declared forest zones (*Kawasan Hutan*) and the lack of *IPR* licences issued for ASM. The mining licences outlined by national legislation were not compatible with the mining situation in West Timor for a number of reasons. Exploration and operation licences are designed for mining activities undertaken by mining companies. However, manganese mining activities were predominately carried out by local communities with traders typically from other parts of Indonesia or from overseas who bought and transported manganese from

the mining locations to the cities and ports. District governments in an attempt to try to regulate the rapid interest in manganese mining and trade, offered exploration licences to traders and semi-formal mining companies, not for exploration activities but to purchase manganese from villages and sell to buyers who could export the ore (Dara 2014). Even though the exploration licenses were legal, this licence does not officially permit the buying and selling of ore, however it was used to create a guise of legality that was locally accepted in the absence of an appropriate licence. In addition, operation licences were too advanced, expensive and technical for many traders of manganese, and so government employees interviewed reported using exploration licenses as a short-term solution for manganese trade to exist with some degree of regulation.

In interviews with district mining department officials they stated that a number of semi-formal mining companies were issued operation licences so that they could perform basic processing activities such as washing and crushing, and set up a base for manganese trade and stockpile for longer term activities (10-20 years). An operation licence requires the payment of significant annual fees. In 2015 there were 90 active operation licences across West Timor, but by 2017, according to provincial government staff, less than 10 licences were still active, with only three companies carrying out mining operations due to the rapid decline in the manganese market caused by the drop in global price and demand for manganese, and the introduction of the export ban which is explained later in this chapter.

Mining companies, government staff and community members reported that a number of exploration and operation mining licences, issued by district government

departments in TTU and Belu, overlapped with other mining licences and some fell within declared forest zones. This led to conflict between mining companies over designated areas and resources. It is not clear from the interviews how these overlapping licences were issued but likely reasons suggested by mining company managers included inadequate mapping resources, lack of experience and ineffective record keeping due to district departments being under resourced, ill-equipped and unable to effectively manage the rapid proliferation of mining activities. Sahin et al. (2012, p. 302) suggest in regard to governance of manganese mining in West Timor that "much stronger institutional frameworks and processes are needed to ensure transparent and accountable decision-making at the provincial and local level."

There was also concern by NGOs and local communities that no licences were issued to small-scale miners or community mining groups by any district government for manganese mining in West Timor, despite the fact that there are *IPR* licences for ASM that can be issued under existing legislation. No *IPR* licences were issued in West Timor due to a number of factors. Firstly, miners and community members were not often aware of the licensing requirements and how to obtain a licence for small-scale mining as this information was not easily available to them. A number of respondents we interviewed were illiterate and had limited skills in speaking Indonesian, preferring to use their local language. Secondly, miners who were aware of licences for small-scale mining reported that the costs and documentation involved in applying for the licence was outside of their abilities to attain. Some interviewees reported that they had applied for a small-scale mining licence but had been denied by the district government department. Thirdly, there was and still is a strong

tendency for governments to preference external mining investors and companies over small-scale mining, which is not only the case in West Timor but also throughout much of Indonesia (Devi 2013; Spiegel 2012). Discussions with provincial level mining department staff in Kupang revealed that they are not opposed to issuing small-scale mining licences to community miners but prefer to support mining companies because of their expertise in mining activities. The provincial level staff also noted that local community members rarely have enough money and skills to apply for small-scale mining licences. This has led to a situation where mining licences were issued in an often haphazard and rushed manner in an attempt to regulate mining activities and traders to which the licences were not designed. At the same time appropriate small-scale mining licences were disregarded by local government departments.

The somewhat chaotic and ineffective management by district governments over mining activities raised concern not only in West Timor but also in a number of regions in Indonesia following the decentralisation of mineral governance from 1999. This rising concern across the nation was largely fuelled by "inadequate local and regional institutional capacity, local government corruption and capture, the proliferation of local duties and levies, weak local legislation and ineffective law enforcement" (Rusli & Duek 2010, p. 12). In addition, there was considerable confusion and ambiguity regarding the designation of mineral governance responsibilities between the national, provincial and district levels (Spiegel 2012). In 2014, the authority over mining activities was recentralised from the district to the provincial government under Law 23/2014, and by 2017 all district mining

government offices had closed in West Timor. Returning authority to the provincial level was undertaken with the intention by higher levels of government that centralised funding and resources could ensure mining activities could be managed effectively and licenses issued appropriately.

While the reversal of the decentralisation of mining governance was made in response to a number of issues that needed addressing, the change was not well met by district government staff and local communities in West Timor. In 2016, conversations with district level mining government staff at each district in West Timor revealed concerns that provincial level authorities would not have the local knowledge, relationships or concern for community interests in mining activities. Tensions between central and local government authorities are not restricted to West Timor, but have also occurred in other regions of Indonesia in relation to mineral governance where in some cases different levels of government have actively worked against each other (Spiegel 2012).

During fieldwork interviews in 2017 on hearing that the authority of mining activities and licensing had returned to the provincial government, community members expressed distress that their voice would not be heard and that they did not have the means to reach provincial level agendas. In Location 8, respondents fought against the mining company because of the environmental damage that the company's excavators caused. The mining company also used a low price to buy manganese from the local people as they were the only buyers in that region and had no competition, and so the local people felt that they did not receive any significant benefits from mining activities. In interviews with the local community in Location 8,

respondents said that after the recentralisation of mineral governance to the provincial level they now had no chance of securing any compensation for the environmental damage to which the mining company was responsible for, including ongoing erosion that continues to threaten their homes and farming land, as the responsibility of providing compensation now lies at the provincial level of which they have no relationships and is a considerable two day journey away. The management of natural resources in this context demonstrates the challenges of balancing effective and reliable governance that can incorporate local interests and concerns and provide relevant and appropriate solutions at the local level.

6.3.2 The Impact of Law No.4/2009 on the Manganese Market

Another change in mining policies that came into effect during the manganese mining period in West Timor was Law 4/2009 on Mineral and Coal Mining prohibiting the export of raw minerals. Law 4/2009 was passed in 2009 banning the export of unprocessed minerals. This law largely came into effect in 2012. The objective of Law 4/2009 was to encourage mining companies to build infrastructure to process locally mined minerals to value add and create more jobs and revenue within Indonesia.

When Law 4/2009 came into full effect in 2012, manganese mining activities were well underway across the five districts of West Timor. Prior to 2012, unprocessed manganese ore was sent directly from ports in West Timor, usually from Wini, Tenau/Bolok or Atapupu, to smelters in China or initially to larger ports first within Indonesia. Previously, manganese required no processing within the country before export. Prior to 2012 there was open access to the trade of unprocessed manganese ore to a large global market. During 2012, Law 4/2009 was fully enforced and

unprocessed minerals in Indonesia could no longer be exported without some degree of processing. Under the new legislation, manganese ore from West Timor had to be processed into ferromanganese or a similar manganese product such as silicomanganese, which are the compositions that manganese is produced for steel production, before export. There are only a small number of smelters in Indonesia which currently process manganese ore into ferromanganese products, most of which are located in Surabaya. As these smelters can only buy and process a limited amount of manganese ore, unlike the expansive global market, the national market for unprocessed manganese is relatively small, limited and fluctuates significantly depending on the global demand for manganese products.

The enforcement of Law 4/2009 created a bottleneck in the local market for unprocessed manganese. Without a global market available, the national market was flooded with unprocessed manganese from multiple traders and mining companies. The enforcement of this law also coincided with a significant decrease in the global price and demand for manganese products, further decreasing the national market for unprocessed manganese ore in Indonesia, with a number of smelters in Surabaya switching their production to alternative minerals and no longer processing manganese. Towards the end of 2012, mining activities in West Timor began to slow down with investors and traders leaving, and mining companies slowing down production. By 2014, when field work began for this research, most mining activities in West Timor had ceased completely and only a handful of mining companies and traders were still operating.

From 2012, there was considerable discussion between district and provincial level governments with a number of mining companies about the possibility of building a smelter in West Timor. Plans were still being discussed and put forward in 2017 according to a number of news articles and reports (ASIA Miner News 2017; Lewokeda 2017), however there are a number of difficulties in building and operating a smelter in such a remote and underdeveloped location. Mining company employees in West Timor reported in interviews that the cost of building and operating a smelter for manganese is considerable, and smelters use high levels of power to heat and melt manganese. The electricity requirements to operate a manganese smelter are higher than what the power station in the provincial city Kupang can currently produce. In addition, large quantities of iron ore would need to be shipped into Kupang to create a ferromanganese product which would add an extra cost as this is not an industrial port like Surabaya and is considerably more remote.

While Law 4/2009 had good intentions to create jobs and economic growth within Indonesia, it caused the local manganese market to crash and the construction and operation of a smelter in West Timor is probably not feasible. Law 4/2009 also had a negative impact on a number of other mining industries in Indonesia, some of which have been given exceptions and are able to export unprocessed or semi-processed ore, including nickel (Asmarini & Munthe 2017; Jamasmie 2017). Mining companies and local government officials in West Timor reported in interviews that there has been some discussion about lifting the ban on the export of unprocessed manganese and allowing semi-processed ore, such as washed and crushed manganese ore, to be

exported. But no clear decisions have yet been made at the time of writing in mid 2018 and the authority to make this decision is currently determined at the national level by the Department of Energy and Mineral Resources (*Kementerian Energi dan Sumber Daya Mineral (ESDM)*) . Therefore, while this law was introduced with the intention to value add and create local employment, it has achieved exactly the opposite in West Timor and demonstrates that a national law covering all minerals is not necessarily appropriate or effective at the local level.

6.3.3 Illegalities in Manganese Mining

The police, army officials, government employees and mining companies have at times assumed roles in governing manganese mining and trade, with their own interests in mind (Sahin et al. 2012). Respondents reported that it was common for example, for tariffs to be paid to the local police and army officials when manganese was weighed in the villages or when manganese was transported across checkpoints between sub-district or district borders or out of ports. While there is a degree of acceptance by local communities and traders of these additional and informal fees, it did create conflict with mining companies. One mining company official in TTU explained in an interview that while they had followed the formal legal procedures of acquiring mining licences and paid the required fees to government, they still had to negotiate informal tariffs requested by the police and army. Mining company employees reported that the inability of local government to effectively manage the mining industry and the involvement of the police and army exhibited an unprofessional practice which was no longer acceptable in centralised regions of Indonesia.

Although many traders and even a number of mining companies worked closely and well with local communities, as explained further in the following section, there were a few larger mining companies who assumed control over mining activities and land in their licensed region. This was the case in both Locations 8 and 10 where the mining companies rented and bought land from local community members, and bought manganese from miners using a significantly lower price than other locations as they had a monopsony (ie. they were the sole buyer) over manganese in that location. In Location 10, respondents reported that the mining company disregarded local ownership of land and minerals, forcing entry onto several landholders' property and mining without their permission or provision for any compensation. The mining company in Location 10 used army officials from Java to "guard" the land from local landholders while they removed the manganese. The local government employees reported that the mining company owner had links with the military in Java. There has been a tendency for mining companies to use military force to exert control over mineral resources in Indonesia (Ballard 2001). This can lead to create extreme environmental and social impacts, with famous cases such as the Freeport gold mine in Papua, the Rio Tinto Kelian gold mine in Kalimantan and the Newmont copper/gold mine Batu Hijau in Sumbawa, all exhibiting numerous human rights abuses (Alier 2001; Ballard 2001; Ballard & Banks 2003; Whitmore 2006). While there are now laws to protect local communities from the manipulation and control of mining companies, the enforcement of these laws is not effective and there is still considerable vulnerability experienced by local communities over their rights to land and resources.

6.3.4 Indigenous Identity and Autonomy Over Natural Resources

Indonesia as a nation state has historically rejected recognition of its indigenous peoples, choosing to promote national unity over identification of indigenous rights to resources which is reflected in a number of laws and also language used by government (Afiff & Lowe 2007; Szczepanski 2002; Thorburn 2002). The Indonesian government has generally referred to indigenous groups as *masyarakat terasing* (isolated communities) or *orang terkebelakang* (backwards/undeveloped people), and has emphasised the need for their incorporation into mainstream society and politics to achieve national unity (McWilliam 2006a; Porath 2010). The argument given by the Indonesian government against recognising distinct indigenous peoples in Indonesia follows that the entire population at the time of colonisation remained unchanged so that all people in Indonesia were indigenous and there is no need to distinguish any particular group as requiring special rights (Colbran 2011). However there are a numbers of groups who differ significantly from the dominant mainstream society in their worldviews, way of life and beliefs who seek and have the right to seek recognition of autonomy over their culture, society and natural resources (UN 2008).

The term indigenous is somewhat difficult to define in an Indonesian context. Most populations are indigenous in the sense that they are the original inhabitants of their land, at least at the time of colonisation. However indigenous people have been defined more specifically as those who adhere to "subsistence economies, sacred territories or homelands that predate the arrival of settlers and surveyors, spiritual belief systems that predate the arrival of missionaries, and languages that express

distinctive lifeways and worldviews" (Tyson 2011, p. 658). This definition distinguishes indigenous peoples as not only the original inhabitants of a particular place but further emphasises their uniqueness and distinction from mainstream society through culture, livelihoods, belief systems, languages and complex socio-ecological ties to their land and natural resources. Policy makers in Indonesia are ambivalent towards granting special rights of land, natural resources, power and status to indigenous peoples due to fears of political secession and territorial fragmentation (Tyson 2011), and instead attempt to assimilate indigenous societies into mainstream political and social systems. Furthermore this has created a situation where becoming indigenous is viewed as a "a deliberate, highly contested political undertaking aimed at transcending uneven socio-political conditions and economic relations" (Tyson 2011, p. 653).

The Indonesian government's approach to indigenous recognition and rights has been widely criticised. As Colbran (2011) writes "Indonesian law systematically discriminates against indigenous communities, depriving them of their right to own, develop, control and use their communal lands, territories and resources" (p. 92). The national approach has largely been to assimilate and force economic development in a similar fashion to prior colonial powers, intentionally dissolving and remaking cultural spaces to suit a development agenda. This approach is undertaken "for and on behalf of the people" however as McWilliam (2006a, p. 47) argues it leaves "...little formal space for recognising diverse customary land tenures and their normative value systems" combined with "ideological strategies that have often worked to deny the legitimacy of customary or *adat* land law in contemporary

Indonesian society (p. 45)." Development is used in this context as a method to "civilise" where "ethnic or tribal identities, cultural distinctiveness, livelihood practices, and ancient ties to the places they inhabit are presented in program documents as problems, evidence of closed minds and a developmental deficit that a well-meaning government must help them to overcome" (Li 2000, p. 154). In the modern age of development and progress, local communities have been subjected to village standardisation and rationalisation where the "implicit aim was to enable primitive communities to shed their backwardness and participate fully in modern society" (Tyson 2011, p. 656).

