



Thesis

entitled

**Examining a political ecology of illegal sand mining and the socio-environmental
conflicts in Harare Metropolitan Province, Zimbabwe**

submitted by

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DECLARATION

I, **Ernest Kudakwashe Mando**, hereby declare that the thesis entitled: “**Examining a political ecology of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe**”, which I hereby submit for the degree of PhD in Environment Management within the Department of Environmental Sciences at the University of South Africa, is my own work and has never previously been submitted by me for a degree at this or any other institution.

I declare that where words from a written source have been used, the words have been paraphrased and referenced and where exact words from a source have been used the words have been placed inside quotation marks and referenced.

I declare that I have not copied and pasted any information from the internet, without specifically acknowledging the source and have inserted appropriate references to these sources in the reference section of the dissertation.

I declare that during my study I have adhered to the Research Ethics Policy of the University of South Africa and have not acted out of these guidelines.

I declare that the content of my dissertation has been submitted through “Turn-it-in” before the final submission for examination.

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Date: 21/01/2024



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ABSTRACT

Globally, sand accounts for approximately 30 percent of global annual solid material consumption, mainly for construction purposes. Sadly, about 50 billion tons of sand is mined illegally especially in developing regions such as Africa where there are high levels of unemployment, poverty and low standards of living. This has resulting in a myriad of socio-environmental problems such as environmental degradation, poor stakeholder relations and social malpractices. In Zimbabwe, most open spaces in urban and peri-urban areas are exploited for sand or gravel mining. In Harare Province, in which the capital city lies, areas such as Hopley farm, Retreat Farm, Waterfalls, Epworth and Chitungwiza have become havens of illegal sand mining. Unfortunately, the illicit and indiscriminate nature of sand mining activities have created conflict between the various stakeholders including central and local government, civil society, local community members, industry and the illegal sand miners.

The few available studies on illegal sand mining, in Zimbabwe have narrowly focused on either causes or impacts of illegal sand mining without exploring the broader and intertwined issues such as governance and the political ecology, and the socio-environmental conflicts associated with illegal sand mining. Having recognised this gap in the literature, this study examines the various interconnected social, economic, political and environmental issues that underpin illegal sand mining in Zimbabwe by conducting a qualitative study in the three areas of Epworth, Retreat Farm and Zeze east. The study is premised on the political ecology framework, reflexive governance framework, land resource theory and stakeholder theory. The political ecology framework informs the study in establishing the interconnected social, political and economic issues on illegal sand mining and conflicts. Similarly, the study utilises the land resource conflict theory to explain conflict that emerge over land use, in this case for the purpose of sand mining. The stakeholder theory explains the utility of stakeholder collaboration in achieving socio-environmental sustainability in the sand mining sector while reflexive governance guides the study in analysing how existing sand governance actions are relevant in addressing illegal sand mining and conflicts in Zimbabwe at large.

By way of empirical investigation, study participants were purposively selected from various sectors including the local government, non-governmental organisations, industry, illegal sand miners and local communities. Qualitative data were collected using semi-structured interviews including face-to-face and telephone interviews, observation and document analysis. Results of the study indicate that illegal sand mining is driven by a set of economic, social and political factors such as poor government policies (land reform policy and indigenisation policy), unemployment, urbanisation, poor national economic performance and declining standards of living of local communities. Emerging impacts include environmental degradation, land use alterations, social malpractices and safety and health problems. The combination of these issues acts as a catalyst in generating social and environmental conflict in Zimbabwe. The study noted limited stakeholder engagement in addressing illegal sand mining and conflicts. However, poor enforcement, corruption, limited stakeholder engagement in design, implementation and evaluation processes hinder reflexive governance of illegal sand mining in Zimbabwe. A study conclusion emphasises the need for efficient and effective reflexive governance and stakeholder engagement for social, environmental and economic sustainability in the sector.

In practice, the study recommends the adoption of a systematic approach to achieving sustainable sand mining by engaging various stakeholders such as the local community, civil society, government and non-governmental organisations (NGOs). As supported by the stakeholder theory, such stakeholders are key to the planning, implementation and review of

programs and actions that address the illegal sand mining problems in Zimbabwe. The study also proposes that the government regulate this informal activity, designate more land for sand mining and incentivise sustainable sand mining by local community members. Furthermore, the study recommends the introduction of an extractive sector fund to support programs for sustainable sand mining.

Key Words: Political ecology; Illegal; Sand mining, Socio-environmental conflict; Zimbabwe.