Furthermore, during the Suharto era, failure of communities to engage in national development agendas was viewed as "un-Indonesian and as an expression of resistance to the Indonesian state" (Porath 2010, p. 276). Indonesian political powers use concepts including "economic growth", "nation-building", "poverty alleviation" and "sustainable development" to justify intervention and imposition into indigenous lives and ways of being (Gomes 1999, p. 11). There has also been a lack of recognition of traditional forms of governance as Campbell-Nelson (2003, pp. 128-129) argues

> "...contestations regarding resource use must also be understood as contestations over competing legal systems where centuries-old traditional laws governing land use are ignored by the legal system of a comparatively nascent state...indigenous identity as embodied in traditional laws and social institutions is at stake as much as natural resources when the state claims control of the latter."

In recent years recognition of resource rights for *adat* communities has increased, particularly regarding forested lands and forest resources (Myers et al. 2017). This has largely been enabled through the promotion of the term *masyarakat adat* (customary communities or Indigenous Peoples) and the formation of Indigenous rights organisations such as AMAN (*Aliansi Masyarakat Adat Nusantara* – Indigenous Peoples' Alliance of the Archipelago) (Afiff & Lowe 2007; Rachman & Siscawati 2016). In 2011-2012, Constitutional Court decisions ruled that *hutan adat* (customary forest) should be considered outside State forestland and is to be managed under *masyarakat adat* authority, and where the State has control over national forests (*hutan negara*) it must respect and protect the rights of all communities (Myers et al. 2017). In addition, the Constitutional Court ruling established the citizenship status of *masyarakat adat* or Indigenous Peoples as right bearing subjects and owners of customary territories (Rachman & Masalam 2017).

Although there has been progress on the recognition of Indigenous rights over forest resources and territories in Indonesia, this has not yet been transferred to mineral resources. A number of changes to the 2009 Mining Laws are currently being considered including strengthening of community protection by increasing the rights of local communities adversely affected by mining activities, but these changes have not yet been implemented (Sullivan 2018). Large-scale mining in Indonesia provides a number of examples which clearly illustrate the abuse of indigenous peoples and their rights to their resources (Ballard 2001), while the recognition of indigenous rights in the field of small-scale mining in Indonesia is "yet to be closely considered" (Spiegel 2012, p. 198).

6.4 Local Governance Systems and Manganese Mining

While mining licences were issued by local governments to traders and mining companies so that they could legally access particular regions, decisions regarding how, where and who carried out manganese mining activities in West Timor was often made at the local level and involved customary forms of governance. This was particularly the case in villages that only had traders buying manganese from the local people, including Locations 2, 3, 4, 5, 6 and 7, and the local people themselves were the ones who decided where and how manganese should be mined, and also how the benefits from mining were used. This section focuses on how customary forms of local governance and authority, used for farming and management of other natural resources such as forestry products, were applied to manage manganese mining for each of the ten locations. This builds on considerations of belief systems and ritual practice in Chapter 5.

6.4.1 Customary Political Structures – Kingdoms

Customary forms of governance remain central to natural resource management to varying degrees in communities in West Timor. In some regions higher levels of customary governance (eg. kingdoms) played a significant role, such as the Biboki kingdom in TTU where the king is still regarded as a key leader (albeit informal) in giving authority to approve activities in the kingdom, including mining. In West Timor, the king has political authority as well as ritual responsibilities. The economic and spiritual maintenance of natural resources are intertwined particularly in regions where animist practices are still prominent. Locations 2, 6 and 9 were all within the Biboki kingdom. In some of these locations, there were individuals who reported that

they did not want mining activities to occur however knew that it was the authority of the king to decide if and how mining activities should proceed in the kingdom. In Location 1, the king chose not to support any mining within the smaller kingdom, regarding manganese and the earth as sacred, a decision that was respected by the local people and the local government village administration. Other locations did not report that higher customary leaders, such as kings or Kaisers, or the customary political structure of kingdoms were influential in governing mining activities, however it is highly location specific depending on the political composition of each region and their history.

6.4.2 Customary Political Structures – Villages

At the village level there are also different degrees of adherence to customary governance and political structures. The heads of the village (*kepala desa*) and the heads of the hamlets (*kepala dusun*) hold formal political and administrative roles that are recognised within the national governance system. The heads of the village and hamlets are elected locally, appointed by the local community to represent them in political dealings and are responsible for negotiating between the village and higher levels of government such as sub-district and district departments. Officially the heads of the village must have completed secondary education and are also often clan leaders or elders, and so move between both nationally constructed and customary forms of governance (Tjoe 2016).

Generally at the village level the *kepala desa*, *kepala dusun*, clan leaders and elders were the people who approved where mining could take place, particularly in places that were considered sacred or had other valuable assets such as trees and water

sources. They also determined how mining should be carried out, such as banning or approving the use of excavators. Some elders and clan leaders interviewed explained that their role was to oversee manganese mining activities and to deal with any issues that arose. This could include making sure that people did not dig too deep or make unsafe excavations and they dealt with issues of conflict over unclear borders or people mining in other's land without permission. Their role was also to negotiate with traders regarding the relationship between the village and the trader. For example, some villages asked that the trader be involved in the initial ritual to allow mining activities to occur or requested that the trader would first need to connect the village to electricity or running water before allowing them to trade with community members.

6.4.3 Access to Manganese and Customary Land Tenure

Access to manganese deposits followed the customary land tenure system that was already in place within each village for the allocation and use of other natural resources such as agricultural and forestry products. Land is traditionally not bought and sold although it is becoming increasingly common to do so, but in the locations visited, particular clan leaders or *Tobe* (customary village administrators) have the authority to allocate land in the village to community members to use for farming and other livelihood activities such as forestry.

Within a village there are different forms of land tenure, including land that belongs to an individual/household or to a clan, land that is for communal use or land that is designated as sacred land to be protected. The land tenure type determines who has the authority over what activities occur on that land. With regards to manganese

mining, where manganese occurred on individual or household land, the landholder was the one who determined where mining activities could occur (e.g. in their garden, near the house) and what mining activities were acceptable (e.g. mining with hand tools only to a certain depth or use of an excavator). For example, a respondent (L4H5R5) in Location 4 described how he chose to mine on his land so that the land would become more fertile for farming after mining had removed the manganese from the soil. Often the landholder and their household were the only ones that mined on their land, however it was not uncommon for other community members or relatives from within the village or from other villages to mine on other's land and split the profit with the landholder. In this situation the landholder had the authority to determine where mining activities occurred and what mining activities were acceptable (eg. mining with hand tools only).

At most locations, all the land in the village had been previously divided up and given to individual clans or designated as communal land, with respondents reporting that the borders for each type of land tenure was already clear in the village before mining began. There were a number of incidences of minor conflict regarding unclear borders and people mining on other's land without permission, however this was rare and generally most community members had access to manganese. In Location 3, 4, 6, 9 and 10 communal land with manganese deposits was available for community members to mine on if they chose. Sometimes communal land was a large open space, but it could also commonly include forest edges, hilltops, creeks and roadsides. On clan or communal land, it was the authority of the clan leaders,

elders and/or village administration which determined what type of mining was acceptable (eg. mining with hand tools only or the use of an excavator).

There were various ways in which sacred land was protected from mining activities or permitted through the use of rituals, depending on the type of *le'u* or sacredness. Whether mining should occur at these places and what ritual was required if mining was approved was a decision made by ritual and clan leaders. In some cases, individual landholders performed a ritual on their own land if they felt that it was necessary and some invited a ritual leader to attend but it was the landholder's decision to do so.

6.4.4 Customary Forms of Governance at each of the Mining Locations

No mining occurred at Location 1 because the king of that region declared that all forms of mining were prohibited. The king's decision was respected by those we interviewed in the location and also by community members in neighbouring regions. The location is well-known for its resistance to modern ways of being and incorporation into a national identity (Suddin 2017).

In Location 2, mining was prohibited within the ritual centre as ruled by the ritual leader of the Biboki kingdom. However the ritual leader gave permission for mining outside of the ritual centre in other regions of the kingdom, including Location 6 and 9. It was up to individual landholders though to decide if they wanted to mine on their own land, and some respondents we talked to within this kingdom chose to mine while others chose not to mine because of their values and beliefs.

In Location 3, most mining occurred in communal areas, including along the creek line and roadside edges. There was one landholder we interviewed who had a community members mine on his land. He described having the authority to determine where and how people mined on his land and negotiated to receive a portion of the profit from their mining activities. Respondents in this village reported that the permission to use an excavator on any land in the village was under the authority of the elders and clan leaders, as the village is located on a slope and excavated land would impact others below. Clan leaders and elders had previously refused a request by a mining company to explore coal mining in their village lands because of the environmental damage it may cause.

In Location 4 most households had access to manganese on their own land so that decisions regarding where and how mining occurred was generally made at the individual/household level. A number of respondents took the initiative to rehabilitate their land after mining by planting bananas and coconuts in mined areas. Manganese deposits were also available to community members on communal land. In this location, the village administration implemented a village tax that was paid for by traders and used for building meeting halls and improving the roads in the village. Each hamlet also took a portion of the profit from traders to put towards building churches in the village. This location indicates how mining activities and the benefits from mining were negotiated at various levels, including individual/household, hamlet level and through village administration.

In Location 5 manganese only occurred on individually owned land of a small number of landholders and so ritual and clan leaders were not involved. No manganese

deposits occurred on communal land. The decision to mine and what type of mining activities occurred was made by each landholder individually, with some choosing to mine manually only, while one respondent we interviewed chose to use an excavator. In Location 6, most mining occurred on communal land and was given approval by customary leaders.

In Location 7 the majority of mining occurred on a prominent landholder's territory and he negotiated where and how mining should occur, and channelled the profit to community projects, including building a large church and paying for scholarships for local students to complete tertiary education. Customary leaders were also engaged in overseeing mining activities to ensure safety and resolve any conflict that arose.

In Location 8 some mining took place on people's own land under the landholder's authority, but most mining was under the control of a significant mining company. Respondents felt that they had limited power over how and where mining activities occurred, and reported damage to their sacred places, agricultural land and water courses caused by mining activities. The local Catholic church, NGOs and some local government administration in this location were central in rallying community members to protest against the mining company.

In Location 9 the main mining location was situated on communal land. Permission was given by the customary leader of the Biboki kingdom and later rituals were performed by local leaders in the village. Access to the mine site and to particular parts of the deposit were determined on a first come basis with sole access to a mining hole given if ongoing presence and use of that area was maintained. Several customary leaders, *Tobe* and village administration oversaw mining activities, dealing

with issues of safety, ritual practice and any conflict. Even though a mining company was present at the mine site, the mining company did not exert control over mining activities and engaged minimally in mining operations, mostly acting as a trader that was constantly present in the location.

In Location 10 mining activities were wholly controlled by the mining company, using army officials to instil fear and guard land and resources. An initial agreement for the company to operate and the terms of this agreement were set up by a local parliamentary figure. The price of manganese was set very low (200 IDR per kilogram [AUD $0.02]) so that it was difficult for community members to earn an income from mining, while landholders and the mining company received most of the benefits. This unequal distribution of wealth led to considerable conflict where local NGOs and the church were involved in staging protests. A number of customary leaders and local government administration reported that they were not able to be involved in the management of mining activities in this location because of the mining company's considerable power.

In summary, the forms of customary governance applied to manganese mining indicate that there are various ways in which local communities are managing mining as a new livelihood opportunity. The locations have different modes of governance depending on the local political situation which allow for meaningful and appropriate management decisions to be made by the community whether it be to resist mining or mine with particular precautions such as hand mining only or protecting sacred land or valuable resources. Unfortunately, customary forms of governance over

mineral resources are not strongly supported in the legislation, inhibiting the potential of ASM to contribute to locally relevant outcomes.

6.6 Bridging National Policies and Local Autonomy for Sustainable Outcomes

The above discussion illustrates some of the difficulties in achieving sustainable outcomes from manganese mining for local communities. These include the current national and provincial policies and legislation and limitations, where customary forms of governance and mining livelihoods are not formally recognised or supported. It is not only a legislative issue that is limiting sustainable outcomes but also an issue regarding the current discourses within formal governing bodies that continue to preference large-scale operations for national benefits over small-scale mining for local development and continue to view ASM as an "illegal" activity (Spiegel 2012). The policy environment is a "competitive political space" where in the case of manganese mining stakeholders from large international corporations, government bodies, police, local private businesses and community groups are all "seeking to influence the ways in which policy is enacted, enforced and/or overlooked" (Sahin et al. 2012, p. 302). This section aims to tease out the current discourses affecting support for ASM, both globally and in Indonesia, and four ways in which this could be shifted to promote greater autonomy and sustainable outcomes from mining at the local level in Indonesia.

Firstly, the language used to refer to ASM needs to shift from negative associations such as "illegal" that construes ASM as an activity outside the legal framework. Lahiri-Dutt (2004) recommends using "informal" as a more appropriate term to refer to ASM activities that may not yet be legally approved or if it sits within a blurry

classification. There is a strong tendency in Indonesia to view artisanal and small-scale mining as an "illegal" activity that should prevented. This is largely due to the focus on the associated negative issues including the environmental and social impacts that ASM can create as well as conflict that can arise between ASM and large-scale mining companies. The fact that ASM is not often regulated through licensing procedures leads it to be defined as "illegal" by default. The approach to deal with ASM in Indonesia has largely focused on halting and deterring small-scale mining operations to try and prevent some of the negative environmental and social implications. Spiegel (2012, p. 202) argues that the focus of dominant discourses on deterring and controlling ASM activities through law enforcement has perpetuated "a more fundamental development problem: the failure to assist rural workers in their livelihood trajectories." While the negative impacts, such as significant mercury pollution from small-scale gold mining, require addressing this hard-lined approach is not necessarily effective or in the best interests of local mining communities. As Spiegel (2012, p. 198) observes "Generalized discourses stressing a culture of 'anarchy' are not only frequently applied to describe small-scale mining; they are often done so in ways that narrowly localize blame to the level of rural individuals."

ASM is also still regarded as a sensitive topic in Indonesia. There were considerable difficulties in obtaining a research visa for this study due to its focus on ASM which was frequently referred to by multiple levels of government as an "illegal" activity despite the fact that ASM does exist within the legal framework. In Indonesia, miners engaging in ASM activities are frequently referred to as *PETI – Penambang Tanpa Izin* translating as "Miners Without a Licence", in other words "illegal" miners (Devi

2013). ASM in Indonesia is frequently perceived by donors and governments as "dirty" and "far less fashionable" than other rural income generating sectors such as agriculture (Spiegel 2012, p. 201). Furthermore, large-scale mining companies have mostly influenced policymaking processes in Indonesia, in conjunction with national power dynamics such as the political forces which perpetuate uneven economic distribution of profits and skewed preferences regarding mining involvement, which in combination continue to "prevent the development of a system that enables the formal legitimisation and regulation of small-scale miners' livelihoods (Spiegel 2012, pp. 200-201)."

In addition, ASM is caught between two agendas where it is seen as an activity that interferes with the higher profit producing large-scale mining industry, while it is also discouraged by a number of anti-mining NGOs and activists, both of which deny rural communities the right to determine the use of their local resources on their own terms. While the anti-mining movement has its role in protecting local communities from the negative impacts of mining, it can also act to deter communities from engaging in ASM even if the mining activities are within the values and desires of the local community. This was observed during fieldwork in West Timor, where a number of local NGOs and anti-mining activists discouraged communities from mining, and while the anti-mining movement can provide much needed support for those who wish to resist mining activities, it is important that communities who do wish to mine can do so without disapproval.

The negative discourse and views of ASM from government, NGOs and mining companies are powerful and prevent the legislation supporting ASM to actually be

implemented and the positive contributions of ASM to be realised. A number of studies in recent years have reported the importance of ASM as a vital source of income generation for rural populations in Indonesia and have suggested that resource rights and governance approaches should be more supportive of ASM activities for poverty alleviation agendas (Aspinall 2001; Dara 2014; Lahiri-Dutt 2004; Langston et al. 2015). Spiegel (2012, p. 201) calls for a "more disaggregated and multi-dimensional notion of the mining sector to "appreciate the diverse participants who depend on small-scale mining for income." ASM is a diverse sector, even within West Timor there are widely varying approaches to manganese mining at a community level, and conservative estimates suggest the industry involves many hundreds of thousands of Indonesian citizens (Aspinall 2001; Hentschel et al. 2002; Ismawati 2014).

Secondly, there needs to be more awareness of the positive contributions of ASM as experienced by local communities. This PhD study provides a strong case of how local communities have utilised ASM to improve their livelihoods, within their existing customary governance systems, while taking the initiative to address the relatively minor negative environmental and social impacts and demonstrating that the management of manganese mining is well within the capabilities of local communities. Increasing the awareness of ASM is important to transform current perspectives by supporting NGOs such as APRI that provide assistance to small-scale miners in Indonesia to address the impacts and apply for licences, and to hold events such as the international conference held in Jakarta in November 2016 on "*Community Mining in Indonesia: Minimising Harm, Maximising Benefits"* as a

collaboration between various universities, government departments, NGOs, researchers and community miners.

Local mining communities in West Timor are being held back by the negative representations of ASM, due to the significant lack of acknowledgement, understanding and concern for the potential and existing contribution of ASM to rural livelihoods. Miners in interviews in all mining locations visited spoke of how they wanted to be formally and legally recognised by government departments, and to be assisted in using better mining technologies, constructing more effective relationships with traders and providing access to clear and stable market prices.

Thirdly, there needs to be acknowledgement of local resource rights. Spiegel (2012, p. 202) argues that "Civil society organisations and government agencies should pursue development planning in ways that do not marginalise poorer workers... by championing property rights systems that privilege powerful elites at the expense of local rights claims." He identifies three main intersecting rights of individuals and communities in the field of mining including "The right to livelihood opportunities and the right to manage local resources", "The right to fair and inclusive community governance" and "The right to live free from the negative impacts from mining" (2012, p. 199). Although there are various policies and legalisation designed to protect local communities they are not necessarily enforced, as evident in Location 8 and 10 where communities were and continue to be subjected to various negative impacts from mining activities imposed by mining companies. Furthermore, the right to livelihood opportunities and to manage local resources using community

governance has not been formally recognised or supported in regard to manganese mining in West Timor, or even more broadly to mineral resources in Indonesia.

Finally, following acknowledgement of the positive aspects of ASM and local resource rights regarding mining, there needs to be further emphasis on supporting ASM not only in national policies, but in the actual implementation of the legislation. Although *IPR* licences exist specifically for ASM they are not often issued, as demonstrated in West Timor. In addition, while there has been recent revisions to mining laws Spiegel (2012, p. 201) highlights that in Indonesia there is "no policy framework for how to develop small-scale mining through 'community management.'" Recent global movements have suggested that formalisation of the ASM industry could be an effective approach to address and monitor the associated environmental and social impacts. In his paper on farming, small-scale mining and rural livelihoods in Sub-Saharan Africa, Hilson (2016, p. 561) argues that "ASM is in the state it is – environmentally-degrading, unpredictable in its growth and associated with numerous social 'ills' – because of policy: its perpetual informality is a response to stifling regulatory frameworks." Siegel and Veiga (2009, p. 51) define formalisation as "the means of absorbing existing customary practices – developed informally by miners – into the mainstream of a country's legal and economic affairs." Licensing ASM activities through formalisation procedures is intended to enable more accountability, recognition and initiative at the local level to take up more environmentally friendly and socially positive methods of mining.

In other forms of ASM, formalisation was found to decrease negative environmental and social impacts, including reducing mercury use (Spiegel et al. 2015). Although

most negative impacts of manganese mining managed by communities were minor and within the ability of community members to address, if specific guidelines and recommendations relevant to manganese mining in West Timor were outlined in the licensing procedure, this could promote better outcomes including rehabilitation techniques, safe mining practices and conflict resolution. In addition, the benefits from mining could be managed far more sustainably through regulation, where income was accounted for at all levels and channelled into community development and higher up through enhancement of the industry itself by improving roads and infrastructure to better connect traders to communities and aid transport of manganese to the ports.

Spiegel (2012, p. 189) asks the pertinent question, "What implications does the *non*-recognition of poorer populations' mining rights have for the management of environmental resources and informal livelihoods, particularly in contested areas where unlicensed mining – by indigenous and migrant workers – may be seen as an essential source of income?" In a study in 2012, he provided the advantages and disadvantages of developing processes to permit ASM operations in Indonesia. Some of the advantages of issuing permits identified in the study included increased knowledge about mining populations, ability to promote ASM training and regulatory measures and respond to citizen enquiries, increase in taxes received by government departments, no loss of local jobs, cooperation and proactive government responses in dealing with environmental and natural resource issues, and increased certainty for future investment and livelihood planning. Some of the disadvantages in this approach included the time and resources to implement the programs and

processing of permits, and that policies and legislation are meaningless and even counterproductive if there are no programs in place to assist workers to comply (Spiegel 2012). Although the negative impacts of manganese mining described in Chapter 4 are not as extreme as other forms of ASM, changes to policy and the implementation of legislation and licences could greatly transform the ability of manganese mining to contribute to sustainable development.

Studies have also found that licences for ASM are often too expensive and difficult for small-scale miners to obtain, including in Uganda (Siegel & Veiga 2009) and Ghana (Macdonald et al. 2014; McQuilken & Hilson 2016). Licences for ASM need to be appropriately priced and designed to meet what is achievable for small-scale miners who do not have the resources or skills of large-scale mining companies.

The demarcation of land specifically for ASM activities, known as WPR (*Wilayah Pertambangan Rakyat* – Area for Peoples' Mining) could also aid in the recognition and regulation of community mining in West Timor. No areas were classed as WPR in West Timor for manganese mining. Because manganese deposits are so widespread and common it may be more trouble than it is worth to demarcate specific areas. However, it may aid in defining what communities are open to mining with a mining company and those who wish to mine independently and sell to traders.

Recommendations from respondents across the locations they can pursue mining livelihoods more sustainably included:

1. Regulation of the price of manganese by the government, set at a minimum of 1000 IDR (AUD $0.10) per kilogram
2. Improved connection with traders to allow consistent, reliable and positive trade relationships
3. Support from NGOs to apply for community licences, address negative impacts such as rehabilitation to prevent erosion and management of finances to enable long-term benefits from mining income (such as purchasing solar panels)
4. Improved control of mining companies, including holding them accountable for the negative social and environmental impacts of mining inflicted on local communities, and ensuring long-term and meaningful benefits reach the communities involved
5. The establishment of local mining associations where miners can share experiences, knowledge, resources and recommendations.

Although some respondents were open to working with mining companies, the significant majority strongly preferred that mining activities were governed and carried out by their community.

As much as it is necessary to support small-scale miners it is also important that communities and individuals who do not want to mine or do not want mining activities to occur on their land are protected. In both Locations 8 and 10, mining operations carried out by mining companies continued despite community protests and army officials were used to defend mining activities on land that had not been given by landholders. This is a breach of local rights and mining companies need to

be held accountable for both the social and environmental impacts of their operations. Although indigenous rights have made some progress in the field of forest resources and management in Indonesia in recent years (Myers et al. 2017), this movement has not yet included mineral resources to the same degree.

From 2014, recentralisation of mineral resources from the district to provincial level was enforced. This change was not welcomed by district governments or local communities in West Timor due to concern that provincial government, while having increased resources, do not necessarily have knowledge and understanding of local situation and the communities' needs and values. It is also far more difficult for community members to communicate with provincial government than the local district departments. Management therefore needs to involve both provincial and district level governments so that both local knowledge and connections as well as adequate resources to manage the industry are combined to enable sustainable outcomes for manganese mining.

6.8 Conclusion

This chapter investigated the national and local governance systems which influenced manganese mining in West Timor, Indonesia. This chapter shows that the policies and legislation of mineral resources in Indonesia, in particular manganese, have fail to support the contribution of ASM as a sustainable livelihood. The importance of local beliefs and customary governance to enable meaningful and sustainable outcomes show a diversity of approaches and management of manganese mining by local communities. Indigenous identity in Indonesia and rights to resources, particularly in the nation's approach to development and mineral

governance, was presented illustrating the disconnect between high levels of authority and local perspectives and values in the field of natural resource management. Recommendations to enable sustainable outcomes from ASM include shifting the view of ASM as “illegal”, acknowledging the positive contributions of ASM as a livelihood, recognising local rights to mineral resources and adapting and implementing the current legislation, including *IPR* licences to regulate and support ASM.

Chapter 7: Conclusion

7.1 Introduction

This thesis has investigated the perspectives, values and beliefs of rural communities regarding the role of manganese mining in contributing to sustainable livelihoods and development in West Timor, Indonesia. Mining is a significant industry in Indonesia however local people's values and beliefs are not often considered in the management of mineral resources.

Four research objectives (and associated research questions) were considered:

1) To investigate the distribution, practice and characteristics of manganese mining in West Timor;
2) To analyse the range of perceptions and values which define the role of manganese mining as a livelihood strategy in contributing to sustainable development in West Timor;
3) To investigate how local beliefs influence different approaches to manganese mining;
4) To investigate opportunities to support manganese mining for sustainable development at the national and local level.

The perspectives, values and beliefs of rural communities towards manganese mining were investigated across ten different locations. Data collection methods included semi-structured and key informant interviews, field observations and secondary data obtained from reports, government documents and published literature. Both quantitative and qualitative data were collected and analysed. Two

conceptual frameworks, a cyclical worldview framework and a perspectives, values and beliefs framework, were used to analyse and present the diversity and dynamic nature of local worldviews applied to manganese mining. The sustainable livelihoods framework was broadly applied to assess the current livelihood situation, and investigate manganese mining as a livelihood strategy, within current agricultural livelihood contexts. The research results provide an in-depth and multi-disciplinary understanding of the diversity of local worldviews in West Timor regarding the importance of manganese mining to rural communities, the benefits and impacts on livelihoods and the environment and the legislative changes required to incorporate and support manganese mining as a livelihood for sustainable development.

This chapter summarises the key findings of the research and conclusions based on the assessments of Chapters 3, 4, 5 and 6, addressing each of the research objectives. Recommendations for mining activities in the future, policy considerations and stakeholder involvement are then provided. Suggestions for further research are also presented followed by concluding comments.

7.2 Key Findings and Conclusions

The first objective of this thesis was to investigate the distribution, practice and characteristics of manganese mining West Timor. This included comparing manganese mining with other forms of ASM. The findings of this objective and research question were provided in Chapter 3.

Question 1: How is manganese mining currently practiced within local worldviews in West Timor and how does it differ from other forms of ASM globally?

Manganese mining was found to be practiced widely across West Timor, occurring commonly across the five districts, starting around 2007 in most locations investigated in this study. Although manganese mining operations had largely ceased when field research started in 2014, due to the enforcement of the export ban on unprocessed minerals and the fall in global demand and price of manganese, mining was still active in Locations 9 and 10 during field work. The potential for mining to return remains if the price and demand for manganese rises and legislation regarding the exportation of unprocessed minerals from Indonesia is lifted.

Manganese mining in West Timor is largely managed by local communities and mining techniques employed are mostly manual. Manganese mining is particularly well suited to artisanal and small-scale forms of mining because the ore deposits are typically small, common, alluvial and occur sporadically across the landscape. Manual mining involved collecting manganese from the soil surface or from river beds and digging out manganese using hand tools. This was the most common form of manganese mining in West Timor and was the predominant form of mining at 5 Locations (3, 4, 5, 6 and 7). Medium-scale mining also occurred at three locations where a mining company was present (Locations 8, 9 and 10), and in these locations heavy machinery was used to excavate manganese ore.