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LIST OF ABBREVIATIONS

A-GPS:	Assisted Global Positioning System
CAES:	College of Agriculture and Environmental Sciences
CPU:	Civil Protection Unit
CSOs:	Community Social Organisations
CM:	Chitungwiza Municipality
DA:	District Administrator
DEA:	Department of Environmental Affairs
DEO:	District Environmental Officer
DMR:	Department of Mineral Resources
DoNR:	Department of Natural Resources
DWA:	Department of Water Affairs
ECF:	Environmental Conservation Forum
EHT:	Environmental Health Technician
ELB:	Epworth Local Board
EMA:	Environmental Management Agency
EMCA:	Environment Management and Coordination Act
EMP:	Environmental Management Plan
EMS:	Environmental Management Services
EP:	Environmental Protection
EPA:	Environmental Protection Agency
EPA:	Environmental Protection Agency
EPBC:	Environment Protection and Biodiversity Conservation
EPR:	Environment Protection Regulation
ESIA:	Environmental and Social Impact Assessment
EU:	European Union
FTLR:	Fast Track Land Reform

FTLRP:	Fast Track Land Reform Program
GEAS:	Global Environmental Alert Service
GGZ:	Go Green Zimbabwe
GHGs:	Greenhouse Gases
GIS:	Geographic Information Systems
GNN:	General Notice Number
GPS:	Global Positioning System
HCC:	Harare City Council
IDEA:	International Institute for Democracy and Electoral Assistance
ILO:	International Labour Organization
LDRAT:	Local Development Research Advocacy Trust
LEAP:	Local Environmental Action Plan
LGB:	Local Government Board
LVB:	Land Valuation Board
MoFA:	Ministry of Food and Agriculture
MMMD:	Ministry of Mines and Mining Development
MPRDA:	Mineral and Petroleum Resources Development Act
NDME:	National Department of Minerals and Energy
NEMA:	National Environmental Management authority
NGO:	Non-Governmental Organization
NRGF:	Natural Resource Governance Framework
NRM:	Natural Resources Management
NSSA:	National Social Security Authority
NTPC:	National Thermal Power Corporation
PPE:	Personal Protective Equipment
SI:	Statutory Instrument
TSCZ:	Traffic Safety Council of Zimbabwe

UK:	United Kingdom
UN:	United Nations
UNDP:	United Nations Development Program
UNEP:	United Nations Environmental Program
UNESCAP:	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO:	United Nations Educational, Scientific and Cultural Organization
USA:	United States of America
USAID:	United States Agency for International Development
USD:	United States Dollar
WASH:	Water, Sanitation and Hygiene
WHO:	World Health Organisation
ZANU PF:	Zimbabwe African National Union Patriotic Front
ZBC:	Zimbabwe Broadcasting Corporation
ZDA:	Zinyengere Development Association
ZRP:	Zimbabwe Republic Police

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DEFINITIONS OF KEY CONCEPTS

While there are various contextual and scholarly definitions of concepts on sand mining and conflicts, this section defines key terms in the context of this study. These include among others; political ecology, reflexive governance, sand mining, illegal sand mining and socio-environmental conflicts. However, further discussion about the key concepts underpinning this study is done in the literature review chapter.

Abstraction: The process of extracting sand from the water body or dry part of the earth using machinery (Bagchi, 2010). Lange (2011) similarly attributes abstraction as the the process of removing sand, gravel or water from the source using some form of machinery. In this study, sand abstraction refers to the mining of sand in undesignated spaces, using rudimentary methodologies and by unauthorized persons for the purpose of selling sand for livelihood.

Conflicts: disagreements that exist between two or more parties when a common interest is not achieved (Alimin, 2019). Economic factors, social factors, political factors and environmental factors drive conflicts (Beevers, 2019). In this study, economic conflicts refer to conflicts that result from accessing income generating resources such as mining land, sand and markets. Environmental conflicts revolve around the environmental impacts of illegal sand mining versus enforcement while social conflicts revolve around legitimacy, human rights and community welfare.

Governance: According to Grin et al. (2010), governance is the application of institutional and legislative practices to promote sustainable development. Similarly, Katisya-Njoroge (2021) defines governance as a set of policies and programs for achieving sustainable societies, economies and environment. In this study, governance is a concept that describes institutions, policies and practices that promote socio-environmental sustainability in the sand mining sector.