The price and market of manganese is largely determined by global demand from India and China and fluctuated considerably from 2007-2017 impacting local prices in West Timor. The average price of manganese in West Timor started low, reaching a peak in 2011 and then fell with the drop in global demand and the introduction of the ban on exportation of unprocessed minerals from Indonesia. Different prices for

manganese were also experienced across the mining locations, influenced predominately by the remoteness of the mining location, the quality of the manganese and the number of traders present at the location.

The majority of miners were local and mined on their own land, or land within the village. Traders generally bought manganese directly from local people, and were not usually involved in the mining activities, transported manganese from the mining location and sold manganese to larger traders and mining companies in the cities, or exported to international buyers. In locations where few or no traders were present, *OBAMA* carried manganese out of the location to traders in larger towns, cities or harbours.

Manganese mining differs significantly from other forms of ASM. Generally, the economic benefits (discussed below) from manganese mining are more stable than other forms of ASM including gold mining, and the negative impacts, such as pollution, conflict and exposure to mercury, are less severe. While manganese mining falls into the category of ASM it is not as directly associated with some of the common push and pull factors, such as major conflict and natural disasters, and significant negative impacts that typically feature in other forms of ASM.

Question 2: How is manganese mining viewed as livelihood strategy in West Timor, what associated benefits and negative impacts are of concern to local communities and how can manganese mining contribute to sustainable development?

The second research question of this study findings were presented in Chapter 4.

Subsistence agriculture is the main livelihood option in West Timor, however the ability to intensify agricultural production is restricted by low and irregular rainfall, low soil fertility and high levels of erosion, which may become more extreme with climate change. In addition, education levels, physical capital such as roads, clean water and infrastructure, and financial capital are low across West Timor, particularly in rural and remote regions. It has therefore been suggested that rural communities diversify out of farming into other livelihood alternatives (McWilliam 2002).

In this context, manganese mining has proved a popular new livelihood option. The ore deposits are widespread, common and often close to the surface, and so can be mined with relatively little investment in tools or skills training. Significant vulnerabilities that inhibit manganese mining as a livelihood are the fluctuations in global prices, the dependence on connections to the global market through traders or mining companies, and the changes in mining policies and continued informality of the ASM industry.

Manganese mining was commonly combined with farming so that the two livelihoods complemented each other. Community members swapped between farming and mining activities during the year and farmed in mined areas. Income from mining also reinvigorated farming livelihoods where respondents purchased small livestock and agricultural land. While some respondents reported preferring farming, others chose to mine more frequently than farm, however the majority of people interviewed combined both livelihoods. Those who chose not to farm and only mine experienced difficulties with obtaining food and income when manganese prices dropped and mining activities ceased.

The main benefit from manganese mining was income, however some respondents also benefitted from skills and employment particularly where mining companies were present. There were multiple ways in which respondents reported using the income from mining at the individual and household level. This diversity in income uses was influenced by the amount of manganese that could be mined and sold in that location, but also varied due to respondents' values in how they wished to channel the income. Income from mining was generally well distributed in each location except for Locations 8 and 10 where mining companies used a low price for manganese and only landholders received significant levels of income. Most commonly respondents used income from mining for every day subsistence needs and school costs. Where income from mining was higher it was used for purchasing livestock, household goods and house improvements. If the income was significant, respondents purchased motorbikes, paid for university degrees or bought land. The income from mining assisted in alleviating vulnerabilities such as food insecurity particularly in difficult farming years and supported education at various levels where farming livelihoods could not provide adequate income for school and university costs.

There were also benefits from manganese mining at the community level. In two locations (4 and 7) a portion of the price paid by traders was put towards community development such as building churches, village offices and improving roads. Respondents often reported that mining gave them financial independence and was empowering because of the positive changes it had on their wellbeing. Some of the mining companies also provided some community benefits such as clean water,

donating generators and transporting children to school, however these benefits were not long term and ceased when mining operations stopped.

Compared to other forms of ASM, manganese mining was associated with relatively low negative impacts as manganese is not toxic and does not require processing. For mining conducted by community members using hand tools both the environmental and social impacts were minor, with only a few incidents of erosion, accidents and conflict of concern to respondents, which were within the community's ability to address. The negative impacts from mining involving companies and heavy machinery were far more extreme and common with major erosion, pollution and conflict reported by respondents that was outside of the community's and mining company's ability to address. While the negative impacts from mining manually are not ongoing, serious erosion and conflict still prevail in Locations 8 and 10 caused by company mining with heavy machinery, even where mining activities have ceased. Because of this, most respondents across all locations gave preference to mining manually within the community rather than mining with a mining company and heavy machinery. In Location 1, and for a number of individuals in other locations, mining was not viewed as a positive activity because of the spiritual damage it causes to the land and also to the relationship between people and the earth.

Therefore, a diversity of ways were observed in which manganese mining was viewed as a livelihood option across the locations, and what benefits and negative impacts were of concern to local communities. Perspectives and values regarding mining were also dynamic in that as respondents experienced mining their understanding and views of manganese mining as livelihood shifted, potentially leading to different

approaches if mining was to return in the future. The contribution of mining to sustainable livelihoods differed depending on the context, in particular the way in which sustainability was understood through local perspectives and values, and the balance between the positive and negative impacts.

Question 3: How do local beliefs influence different approaches to manganese mining practices and how are they changing because of mining?

The third research question investigated local beliefs, in the form of relationships to the earth as a living being and concepts of sacredness, in influencing approaches to manganese mining and also how beliefs were changed through mining. The use of ritual practices to permit and enhance mining activities was examined. These issues were explored in Chapter 5.

In West Timor, the earth is considered a highly multi-faceted spiritually active landscape, alive with ancestors, spirit owners, spirit beings, animals, plants and rocks, particularly in areas not heavily influenced by Protestant religion. The earth as *Uis Pah*, God of the Earth, is the complementary partner with *Uis Neno*, God of the Sky. Within this belief of the earth as animate, interconnected and inspirited, mining was viewed as a detrimental activity that damaged not only the wellbeing of the earth but also the relationship of people to the earth. Although this belief was not commonly adhered to across West Timor, it was central in the decision of Location 1 to not engage in mining, as well as by a number of individuals across other locations.

Concepts of sacredness (*le'u* or *lulik*) found in Timorese cultures were complex and influential in many of the locations investigated in guiding decisions around

manganese mining. What was determined as sacred, why it was sacred and how it influenced mining activities varied across the locations and was sometimes held as a collective belief but also often expressed on an individual level based on people's personal experiences. Manganese itself could be considered sacred because of its physical characteristics, or its ability to appear and disappear. Places were also considered sacred if they were energetically powerful, were used for ritual practice or offerings or were the burial grounds of ancestors. While sacredness could prevent mining from occurring in particular areas, it could also be "tamed" using rituals to enable safe extraction of manganese.

Rituals are performed to maintain balance and order, to promote well-being and renewal, and can involve sacrifice as form of reciprocity. Rituals, similar to those already practiced in agriculture, were commonly used in a number of the locations, except for the Protestant locations, before mining began to communicate intention and ask for permission from the spirit realm and ensure good results from manganese mining. Rituals were performed on a communal and individual level, and sometimes in response to particular events such as accidents or dreams. Sacrifice as a form of reciprocity, was used to enhance the abundance of manganese at some locations.

Some respondents felt that cultural beliefs were lost as people engaged in mining with natural resources no longer viewed as sacred but as a commodity to be exploited. Although the loss of sacred concepts is a trend in West Timor that has been greatly influenced through Christianity and globalisation, mining has also contributed to this loss of beliefs. In some locations however mining renewed ritual practice and

consideration of the earth's spiritual dimension, with some locations using cultural ritual practices for mining that were no longer implemented for agriculture.

Question 4: How is manganese mining currently managed through national and local governance systems and how can it be improved to support sustainable development?

The fourth research question investigated both national and customary forms of governance of mineral resources, and how these forms of governance enabled or constrained sustainable outcomes from manganese mining. Opportunities for change and recommendations to support and enhance ASM and manganese mining as a sustainable livelihood were also considered in Chapter 6.

Indonesia has historically had strict and centralised control of mineral resources, using the mining industry to fund the national economy, military power and political relations. While there have been significant benefits at the national level from mining there have been considerable costs to the environment and to local communities including land and resource dispossession, conflict and health impacts. Mining companies in Indonesia must now adhere to CSR practices and environmental impacts assessments. The control of mineral resources was also decentralised under Law 22/1999 from the national level to the district level, so that mining licences could be issued by district governments.

Manganese mining in West Timor was influenced by a number of licensing procedures and mining laws. When manganese mining began governance of mineral resources was decentralised so that district governments had the authority over

mining activities. However, local governments had minimal previous experience in the extractive industry as mining in West Timor, challenging local governments to respond effectively.

Two main licences, exploration and operation, were issued by district governments across the five districts, for manganese mining in West Timor, both of which are intended for medium and large-scale mining operations by mining companies. However, most manganese mining activities were performed by local communities on a small-scale. The licence specifically for ASM in Indonesia known as an *IPR* (*Izin Pertambangan Rakyat* – Permit for People's Mining) was not issued in any of the districts for manganese mining, despite the fact that this licence is intended for small-scale mining. Neither were any regions formally designated as *WPR* (*Wilayah Pertambangan Rakyat* – Area for People's Mining).

In addition to the incompatibility of mining licences and no licences specifically issued for ASM, there were also issues with the overlapping of exploration and operation licences and licences issued within forest zones for mining companies. This was likely due to the haphazard manner of local governments attempting to regulate mining activities without adequate resources. Ineffective and inappropriate management of mineral resources was noted in other regions of Indonesia and so prompted a partial "recentralisation" of mineral resources from the district level to the provincial level across the nation that was carried out in 2017 under Law 23/2014. While the provincial government has more resources, district governments and local communities were concerned that the provincial level did not have the local knowledge and relationships with rural regions to incorporate community interests

in mining management decisions. As this is a relatively recent change the ramifications for local communities are not yet clear.

The implementation of Law 4/2009 banning the export of unprocessed minerals from Indonesia came into effect in 2012 and greatly impacted the manganese market in West Timor. Combined with a decline in the global price and demand for manganese from 2012, the new law meant that manganese ore could not be shipped directly to China but had to be processed first within Indonesia. With only a few smelters processing manganese in Surabaya the local manganese market quickly became flooded halting most mining activities in West Timor, with only a handful of companies continuing operations from 2014 until research concluded in 2017. Although the law was intended to value add and create jobs within Indonesia, it has greatly limited the manganese market and mining industry in West Timor. The involvement of both police and army officials in ASM in West Timor indicates the contested political space of mineral resources where power and force can be used to manipulate and enforce desired outcomes.

In regard to community resource management, customary forms of governance are still active and relevant in most of the locations investigated and played a significant role in determining how, where and if mining activities occur. Local leaders were often central in overseeing the safety of mining activities and resolving any conflict. Land tenure, already in place through agricultural systems, determined who had access to manganese deposits whether it was on individual, clan or communally held land.

The potential of ASM to be developed as a 'formal' recognised and accepted sustainable livelihood is limited by the view of the industry as "illegal." Negative views of the ASM industry prevent manganese mining from being recognised and supported by governments as a poverty alleviating livelihood for rural communities. This is exacerbated by the traditionally centralised control of mineral resources where local rights to minerals are largely ignored.

It is recommended that ASM manganese is viewed by governments, donors, mining companies, NGOs and researchers as a livelihood that has the potential to contribute to sustainable development as has been demonstrated in this study, in other places in Indonesia (Dara 2014; Langston et al. 2015; Spiegel 2012) and also globally for other forms of ASM (Banchirigah & Hilson 2010; Hilson 2016; Verbrugge 2016).

When views of ASM have shifted, there can be more government support and regulation of community mining activities through the issuing of *IPR* licences and the designation of *WPR* regions. Although the lack of *IPR* licences for manganese mining was largely due to government tendencies to favour company mining, *IPR* licences are also difficult for community members to apply for because of the high costs and complex application requirements (Spiegel 2012). This study recommends that changes be made to *IPR* licences so that they are achievable both in cost and resources for community members. In addition, licences that are tailored to specific minerals would enhance the applicability and appropriateness of particular guidelines, as mining issues can vary considerably depending on the resource, as proven in the differences between gold and manganese mining in their value, impacts and methods of extraction as outlined in Chapter 3.

The management of manganese mining needs to involve collaboration across various government departments, including forestry, planning (*BLHD*) and mining, and include the stakeholders such as traders, mining companies, NGOs, researchers and community groups. Networking and communication between these stakeholders will enable a better understanding of the industry and the management required at each level to ensure sustainable outcomes. Particularly now that the governance of mineral resources has been recentralised to the provincial level, stronger communication and relationships with local communities is required so that mining management decisions are locally relevant and appropriate.

This study demonstrates that local perspectives, values and beliefs regarding manganese mining are diverse and dynamic, leading to a variety of responses to mining as a new livelihood across West Timor. The potential of manganese mining as a sustainable livelihood depends most critically on the ability of local communities to make empowered and meaningful decisions regarding the use of their natural resources. As Hodge (2014, p. 30) states sustainable outcomes from mining require that "...people can and will have an opportunity to participate in the decisions that affect their future, and they will be supported to ensure they have the capacity to do so effectively." This includes the protection of those who wish not to mine in accordance with their values and beliefs. Sustainable outcomes are only achievable from mining where local communities are given the rights, freedom and support to manage their mineral resources on their own terms.

7.4 Future Research

While this study focused on the local perspectives, values and beliefs of communities regarding manganese mining as a sustainable livelihood, it did not provide a detailed quantitative investigation of the benefits and negative impacts of manganese mining. While the negative impacts of manganese mining carried out on small-scale were of minor concern to respondents and are likely to be minimal, further research is required to investigate the more significant impacts of company mining and mining using heavy machinery. In this context, the health impacts are of concern, where manganese and other potentially more toxic minerals such as lead and uranium, may be polluting the air and water sources and causing long-term health implications for local community members, especially children, who are exposed to these substances on a regular basis.

While most respondents in this study reported that manganese mining contributed positively to their livelihoods through income contributions, further research regarding the gendered benefits of mining income to rural communities and their livelihoods in West Timor could capture in more detail the extent to which mining has improved livelihoods, wellbeing and community development. More comprehensive livelihoods studies would indicate the most substantial benefits from mining and action research or applied development programs for supporting also areas of community development through improved financial management, such as investment in long-term benefits, that would enable more sustainable livelihood outcomes.

While this research provides a detailed investigation into how manganese mining is valued as a sustainable livelihood within local worldviews, further studies in this field on other mineral resources are required to understand the complex intersection of mineral governance, economic development, indigenous rights and sustainable livelihoods, particularly in the field of small-scale mining in rural regions.

7.5 Concluding Comments

This thesis has examined how manganese mining is viewed and managed by local communities as a sustainable livelihood within their worldviews, consisting of perspectives, values and beliefs. Manganese mining is a relatively new, widespread and common livelihood option (Chapter 3), which has provided economic development and poverty alleviation to rural communities across West Timor, where most negative impacts can be addressed where mining is carried out by communities on a small-scale (Chapter 4). Communities have adapted to mining as a new livelihood through the application of a range of cultural beliefs and practices, where mining activities are governed through an existing spiritual-ecological framework for meaningful outcomes (Chapter 5). The potential of manganese mining as a sustainable livelihood able to contribute to local needs is greatly influenced by the national political systems of governance and current legislation (Chapter 6).

Utilisation of mineral resources is an important component of rural livelihood strategies in West Timor and has the potential to provide significant sustainable outcomes if managed and supported appropriately. Negative views and inappropriate legislation of ASM currently limit manganese mining to contribute to sustainable rural development. Manganese mining as a sustainable livelihood

depends most critically on the ability of local communities to make empowered and meaningful decisions regarding the use of their natural resources including the protection of those who wish not to mine.

References

Abuya, WO 2016, 'Mining conflicts and Corporate Social Responsibility: Titanium mining in Kwale, Kenya', *The Extractive Industries and Society*, vol. 3, no. 2, pp. 485-493.

Acuña, RM 2014, 'The politics of extractive governance: Indigenous peoples and socio-environmental conflicts', *The Extractive Industries and Society*, vol. 2, pp. 85-92.

Adler Miserendino, R, Bergquist, BA, Adler, SE, Guimarães, JRD, Lees, PSJ, Niquen, W, Velasquez-López, PC & Veiga, MM 2013, 'Challenges to measuring, monitoring, and addressing the cumulative impacts of artisanal and small-scale gold mining in Ecuador', *Resources Policy*, vol. 38, no. 4, pp. 713-722.

Afiff, S & Lowe, C 2007, 'Claiming indigenous community: Political discourse and natural resource rights in Indonesia', *Alternatives*, vol. 32, pp. 73-97.

Alier, JM 2001, *Environmental Conflicts, Environmental Justice, and Valuation*.

Allerton, C 2009, 'Static crosses and working spirits: anti-syncretism and agricultural animism in Catholic West Flores', in *Anthropological Forum*, vol. 19, pp. 271-287.

Amankwah, R & Anim-Sackey, C 2003, 'Strategies for sustainable development of the small-scale gold and diamond mining industry of Ghana', *Resources Policy*, vol. 29, no. 3, pp. 131-138.

Amri, U 2011, 'The dynamic of power relations over Bombana's gold mining in Southeast Sulawesi, Indonesia', *Jurnal Kawistara*, vol. 1, no. 3.

ASIA Miner News 2017, 'Kupang manganese smelter work starts', *The Asia Miner*.

Asia Minerals Corporation 2013, *Manganese,* http://www.asiamineralscorp.com/projects/manganese.html.

Asmarini, W & Munthe, B 2017, *Indonesia eases export ban on nickel ore, bauxite,* https://www.reuters.com/article/us-indonesia-mining-exports/indonesia-eases-export-ban-on-nickel-ore-bauxite-idUSKBN14W1TZ.

Aspinall, C 2001, 'Small-scale mining in Indonesia', *International Institute for Environment and Development, Mining Minerals and Sustainable Development Report*, no. 79, p. 30.

Audley-Charles, MG 1965, 'A geochemical study of Cretaceous ferromanganiferous sedimentary rocks from Timor', *Geochimica et Cosmochimica Acta*, vol. 29, no. 11, pp. 1153-1173.

Badan Pusat Statistik 2013, *Indeks pembangunan manusia Provinsi dan Nasional 1996-2013,* http://www.bps.go.id/linkTabelStatis/view/id/1516.

Badan Pusat Statistik 2014, *Jumlah desa yang memiliki fasilitas sekolah menurut provinsi dan tingkat pendidikan, 2003-2014 (Number of villages that have educational facilities by province and education level, 2003-2014)*, 01/01/2018, <https://www.bps.go.id/linkTableDinamis/view/id/905>.

Badan Pusat Statistik 2014a, *Jumlah dan persentase penduduk miskin, garis kemiskinan, indeks kedalaman kemiskinan (P1), dan indeks keparahan kemiskinan (P2) menurut Provinsi, September 2014,* http://www.bps.go.id/linkTabelStatis/view/id/1488.

Badan Pusat Statistik 2014b, *Analisis sosial ekonomi petani di Nusa Tenggara Timur 2013*, http://ntt.bps.go.id/backend1812/pdf_publikasi/Analisis-Sosial-Ekonomi-Petani-di-Nusa-Tenggara-Timur---Analisis-Hasil-Survei-Pendapatan-Rumah-Tangga-Usaha-Pertanian-Sensus-Pertanian-2013.pdf.

Ballard, C 2001, *Human rights and the mining sector in Indonesia: A baseline study*, IIfEaD (IIED).

Ballard, C & Banks, G 2003, 'Resource wars: The anthropology of mining', *Annual Review of Anthropology*, vol. 32, pp. 287-313.

Banchirigah, SM & Hilson, G 2010, 'De-agrarianization, re-agrarianization and local economic development: Re-orientating livelihoods in African artisanal mining communities', *Policy Sciences*, vol. 43, no. 2, pp. 157-180.

Banerjee, S 2003, 'Who sustains whose development? Sustainable development and the reinvention of nature', *Organization Studies*, vol. 24, no. 1, pp. 143-180.

Barceloux, DG 1999, 'Manganese', *Journal Of Toxicology. Clinical Toxicology*, vol. 37, no. 2, pp. 293-307.

Barlow, C & Gondowarsito, R 2009, 'Socioeconomic conditions and poverty alleviation in east Nusa Tenggara', in B Resosudarmo & F Jotzo (eds), *Working with nature against poverty: Development, resources and the environment in eastern Indonesia*, Institute of Southeast Asian Studies.

Barnett, T, Blas, E & Whiteside, A 1996, *AIDS Briefs: Subsistence Agriculture*, http://pdf.usaid.gov/pdf_docs/PNACA377.pdf.

Barney, K 2018, 'Reassembling informal gold-mining for development and sustainability? Opportunities and limits to formalisation in India, Indonesia and Laos', in K Lahiri-Dutt (ed.), *Between the plough and the pick: Informal, artisanal and small-scale mining in the contemporary world*, ANU Press.

Beavis, S & McWilliam, A 2018, 'Muddy rivers and toxic flows: Risks and impacts of artisanal gold-mining in the riverine catchments of Bombana, Southeast Sulawesi (Indonesia)', in *Between the plough and the pick: Informal, artisanal and small-scale mining in the contemporary world*, ANU Press.

Bebbington, A 1999, 'Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty', *World Development*, vol. 27, no. 12, pp. 2021-2044.

Bebbington, A, Hinojosa, L, Bebbington, D, Burneo, M & Warnaars, X 2008, 'Contention and ambiguity: Mining and the possibilities of development', *Development and Change*, vol. 39, no. 6, pp. 965-992.

Bellwood, P 2007, *Prehistory of the Indo-Malaysian archipelago : Revised edition*, ANU Press.

Bellwood, P 2011, 'Holocene Population History in the Pacific Region as a Model for Worldwide Food Producer Dispersals', *Current Anthropology*, vol. 52, no. S4, pp. S363-S378.

Benu, F 2003, *Farm productivity and farmers welfare in West Timor, Indonesia*, Curtin University of Technology.

Benu, F & Mudita, IW 2017, 'Money matters for subsistence farmers: Provision of a low-rate credit scheme by a local bank allowed mungbean farmers to adopt improved cultivation practices', *Net Journal of Agricultural Science*, vol. 5, no. 2, pp. 71-78.

Berkes, F 2012, *Sacred ecology*, Routledge.

Bernard, HR 2011, *Research Methods in Anthropology*, AltaMira Press.

Blignaut, JN & Hassan, RM 2002, 'Assessment of the performance and sustainability of mining sub-soil assets for economic development in South Africa', *Ecological Economics*, vol. 40, no. 1, pp. 89-101.

Blyth, M, Djoeroemana, S, Russell-Smith & Myers, B 2007, 'Integrated rural development in East Nusa Tenggara, Indonesia: overview of opportunities, constraints and options for

improving livelihoods', in S Djoeromana, B Myers, J Russell-Smith, M Blyth & E Salean (eds), *Proceedings of a workshop to identify sustainable rural livelihoods, held in Kupang, Indonesia, 5-7 April 2006*, ACIAR.

Boateng, DO, Codjoe, FNY & Ofori, J 2014, 'Impact of illegal small scale mining (Galamsey) on cocoa production in Atiwa district of Ghana'.

Bose-O'Reilly, S, Drasch, G, Beinhoff, C, Rodrigues-Filho, S, Roider, G, Lettmeier, B, Maydl, A, Maydl, S & Siebert, U 2010, 'Health assessment of artisanal gold miners in Indonesia', *Science of the Total Environment*, vol. 408, no. 4, pp. 713-725.

Bovensiepen, J 2011, 'Opening and closing the land: Land and power in the Idate Highlands', in A McWilliam & EG Traube (eds), *Land and life in Timor-Leste: Ethnographic essays*, ANU E-Press.

Bovensiepen, J 2014, 'Lulik: Taboo, animism, or transgressivesSacred? An exploration of identity, morality, and power in Timor-Leste', *Oceania*, vol. 84, no. 2, pp. 121-137.

Bowler, RM, Gysens, S, Diamond, E, Nakagawa, S, Drezgic, M & Roels, HA 2006, 'Manganese exposure: Neuropsychological and neurological symptoms and effects in welders', *NeuroToxicology*, vol. 27, no. 3, pp. 315-326.

Bradt, D & Drummond, C 2008, 'Delayed recognition of excess mortality in West Timor', *Emergency Medicine Australasia*, vol. 20, pp. 70-77.

Buxton, A 2013, *Responding to the challenge of artisanal and small-scale mining. How can knowledge networks help?*

Buxton, A & Wilson, E 2013, *FPIC and the extractive industries: A guide to applying the spirit of free, prior and informed consent in industrial projects*.

Campbell-Nelson, K 2003, *Learning resistance in West Timor*, PhD thesis, University of Massachusetts.

Cartier, LE & Bürge, M 2011, 'Agriculture and artisanal gold mining in Sierra Leone: Alternatives or complements?', *Journal of International Development*, vol. 23, no. 8, pp. 1080-1099.

Castilhos, ZC, Rodrigues-Filho, S, Rodrigues, APC, Villas-Bôas, RC, Siegel, S, Veiga, MM & Beinhoff, C 2006, 'Mercury contamination in fish from gold mining areas in Indonesia and human health risk assessment', *Science of the Total Environment*, vol. 368, no. 1, pp. 320-325.

Catalán-Vázquez, M, Riojas-Rodríguez, H & Pelcastre-Villafuerte, BE 2014, 'Risk: For whom? Representations of mining activity by different social actors in the Molango manganese district of Hidalgo, Mexico', *Risk Analysis*, vol. 34, no. 1, pp. 28-43.

Chambers, R & Conway, G 1992, *Sustainable rural livelihoods: practical concepts for the 21st century*, Institute of Development Studies (UK).

Chandra, SV, Shukla, GS, Srivastava, R, Singh, H & Gupta, V 1981, 'An exploratory study of manganese exposure to welders', *Clinical toxicology*, vol. 18, no. 4, pp. 407-416.

Charlton, T, Barber, A, McGowan, A, Nicoll, R, Roniewicz, E, Cook, S, Barkham, S & Bird, P 2009, 'The Triassic of Timor: Lithostratigraphy, chronostratigraphy and palaeogeography', *Journal of Asian Earth Sciences*, vol. 36, no. 4, pp. 341-363.

Childs, J 2008, 'Reforming small-scale mining in sub-Saharan Africa: Political and ideological challenges to a Fair Trade gold initiative', *Resources Policy*, vol. 33, no. 4, pp. 203-209.

Colbran, N 2011, 'Indigenous peoples in Indonesia: At risk of disappearing as distinct peoples in the rush for biofuel?', *International Journal on Minority and Group Rights*, vol. 18, pp. 63-92.

Collins, N & Lawson, L 2014, *Investigating approaches to working with artisanal and small-scale miners: A compendium of strategies and reports from the field*.

Corbin, J & Strauss, A 1990, 'Grounded theory research: Procedures, canons and evaluative criteria', *Zeitschrift für Soziologie*, vol. 19, no. 6, pp. 418-427.

Crawley, A & Sinclair, A 2003, 'Indigenous human resource practices in Australian mining companies: Towards an ethical model', *Journal of Business Ethics*, vol. 45, no. 4, pp. 361-373.

Creswell, J 2003, *Research design: Qualitative, quantitative, and mixed methods approaches*, 2nd edn., SAGE Publications.

Crossgrove, J & Zheng, W 2004, 'Manganese toxicity upon overexposure', *NMR in Biomedicine*, vol. 17, no. 8, pp. 544-553.

Cunningham, A, Garnett, S & Stacey, N 2007, 'Evaluation of non-timber forest product species as potential elements of agroforestry systems', in *ACIAR Proceedings*, vol. 126, p. 174.

Cunningham, C 1967, 'Atoni kin categories and conventional behaviour', *Bijdragen tot de Taal-, Land- en Volkenkunde*, vol. 123, no. 1, pp. 53-70.

D'Souza, K 2005, 'Artisanal and small-scale mining in Africa: the poor relation', *The Geological Society*, vol. 250, pp. 95-120.

Dara, MJR 2014, *Understanding risk and benefits of informal (artisanal small-scale) mining of manganese by peasants in Indonesia: A study on resource management and livelihood options in Kupang and TTS, West Timor, NTT*.

Das, A, Sukla, L, Pradhan, N & Nayak, S 2011, 'Manganese biomining: a review', *Bioresource technology*, vol. 102, no. 16, pp. 7381-7387.

Davies, D, Maru, Y & May, T 2012, *Enduring community value from mining: conceptual framework*.

De Theije, M & Salman, T 2018, 'Conflicts in marginal locations: Small-scale gold-mining in the Amazon', in *Between the plough and the pick: Informal, artisanal and small-scale mining in the contemporary world*, ANU Press.

de Vries, B & Petersen, A 2009, 'Conceptualizing sustainable development: An assessment methodology connecting values, knowledge, worldviews and scenarios', *Ecological Economics*, vol. 68, pp. 1006-1019.

Descola, P 1992, 'Societies of nature and the nature of society', *Conceptualizing society*, pp. 107-126.

Devi, B 2013, *Mining and development in Indonesia: An overview of the regulatory framework and policies*.

Dietz, S & Neumayer, E 2007, 'Weak and strong sustainability in the SEEA: concepts and measurement', *Ecological Economics*, vol. 61, pp. 617-626.

Dinas Pertambangan dan Energi NTT 2015, *Daftar izin usaha pertambangan Provinsi Nusa Tenggara Timur (Record of mining licences for East Nusa Tenggara)*.

Donohue, M & Denham, T 2010, 'Farming and language in island southeast Asia', *Current Anthropology*, vol. 51, no. 2, pp. 223-256.

Dorman, DC, Struve, MF, Clewell Iii, HJ & Andersen, ME 2006, 'Application of pharmacokinetic data to the risk assessment of inhaled manganese', *NeuroToxicology*, vol. 27, no. 5, pp. 752-764.

Dörrbecker, M & Dedering, U 2015, *Timor Barat: Kabupaten dan kecamatan (West Timor: Districts and sub-districts)*, <http://en.wikipedia.org/wiki/West_Timor -/media/File:Peta_Timor_Barat_-_Kabupaten_dan_Kecamatan.png>.

Dudka, S & Adriano, D 1997, 'Environmental impacts of metal ore mining and processing: A review', *Journal of Environmental Quality*, vol. 26, no. 3, pp. 590-602.

Duncan, C 2007, 'Mixed outcomes: The impact of regional autonomy and decentralisation on indigenous ethnic minorities in Indonesia', *Development and Change*, vol. 38, no. 4, pp. 711-733.

Eftimie, A, Heller, K, Strongman, J, Hinton, J, Lahiri-Dutt, K & Mutemeri, N 2012, 'Gender dimensions of artisanal and small-scale mining: A rapid assessment toolkit'.

Erb, M 2016, 'Mining and the conflict over values in Nusa Tenggara Timur Province, Eastern Indonesia', *The Extractive Industries and Society*, vol. 3, no. 2, pp. 370-382.

Erikson, KM, Thompson, K, Aschner, J & Aschner, M 2007, 'Manganese neurotoxicity: A focus on the neonate', *Pharmacology & Therapeutics*, vol. 113, no. 2, pp. 369-377.

Farram, S 2004, *From 'Timor Koepang' to 'Timor NTT': A political history of West Timor, 1901-1967*, Charles Darwin University.

Fisher, E, Mwaipopo, R, Mutagwaba, W, Nyange, D & Yaron, G 2009, '"The ladder that sends us to wealth": Artisanal mining and poverty reduction in Tanzania', *Resources Policy*, vol. 34, no. 1, pp. 32-38.

Fisher, R, Ling, H, Natonis, R, Hobgen, S, Mudita, IW, Markus, J, Bunga, W & Nampa, W 2018, 'Evidence for artisanal and small-scale mining supporting rural livelihood diversification: The case of manganese mining in West Timor, Indonesia', *The Extractive Industries and Society*.

Fonseca, A, McAllister, M & Fitzpatrick, P 2013, 'Measuring what? A comparative anatomy of five mining sustainability frameworks', *Minerals Engineering*, vol. 46-47, pp. 180-186.

Food and Agriculture Organization 2010, *Nutrition security and food security in seven districts in NTT Province, Indonesia: Status, causes and recommendations for rResponse*, http://documents.wfp.org/stellent/groups/public/documents/ena/wfp236825.pdf?_ga=2.82078546.558351863.1514691248-151599725.1514691248.

Fox, J 1977, *Harvest of the palm: Ecological change in eastern Indonesia*, Harvard University Press.

Fox, J 1996, 'The paradox of powerlessness: Timor in historical perspective', paper presented to *Focus on East Timor*, University of Oslo.

Fox, J 2006a, 'Austronesian societies and their transformations', in P Bellwood, JJ Fox & D Tryon (eds), *The Austronesians: Historical and comparative perspectives*, Australian National University.

Fox, J 2006b, 'Chapter 7 The transformation of progenitor lines of origin: Patterns of precedence in Eastern Indonesia', in J Fox & C Sather (eds), *Origins, ancestry and alliance: Explorations in Austronesian ethnography*, ANU E Press.

Fulton, D, Manfredo, M & Lipscomb, J 1996, 'Wildlife value orientations: a conceptual and measurement approach', *Human Dimensions of Wildlife*, vol. 1, pp. 24-47.

Gamu, J, Le Billon, P & Spiegel, S 2015, 'Extractive industries and poverty: A review of recent findings and linkage mechanisms', *The Extractive Industries and Society*, vol. 2, no. 1, pp. 162-176.

Gandataruna, K & Haymon, K 2011, 'A dream denied? Mining legislation and the Constitution in Indonesia', *Bulletin of Indonesian Economic Studies*, vol. 47, no. 2, pp. 221-231.

Ghose, MK & Roy, S 2007, 'Contribution of small-scale mining to employment, development and sustainability–an Indian scenario', *Environment, Development and Sustainability*, vol. 9, no. 3, pp. 283-303.

Gibb, H & O'Leary, KG 2014, 'Mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining community: A comprehensive review', *Environmental Health Perspectives*.

Glasby, GP 1978, 'Deep-sea manganese nodules in the stratigraphic record: Evidence from DSDP cores', *Marine Geology*, vol. 28, no. 1–2, pp. 51-64.

Gomes, A 1999, 'Modernity and indigenous minorities in Malaysia and Indonesia', *RIMA Review of Malaysian and Indonesian Affairs*, vol. 33, no. 1, pp. 1-15.

Gray, RD, Drummond, AJ & Greenhill, SJ 2009, 'Language phylogenies reveal expansion pulses and pauses in Pacific settlement', *Science*, vol. 323, no. 5913, pp. 479-483.

Großmann, K, Padmanabhan, M & von Braun, K 2017, 'Contested development in Indonesia: Rethinking ethnicity and gender in mining', *Austrian Journal of South-East Asian Studies*, vol. 10, no. 1, pp. 11-28.

Guirco, D & Cooper, C 2012, 'Mining and sustainability: asking the right questions', *Minerals Engineering*, vol. 29, pp. 3-12.

Gulf Minerals Corporation 2015, *Developing premium Indonesian manganese alloys,* http://www.asx.com.au/asxpdf/20150116/pdf/42w12k67w9lp7s.pdf.

Hägerdal, H 2012, *Lords of the land, lords of the sea: Conflict and adaptation in early colonial Timor, 1600-1800*, vol. 273, BRILL.

Hammett, D, Twyman, C & Graham, M 2015, *Research and fieldwork in development*, Routledge.

Han Onn, A & Woodley, A 2014, 'A discourse analysis on how the sustainability agenda is defined within the mining industry', *Journal of Cleaner Production*, vol. 84, pp. 116-127.

Hart, M 2010, 'Indigenous worldviews, knowledge, and research: the development of an Indigenous research paradigm', *Journal of Indigenous Voices in Social Work*, vol. 1, pp. 1-16.

Hedlund-de Witt, A 2012, 'Exploring worldviews and their relationships to sustainable lifestyles: Towards a new conceptual and methodological approach', *Ecological Economics*, vol. 84, pp. 74-83.

Hedlund-de Witt, A 2014, 'Rethinking sustainable development: Considering how different worldviews envision "Development" and "Quality of life"', *Sustainability*, vol. 6, pp. 8310-8328.

Heemskerk, M 2005, 'Collecting data in artisanal and small-scale mining communities: Measuring progress towards more sustainable livelihoods', *Natural Resources Forum*, vol. 29, pp. 82-87.

Hein, J & Petersen, S 2013, 'The geology of manganese nodules', in *Deep Sea Minerals: Manganese Nodules, a physical, biological, environmental, and technical review: 1B*, Secretariat of the Pacific Community.

Hentschel, T, Hruschka, F & Priester, M 2002, *Global report on artisanal and small scale mining*, http://www.iied.org/mmsd/mmsd_pdfs/asm_global_report_draft_jan02.pdf

Hewitt, D 2000, 'A clash of worldviews: Experiences from teaching Aboriginal students', *Theory into Practice*, vol. 39, no. 2, pp. 111-117.

Hicks, D 1996, 'Making the king divine: A case study in ritual regicide from Timor', *The Journal of the Royal Anthropological Institute*, vol. 2, no. 4, pp. 611-624.

Hicks, D 2008, 'Afterword: Glimpses of alternatives—the Uma Lulik of East Timor', *Social Analysis*, vol. 52, no. 1, pp. 166-180.

Hilson, G 2000, 'Defining "cleaner production" and "pollution prevention" in the mining context', *Minerals Engineering*, vol. 16, no. 4, pp. 305-321.

Hilson, G 2002, 'Land use competition between small- and large-scale miners: a case study of Ghana', *Land Use Policy*, vol. 19, no. 2, pp. 149-156.

Hilson, G 2016, 'Farming, small-scale mining and rural livelihoods in Sub-Saharan Africa: A critical overview', *The Extractive Industries and Society*, vol. 3, pp. 547-563.

Hilson, G & Banchirigah, SM 2009, 'Are alternative livelihood projects alleviating poverty in mining communities? Experiences from Ghana', *The Journal of Development Studies*, vol. 45, no. 2, pp. 172-196.

Hilson, G & Garforth, C 2013, '‘Everyone now is concentrating on the mining’: drivers and implications of rural economic transition in the eastern region of Ghana', *The Journal of Development Studies*, vol. 49, no. 3, pp. 348-364.

Hilson, G & McQuilken, J 2014, 'Four decades of support for artisanal and small-scale mining in sub-Saharan Africa: a critical review', *The Extractive Industries and Society*, vol. 1, no. 1, pp. 104-118.

Hilson, G & Murck, B 2000, 'Sustainable development in the mining industry: clarifying the corporate perspective', *Resources Policy*, vol. 26, no. 4, pp. 227-238.

Hilson, G & Yakovleva, N 2007, 'Strained relations: A critical analysis of the mining conflict in Prestea, Ghana', *Political Geography*, vol. 26, no. 1, pp. 98-119.

Hinton, J 2006, *Communities and small-scale mining: An integrated review for development planning* http://www.eisourcebook.org/cms/June 2013/CASM, an Integrated Review for Development Planning.pdf.

Hobbs, J 2005, 'Enhancing the contribution of mining to sustainable development', in B Marker, M Petterson, F McEvoy & M Stephenson (eds), *Sustainable mineral operations in the developing world*, The Geologial Society, Special Publication 250.

Hodge, A 2014, 'Mining company performance and community conflict: moving beyond a seeming paradox', *Journal of Cleaner Production*, vol. 84, pp. 27-33.

Hornidge, A & Scholtes, F 2011, 'Climate change and everyday life in Toineke Village, West Timor: Uncertainties, knowledge and adaptation', *Journal of Empirical Social Anthropology*, vol. 61, no. 2, pp. 151-175.

Horridge, A 2006, 'The Austronesian conquest of the sea - Upwind', in P Bellwood, JJ Fox & D Tryon (eds), *The Austronesians: Historical and comparative perspectives*, Australian National University E Press.

ILO 2005, *A load to heavy: child labour in mining and quarrying*, http://www.ilo.org/ipecinfo/product/viewProduct.do?productId=880.

Ingold, T 2006, 'Rethinking the animate, re-animating thought', *Ethnos*, vol. 71, no. 1, pp. 9-20.

Ingram, V, Tieguhong, JC, Schure, J, Nkamgnia, E & Tadjuidje, MH 2011, 'Where artisanal mines and forest meet: Socio-economic and environmental impacts in the Congo Basin', *Natural Resources Forum*, vol. 35, pp. 304-320.

International Manganese Institute 2014, *Essential manganese: Annual review 2014*, http://www.manganese.org/images/uploads/publications/2014_AR_Final.pdf.

Irzik, G & Nola, R 2009, 'Worldviews and their relation to science', *Science & Education*, vol. 18, no. 6-7, pp. 729-745.

Ismawati, Y 2014, 'ASGM: the producation of social and environmental sufferring. Gold, mercury and the next minamata tragedy', paper presented to *Bali Fokus*.

Jamasmie, C 2017, *Nickel prices plummet as Indonesia eases export ban,* http://www.mining.com/nickel-prices-plummet-as-indonesia-eases-export-ban-on-ore/.

Jenkins, H & Yakovleva, N 2006, 'Corporate Social Responsibility in the mining industry: Exploring trends in social and environmental disclosure', *Journal of Cleaner Production*, vol. 14, pp. 271-284.

Johnson, KA, Hill, ED & Cohen, AB 2011, 'Integrating the study of culture and religion: Toward a psychology of worldview', *Social and Personality Psychology Compass*, vol. 5, no. 3, pp. 137-152.

Jones, G, Laila Nagib, S & Handayani, T 1998, 'The expansion of high school education in poor regions: The case of East Nusa Tenggara, Indonesia', *Bulletin of Indonesian Economic Studies*, vol. 34, no. 3, pp. 59-84.

Jønsson, J & Bryceson, D 2009, 'Rushing for gold: Mobility and small-scale mining in East Africa', *Development and Change*, vol. 40, no. 2, pp. 249-279.

Jønsson, J & Fold, N 2011, 'Mining 'from below': Taking Africa's artisanal miners seriously', *Geography Compass*, vol. 5, no. 7, pp. 479-493.

Kamlongera, PJ 2011, 'Making the poor 'poorer' or alleviating poverty? Artisanal mining livelihoods in rural Malawi?', *Journal of International Development*, vol. 23, no. 8, pp. 1128-1139.

Karafet, TM, Hallmark, B, Cox, MP, Sudoyo, H, Downey, S, Lansing, JS & Hammer, MF 2010, 'Major east–west division underlies Y chromosome stratification across Indonesia', *Molecular biology and evolution*, vol. 27, no. 8, pp. 1833-1844.

Kehi, B & Palmer, L 2012, 'Hamatak halirin: The cosmological and socio-ecological roles of water in Koba Lima, Timor', *Bijdragen tot de Taal-, Land- en Volkenkunde*, vol. 168, no. 4, p. 445.

Kirsch, S 2010, 'Sustainable mining', *Dialectical Anthropology*, vol. 34, no. 1, pp. 87-93.

Kluckhorn, C 1962, 'Values and value orientations in the theory of action: an exploration in definition and classification', in T Parsons & E Shils (eds), *Towards a general theory of action*, Harvard University Press.

Koltko-Rivera, ME 2004, 'The psychology of worldviews', *Review of General Psychology*, vol. 8, no. 1, p. 3.

Kondakis, XG, Makris, N, Leotsinidis, M, Prinou, M & Papapetropoulos, T 1989, 'Possible health effects of high manganese concentration in drinking water', *Archives of Environmental Health: An International Journal*, vol. 44, no. 3, pp. 175-178.

Krisnayanti, BD, Anderson, CW, Utomo, WH, Feng, X, Handayanto, E, Mudarisna, N & Ikram, H 2012, 'Assessment of environmental mercury discharge at a four-year-old artisanal gold mining area on Lombok Island, Indonesia', *Journal of Environmental Monitoring*, vol. 14, no. 10, pp. 2598-2607.

Kristensen, A, Thomsen, J & Mikkelsen, S 2014, 'A review of mercury exposure among artisanal small-scale gold miners in developing countries', *International Archives of Occupational and Environmental Health*, vol. 87, no. 6, pp. 579-590.

Kumah, A 2006, 'Sustainability and gold mining in the developing world', *Journal of Cleaner Production*, vol. 14, no. 3-4, pp. 315-323.

Lahiri-Dutt, K 2003, 'Informal coal mining in Eastern India: Evidence from the Raniganj Coalbelt', *Natural Resources Forum*, vol. 27, pp. 68-77.

Lahiri-Dutt, K 2008, 'Digging to survive: Women's livelihoods in South Asia's small mines and quarries', *South Asian Survey*, vol. 15, no. 2, pp. 217-244.

Lahiri-Dutt, K, Alexander, K & Insouvanh, C 2014, 'Informal mining in livelihood diversification: mineral dependence and rural communities in Lao PDR', *South East Asia Research*, vol. 22, no. 1, pp. 103-122.

Lahiri-Dutt, K 2004, 'Informality in mineral resource management in Asia: raising questions relating to community economies and sustainable development', in *Natural Resources Forum*, vol. 28, pp. 123-132.

Langston, J, Lubis, M, Sayer, J, Margules, C, Boedhihartono, A & Dirks, P 2015, 'Comparative development benefits from small and large scale mines in North Sulawesi, Indonesia', *The Extractive Industries and Society*, vol. 2, pp. 434-444.

Lansing, JS, Cox, MP, Therese, A, Downey, SS, Hallmark, B & Sudoyo, H 2011, 'An ongoing Austronesian expansion in Island Southeast Asia', *Journal of Anthropological Archaeology*, vol. 30, no. 3, pp. 262-272.

Larsen, JJ, Andrevski, H & Lyneham, S 2013, 'Experiences of trafficked persons: an Indonesian sample', *Trends & Issues in Crime and Criminal Justice*.

Laurence, D 2011, 'Establishing a sustainable mining operation: an overview', *Journal of Cleaner Production*, vol. 19, no. 2, pp. 278-284.

Le Billon, P 2008, 'Diamond wars? Conflict diamonds and geographies of resource wars', *Annals of the Association of American Geographers*, vol. 98, no. 2, pp. 345-372.

Leong, F 2008, *Worldview*, SAGE Publications, Los Angeles.

Lertzman, D & Vredenburg, H 2005, 'Indigenous peoples, resource extraction and sustainable development: An ethical approach', *Journal of Business Ethics*, vol. 56, no. 3, pp. 239-254.

Lewokeda, A 2017, 'PLN pasok listrik untuk pabrik mangan', *ANTARA*.

Li, TM 2000, 'Articulating indigenous identity in Indonesia: Resource politics and the tribal slot', *Comparative Studies in Society and History*, vol. 42, no. 1, pp. 149-179.

Li, TM 2002, 'Engaging simplifications: Community-based resource management, market processes and state agendas in Upland Southeast Asia', *World Development*, vol. 30, no. 2, pp. 265-283.

Limbong, D, Kumampung, J, Rimper, J, Arai, T & Miyazaki, N 2003, 'Emissions and environmental implications of mercury from artisanal gold mining in north Sulawesi, Indonesia', *Science of the Total Environment*, vol. 302, no. 1-3, pp. 227-236.

Lincoln, Y & Denzin, N 2011, 'Epilogue: Toward a "refunctioned ethnography"', in *The SAGE Handbook of Qualitative Research*, 4th edn., Sage Publications.

Macdonald, K, Lund, M, Blanchette, M & Mccullough, C 2014, 'Regulation of artisanal and small scale gold mining (ASGM) in Ghana and Indonesia as currently implemented fails to adequately protect aquatic ecosystems', in Sui, Sun & Wang (eds), *Proceedings of International Mine Water Association Symposium*, Xuzhou, China.

Maconachie, R, & Hilson, G 2011, 'Safeguarding livelihoods or exacerbating poverty? Artisanal mining and formalization in West Africa', *Natural Resources Forum*, vol. 35, pp. 293-303.

Maemunah, S 2015, *Mollo, pembangunan dan perubahan iklim: Usaha rakyat memulihkan alam yang rusak (Mollo, development and climate change: Society's efforts to restore nature)*, KOMPAS Penerbit Buku.

Mahanty, S & McDermott, C 2013, 'How does 'Free, Prior and Informed Consent' (FPIC) impact social equity? Lessons from mining and forestry and their implications for REDD+', *Land Use Policy*, vol. 35, pp. 406-416.

Margolis, SV, Ku, TL, Glasby, GP, Fein, CD & Audley-Charles, MG 1978, 'Fossil manganese nodules from Timor: Geochemical and radiochemical evidence for deep-sea origin', *Chemical Geology*, vol. 21, no. 3, pp. 185-198.

Maribus 2014, 'Chapter 3 Marine resources - Opportunities and risks', in *World Ocean Review: Living with the Oceans*, mareverlag.

McGregor, D 2004, 'Traditional ecological knowledge and sustainable development: Towards coexistence', in M Blaser, H Feit & G McRae (eds), *In the way of development: Indigenous peoples, life projects and globalization*, International Development Research Centre.

McQuilken, J & Hilson, G 2016, *Artisanal and small-scale gold mining in Ghana: Evidence to inform an 'action dialogue'*.

McWilliam, A 1989, *Narrating the gate and the path: Place and precedence in South West Timor*, Australian National University.

McWilliam, A 1994, 'Case studies in dual classification as process: childbirth, headhunting and circumcision in West Timor', *Oceania*, vol. 65, no. 1, pp. 59-74.

McWilliam, A 2001, 'Prospects for the sacred grove: Valuing lulic forests on Timor', *The Asia Pacific Journal of Anthropology*, vol. 2, no. 2, pp. 89-113.

McWilliam, A 2002, *Paths of Origin, gates of Life – A study of place and precedence in southwest Timor*, KITLV Press.

McWilliam, A 2006a, 'Historical reflections on customary land rights in Indonesia ', *The Asia Pacific Journal of Anthropology*, vol. 7, no. 1, pp. 45-64.

McWilliam, A 2006b, 'Mapping with metaphor: Cultural topographies in West Timor', in JJ Fox (ed.), *The poetic power of place: Comparative perspectives on Austronesian ideas of locality*, ANU Press.

McWilliam, A 2007, 'Austronesians in linguistic disguise: Fataluku cultural fusion in East Timor', *Journal of Southeast Asian Studies*, vol. 38, no. 02, pp. 355-375.

McWilliam, A, Palmer, L & Shepherd, C 2014, 'Lulik encounters and cultural frictions in East Timor: Past and present', *The Australian Journal of Anthropology*, vol. 25, no. 3, pp. 304-320.

Meisanti, M, Jusoff, K, Salman, D & Rukmana, D 2012, 'The impacts of gold mining on the farmer’s community', *American-Eurasian Journal of Sustainable Agriculture*, vol. 6, no. 4, pp. 209-214.

Merchant, C 1989, *The death of nature : women, ecology, and the scientific revolution*, New York : Harper & Row.

Miller, J, Ritchie, B, Tran, C, Beggs, S, Lada, C, Whetter, K & Cobiac, L 2013, 'Seasonal variation in the nutritional status of children aged 6 to 60 months in a resettlement village in West Timor', *Asia Pac J Clin Nutr*, vol. 22, no. 3, pp. 449-456.

Mirsel, R & Manehitu, J 2014, 'Komoditi yang disebut manusia: Membaca fenomena perdagangan manusia di NTT dalam pemberitaan media (Commodities called humans: Reading the human trafficking phenomenon in NTT media coverage)', *Jurnal Ledalero*, vol. 13, no. 2, pp. 365-398.

MMSD 2002, 'Breaking new ground: Mining, minerals and sustainable development', http://pubs.iied.org/pdfs/G00905.pdf.

Molengraaff, G 1915, 'On the occurrence of nodules of manganese in the mesozoic deep-sea deposits from Borneo, Timor, and Rotti, their significance and mode of formation', in *KNAW*, Amsterdam, pp. 415-430.

Monk, K, De Fretes, Y & Reksodiharjo-Lilly, G 1997, *Ecology of Nusa Tenggara and Maluku*, Periplus Editions.

Moran, C & Kunz, N 2014, 'Sustainability as it pertains to minerals and energy supply and demand: a new interpretative perspective for assessing progress', *Journal of Cleaner Production*, vol. 84, pp. 16-26.

Muslimatun, S & Fanggidae, S 2009, *A brief review on the persistence of food insecurity and malnutrition problems in East Nusa Tenggara Province, Indonesia*, I Publications.

Myers, R, Intarini, D, Sirait, M & Maryudi, A 2017, 'Claiming the forest: Inclusions and exclusions under Indonesia's 'new' forest policies on customary forests', *Land Use Policy*, vol. 22, pp. 205-213.

Nakazawa, K, Nagafuchi, O, Kawakami, T, Inoue, T, Yokota, K, Serikawa, Y, Cyio, B & Elvince, R 2016, 'Human health risk assessment of mercury vapor around artisanal small-scale gold mining area, Palu city, Central Sulawesi, Indonesia', *Ecotoxicology and environmental safety*, vol. 124, pp. 155-162.

Naugle, DK 2002, *Worldview: The History of a concept*, Wm. B. Eerdmans Publishing.

Nel, E, Binns, T & Gibb, M 2014, 'Community development at the coal face: networks and sustainability among artisanal mining communities in Indwe, Eastern Cape Province, South Africa', *The Geographical Journal*, vol. 180, no. 2, pp. 175-184.

Newig, H 2011, *Conducting research in conservation: A social science perspective*, London: Routledge Publishers.

Newton, D & Barbier, J 1988, *Islands and Ancestors*, Metropolitan Museum of Art.

Nordholt, HS 1971, *The political system of the Atoni of Timor*, The Hague.

Nuban, A 2015, *Analisis erosi dan sedimentasi di daerah tambang rakyat di Desa Bokong, Kecamatan Taebenu, Kabupaten Kupang (Erosion and sedimentation analysis in a small-scale mining region in the village of Bokong, sub-district Taebenu, District Kupang)*, Universitas Nusa Cendana (UNDANA).

O'Faircheallaigh, C 2013, 'Extractive industries and Indigenous peoples: A changing dynamic?', *Journal of Rural Studies*, vol. 30, pp. 20-30.

Ololade, O & Annegarn, H 2013, 'Contrasting community and corporate perceptions of sustainability: A case study within the platinum mining region of South Africa', *Resources Policy*, vol. 38, pp. 568-576.

Ormeling, FJ 1956, *The Timor Problem: A geographical interpretation of an underdeveloped island*, Ams Pr Inc.

Ormston, R, Spencer, L, Barnard, M & Snape, D 2013, 'The foundations of qualitative research', in J Ritchie, J Lewis, C McNaughton Nicholls & R Ormston (eds), *Qualitative research practice: A guide for social science students and researchers*, SAGE Publications.

Owen, J & Kemp, D 2012, 'Social licence and mining: A critical perspective', *Resources Policy*, vol. 38, no. 1, pp. 29-35.

Owen, J & Kemp, D 2014, ''Free prior and informed consent', social complexity ad the mining industry: Establishing a knowledge base', *Resources Policy*, vol. 41, pp. 91-100.

Palmer, L 2015, *Water politics and spiritual ecology: Custom, environmental governance and development*, Routledge.

Pasaribu, S 2007, 'Revitalizing institutions to enhance climate forecast application in East Nusa Tenggara Province, Indonesia', *Anal Kebijak Pertan*, vol. 5, no. 3, pp. 239-253.

Pegg, S 2006, 'Mining and poverty reduction: Transforming rhetoric into reality', *Journal of Cleaner Production*, vol. 14, pp. 376-387.

Peluso, NL 2018, 'Entangled territories in small-scale gold mining frontiers: Labor practices, property, and secrets in Indonesian gold country', *World Development*, vol. 101, pp. 400-416.

Porath, N 2010, ''They have not progressed enough': Development's negated identities among two indigenous peoples (*orang asli*) in Indonesia and Thailand', *Journal of Southeast Asian Studies*, vol. 41, no. 2, pp. 267-289.

Pradhan, D, Ancev, T, Drynan, R & Harris, M 2011, 'Management of water reservoirs (Embungs) in West Timor, Indonesia', *Water Resources Management*, vol. 25, no. 1, pp. 339-356.

Rachman, N & Masalam, H 2017, 'The trajectory of indigeneity politics against land dispossession in Indonesia', *Sriwijaya Law Review*, vol. 1, no. 1, pp. 98-113.

Rachman, N & Siscawati, M 2016, 'Forestry law, Masyarakat Adat and struggles for inclusive citizenship in Indonesia', in C Antons (ed.), *Routledge Handbook of Asian Law*, Routledge.

Rajaram, V, Dutta, S & Parameswaran, K 2005, *Sustainable mining practices: A global perspective*, CRC Press.

Ribeiro-Duthie, AC & Castilhos, ZC 2016, *Brazilian gold mining industry and relations amid ASM, MSM and LSM: Sustainable development initiatives*.

Richards, L & Morse, JM 2012, *Readme first for a user's guide to qualitative methods*, Sage.

Rodrigues da Silva Enríquez, MA & Drummond, J 2007, 'Social-environmental certification: Sustainable development and competitiveness in the mineral industry of the Brazilian Amazon', in *Natural Resources Forum*, vol. 31, pp. 71-86.

Rokeach, M 1973, *The nature of human values*, Free press.

Rose, M 2016, ''It's Dangerous, but these are my People': The Assimilation of a Catholic Priest among the Meto of Oecussi', *The Asia Pacific Journal of Anthropology*, vol. 17, no. 1, pp. 66-82.

Rozali, S 2007, 'Microfinance for developing poor communities in East Nusa Tenggara: problems and solutions from the perspective of a non-government organisation', in S Djoeroemana, B Myers, J Russell-Smith, M Blyth & E Salean (eds), *Integrated rural development in East Nusa Tenggara, Indonesia*, ACIAR.

Rusli, R & Duek, A 2010, *The natural resources industry in decentralised Indonesia: How has decentralisation impacted the mining, oil and gas industries*.

Sahin, SB, Lewis, B & Lewis, J 2012, 'Fractured futures: Indonesian political reform and West Timorese manganese mining', *Global Change, Peace & Security*, vol. 24, no. 2, pp. 289-304.

Santamaria, AB 2008, 'Manganese exposure, essentiality & toxicity', *Indian Journal of Medical Research*, vol. 128, p. 484+.

Santos-Burgoa, C, Rios, C, Mercado, LA, Arechiga-Serrano, R, Cano-Valle, F, Eden-Wynter, RA, Texcalac-Sangrador, JL, Villa-Barragan, JP, Rodriguez-Agudelo, Y & Montes, S 2001, 'Exposure to manganese: Health effects on the general population, a pilot study in Central Mexico', *Environmental Research*, vol. 85, no. 2, pp. 90-104.

Schwartz, SH 1994, 'Are there universal aspects in the structure and contents of human values?', *Journal of Social Issues*, vol. 50, no. 4, pp. 19-45.

Scoones, I 1998, *Sustainable Rural Livelihoods: A framework for analysis*, https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/3390/Wp72.pdf?sequence=1.

Scoones, I 2009, 'Livelihoods perspectives and rural development', *The Journal of Peasant Studies*, vol. 31, no. 1, pp. 171-196.

Shen, L & Gunson, AJ 2006, 'The role of artisanal and small-scale mining in China's economy', *Journal of Cleaner Production*, vol. 14, no. 3–4, pp. 427-435.

Siegel, S & Veiga, M 2009, 'Artisanal and small-scale mining as an extralegal economy: De Soto and the redefinition of "formalization"', *Resources Policy*, vol. 34, pp. 51-56.

Siegel, S & Veiga, MM 2010, 'The myth of alternative livelihoods: artisanal mining, gold and poverty', *International Journal of Environment and Pollution*, vol. 41, no. 3, pp. 272-288.

Simatauw, M 2002, *The polarization of the people and the state on the interests of the political economy and women's struggles to defend their existence*.

Sinding, K 2005, 'The dynamics of artisanal and small-scale mining reform', *Natural Resources Forum*, vol. 29, no. 3, pp. 243-252.

Smith, N 2013, *Contested discourses: Aboriginal attitudes towards non-native plants and engagement in weed management in Cape York, northern Australia*, Charles Darwin University.

Spiegel, S 2012, 'Governance institutions, resource rights regimes, and the informal mining sector: regulatory complexities in Indonesia', *World Development*, vol. 40, no. 1, pp. 189-205.

Spiegel, S, Keane, S, Metcalf, S & Veiga, M 2015, 'Implications of the Minamata Convention on Mercury for informal gold mining in Sub-Saharan Africa: From global policy debates to grassroots implementation?', *Environment, Development and Sustainability*, vol. 17, pp. 765-785.

Spriggs, M 2011, 'Archaeology and the Austronesian expansion: Where are we now?', *Antiquity*, vol. 85, p. 510+.

Starke, L 2002, 'Breaking new ground: Mining, minerals, and sustainable development', *London: Earthscan*.

Suddin, S 2017, 'Resources of Boti Village (Timor Island) for the ecotourism development', *Journal of Indonesian Tourism and Development Studies*, vol. 5, no. 2.

Suharyo, W, Toyamah, N, Poesoro, A, Sulaksono, B, Usman, S & Febriany, V 2007, *Improving the business climate in NTT: the case of agriculture trade in West Timor*.

Sujana, N 2014, *Elements of life for the Timor people,* Indonesia Nature Film Society.

Sullivan, B 2018, 'Proposed changes to mining law: Shuffling the deck chairs on the Titanic', *Coal & Mineral Asia Magazine*, vol. 87.

Suparlan, P 1985, 'Kebudayaan Timor', in Koentjaraningrat (ed.), *Manusia dan kebudayaan di Indonesia*, Djambatan.

Szczepanski, K 2002, 'Land policy and adat law in Indonesia's forests', *Pacific Rim Law & Policy Journal Association*, vol. 11, no. 1, pp. 231-255.

Tahu, MF & Meak, BU 2013, *Menata yang rusak karena tambang: Sebuah pengalaman advokasi kebijakan publik di Timor Barat, Nusa Tenggara Timur*, Pustaka Pelajar, YABIKU and OXFAM.

Telmer, KH & Veiga, MM 2009, 'World emissions of mercury from artisanal and small scale gold mining', in *Mercury fate and transport in the global atmosphere*, Springer.

Thorburn, C 2002, 'Regime change - prospects for community-based resource management in post-New Order Indonesia', *Society & Natural Resources*, vol. 15, no. 7, pp. 617-628.

Tidey, S 2012, 'A divided provincial town: The development from ethnic to class segmentation in Kupang, West Timor', *City and Society*, vol. 24, no. 3, pp. 302-320.

Tjoe, Y 2016, 'Measuring the livelihood vulnerability index of a dry region in Indonesia: A case study of three subsistence communities in West Timor', *World Journal of Science, Technology and Sustainable Development*, vol. 13, no. 4, pp. 250-274.

Traube, EG 1986, *Cosmology and social life: Ritual exchange among the Mambai of East Timor*, University of Chicago Press.

Trindade, J 2011, '*Lulik*: The core of Timorese values', paper presented to *Communicating new research on Timor-Leste 3rd Timor-Leste Study Association (TLSA) Conference*, 30th June 2011.

Tschakert, P 2009, 'Recognizing and nurturing artisanal mining as a viable livelihood', *Resources Policy*, vol. 34, no. 1–2, pp. 24-31.

Tyson, A 2011, 'Being special, becoming Indigenous: Dilemmas of special *Adat* rights in Indonesia', *Asian Journal of Social Science*, vol. 39, pp. 652-673.

UN 2008, *United Nations Declaration on the rights of Indigenous peoples*, http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf.

Vale 2015, *Manganese and ferroalloys,* http://www.vale.com/australia/EN/business/mining/manganese/Pages/default.aspx.

Valeri, V 1985, *Kingship and sacrifice: Ritual and society in ancient Hawaii*, University of Chicago Press.

Van Opstal, M & Hugé, J 2013, 'Knowledge for sustainable development: a worldviews perspective', *Environ Dev Sustain*, vol. 15, pp. 687-709.

Van Rheenen, G 2011, *Defining an Animistic Worldview,* http://www.missiology.org/defining-an-animistic-worldview/.

Veiga, MM, Maxson, PA & Hylander, LD 2006, 'Origin and consumption of mercury in small-scale gold mining', *Journal of Cleaner Production*, vol. 14, no. 3, pp. 436-447.

Verbrugge, B 2016, 'Voices from below: Artisanal-and small-scale mining as a product and catalyst of rural transformation', *Journal of Rural Studies*, vol. 47, pp. 108-116.

Vidal, C 2008, 'Wat is een wereldbeeld? (What is a worldview?)', in H Van Belle & J Van der Veken (eds), *De wetenschappen en het creatieve aspect van de werkelijkheid*, Acco.

Vidal, C 2012, 'Metaphilosophical criteria for worldview comparison', *Metaphilosophy*, vol. 43, no. 3, pp. 306-347.

Warnaars, X 2012, 'Why be poor when we can be rich? Constructing responsible mining in El Pangui, Ecuador', *Resources Policy*, vol. 37, no. 2, pp. 223-232.

Weiss, B 2000, 'Vulnerability of children and the developing brain to neurotoxic hazards', *Environmental Health Perspectives*, vol. 108, no. Suppl 3, p. 375.

Wennberg, A, Iregren, A, Struwe, G, Cizinsky, G, Hagman, M & Johansson, L 1991, 'Manganese exposure in steel smelters a health hazard to the nervous system', *Scandinavian Journal of Work, Environment & Health*, pp. 255-262.

Whitmore, A 2006, 'The emperors new clothes: Sustainable mining?', *Journal of Cleaner Production*, vol. 14, no. 3, pp. 309-314.

Widiyono, W 2008, 'Konservasi flora, tanah dan sumberdaya air embung-embung di Timor Barat Provinsi Nusa Tenggara Timur (The conservation of flora, land and water catchment reservoirs in West Timor, NTT)', *Jurnal Teknologi Lingkungan*, vol. 9, no. 2, pp. 197-204.

Wiriosudarmo, R 2001, *Baseline study and gap analysis on mining in Indonesia*, IIfEa Development.

World Commission on Environment and Development 1987, *Our Common Future*, http://www.un-documents.net/our-common-future.pdf.

World Food Programme 2015, *Peta ketahanan dan kerentanan pangan Nusa Tenggara Timur Tahun 2015 (Food security and vulnerability in East Nusa Tenggara 2015)*.

Yakovleva, N 2017, *Corporate social responsibility in the mining industries*, Routledge.

Young, J & Septoff, A 2002, *Digging for change: Towards a responsible minerals future, an NGO and community perspective*, http://bankwatch.org/documents/eir_mineralsfuture.pdf.

Appendices

Appendix A: Interview Questions

Guiding interview questions semi-structured interviews with key informants (e.g. heads of the village or hamlet)

Date: Location: Number:

Name:

When did mining start here?

How has mining changed since it started? Types of mining, more or less frequent?

Is the mining happening now? (past, present and future activity)

When was the busiest time since mining began? (ie. most amount of manganese being taken out)

Who do you sell to? Has this always been the same?

Do they grade the mangan by quality? Is there any other people involved apart from the buyers?

What is the current price?

How much goes to the miner and how is it shared? How much to the landholder?

Are there other costs? Excavator?

And how has the price changed?

How have you mined? Digging with hand tools, or machinery (excavator)?

How many people usually mine here? Has the number changed since mining began?

Where are the miners from?

Do miners live here sometimes, or always travel here?

Are family groups involved? What are the ages of people who mine here?

How is the mining structured? Who can work in what areas?

Who digs and who sorts?

Is the mining seasonal? How do people farm and mine?

Since mining do less people travel further for work?

How much manganese can miners mine per day? How much can they sell?

What benefits are there from mining? What do people here usually use the income from mining for?

Has there been other benefits? Are there benefits for the community?

What was the land used for before mining?

Was there any negative impacts from mining?

Was vegetation removed to make the mine?

Has there been any landslides?

Has anyone been injured or died here?

Has anyone become sick from the mining?

Are there other mines nearby?

Was there a ceremony performed before people started mining in this area? What other rituals have been performed for mining?

Are there any particular beliefs about manganese? Does it have special qualities?

Are there sacred areas that are protected from mining?

How long will the mine stay open for?

What will happen to the mine when mining is finished? Who is responsible for ceremonies and rehabilitation?

What are the main concerns about the mine? The price? Health and safety? Environment? What happens after mining? And how do people feel about licences and their bargaining power?

What are your thoughts on current mining management?

What do you think about large-scale companies, companies buying from locals or community licences with investors?

How could mining be regulated better?

Any other comments?

Interview questions for semi-structured interviews with miners, community members and landholders

Date: **Location:** **Number:**

Name: **Gender:** **Age:** **Time:**

Household:

When did you start mining and where?

How often do you mine? How much can you mine in a day?

How far do you travel to mine?

Do you mine on your own or in a group?

What tasks do you do and how do you share that in the group? Share money?

What has been your experience of learning to mine? Was it difficult or strange at first?

What is your main form of income currently to help your family with its needs?

Negative and Positive Aspects

How does mining help or impact your farming activities?

How has mining helped you and your family? How much income can you earn per day/week form mining?

What have you used the income from mining for?

How has it affected other people who are mining and their families?

How has it impacted community development?

What negative impacts have you experienced from mining? Health? Social? Environmental? Conflict?

How do you think these impacts could be addressed? By who?

What changes has mining brought? Are they good or bad?

Beliefs

Is manganese sacred or does it have special qualities? Is it different to other rocks?

How do you feel about mining manganese? Does it feel different to farming?

Does the land feel different after mining?

Are there some places that are sacred that shouldn't be mined?

Do people here share similar beliefs or do they differ?

What rituals are required or used for mining?

Sustainable mining

How long do you think mining will continue?

What would you use the money for in the future if you could mine again?

Could the money be used for the community?

What would you do differently if you mined again? What have you learnt from last time?

How would you like to mine next time? Manually with community or with a company and heavy machinery?

How would you like the government to help?

Any other comments?

Appendix B: Involvement in GPFD Project Activities

The researcher attended and was involved in the following Government Partnerships for Development (GPFD) project activities:

1. Community mining forum, held in Bokong, West Timor in February 2015
2. GIS workshop for mapping mines and mining impacts, held in Soe, West Timor in July 2015
3. Workplace mining study tour with six Indonesian representatives, held in Darwin and Canberra in November 2015
4. Community mining forum, held in Tubuhue, West Timor in May 2016
5. Writing workshop held in Bali in August 2016
6. ASM international conference titled “Community mining in Indonesia: Minimising harm, maximising benefits” held Jakarta in November 2016
7. Writing workshop, held in Soe, West Timor in May 2017
8. Research presentations, held at UNDANA, Kupang, West Timor in September 2017