Illegal sand mining: illegal sand mining is a type of illicit sand mining that is unregulated and occurs at undesignated areas (Chevallier, 2014; Lange, 2011). In this study, illegal sand mining entails all sand mining activities whether small-, medium- or large-scale that occurs without

the approval of local authorities. This type of mining is more pronounced in open spaces, undesignated areas and involving rudimentary mining methodologies

Political ecology: According to Dawson (2021), political ecology is a discipline within environmental studies that focuses on power relations as well as the interaction of nature and society. This study defines political ecology as a framework used to explain illegal sand mining and conflicts by exploring interconnected social, economic and political factors.

Reflexive governance: a modern governance approach that involves development and re-designing of policies and practices that suit current needs (Haas & Jasanoff, 2012). In this study, reflexive governance is defined as a governance approach that calls for adoption of flexible policies and regulations that address illegal sand mining and socio-environmental conflicts.

Sand mining: an extractive activity that involves the abstraction, transport and consumption of sand mainly for construction purposes (Zhu, 2022).

Social sustainability: a business practice that observes the negative and positive impacts of operations on society with the aim to achieve sustainability (Schmitz, Stinson and James, 2010). In this study, social sustainability is defined as sand mining that addresses both current and future societal needs and environmental needs.

Sustainable development: development that meets needs of the current generation without jeopardizing the needs of future generations (Murombo, 2011). In this study, sustainable development is related to sand mining, and how illegal sand mining interferes with it.

CHAPTER 1 INTRODUCTION

1.1 Introduction

Globally, sand is one of the most valuable extractive resources used as raw material for construction purposes. Sand accounts for approximately 79% of the primary material inputs used in infrastructure construction such as buildings and transport systems (Mah, 2015; Adu-Gyamfi, 2016; Patil & Shinde, 2016; Garside, 2021). Due to its demand, more than 50 billion tons of solid material is mined globally every year (Leal Filho et al., 2021; Greenfacts, 2022). In West Africa alone, more than 40 billion tons of coastal sand is extracted every year while 30 percent of it is used in making concrete (United Nations Development Program [UNDP], 2016; Asori et al., 2022). This growing global demand has resulted in illegal sand mining in most regions especially in Asia and Africa that are relatively underdeveloped (Bagchi, 2010; Chevallier, 2014; Ujoh, 2014; Dung, 2011) leading to various socio-environmental problems such as pollution, land degradation and conflicts (Asori et al., 2022). In Zimbabwe, illegal sand mining remains prevalent and the cause of conflict despite the existence of regulatory efforts (Lange, 2011). Moreover, many open spaces in urban and peri-urban areas in major towns and cities are illegally mined for sand and gravel resulting in a wide range of socio-environmental problems (Mushonga, 2022; George & Steven, 2022). In Harare Metropolitan Province, illegal sand mining is more pronounced in areas such as Epworth, Retreat Farm, Hopley and Zengeza (Chimhete, 2004; Mushonga, 2022).

However, political ecology has not fully utilised to examine illegal sand mining issues and conflicts despite its wide application in global environmental issues (Dawson, 2021; Baba, 2014). As such, most previous studies on illegal sand mining did not unpack the salient political, economic and social issues that underpin illegal sand mining and associated conflicts (Rochayati et al., 2020; Azhary et al., 2020; Upadhyay, 2019; Elavenil et al., 2017; Dalu et al., 2017; Cooray & Gamage, 2016; Adu-Gyamfi, 2016; Mah, 2015; Ratnayake, 2013; Chevallier, 2014; Singh et al., 2014; Masalu, 2010). In Zimbabwe, the relatively few studies on sand mining are silent on the interconnected social, political and economic issues that perpetuate this problem, nor attempt to explain the nexus with socio-environmental conflict (Mushonga, 2022; George & Steven, 2022; Dalu et al., 2017). Against that backdrop, this study critically examines illegal sand mining and associated socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe from a political ecology perspective. Political ecology will

be described in more detail in Chapter 2 and is the study of the relationship between society and the environment from a broader economic, social and political context (Robertson, 2015; Neumann, 2009; Stott & Sullivan; 2000).

This chapter is divided into eight sections. The current section is followed by section 1.2 that presents a background to the study including a discussion of the global overview of sand mining and illegal sand mining, drivers of illegal sand mining, impacts, associated conflicts, and legal framework and governance of illegal sand mining. Section 1.3 outlines the research problem and is followed in section 1.4 with the study aim, research questions and research objectives. Section 1.5 explains the process of data collection for both primary and secondary data while section 1.6 outlines the data analysis procedures. Section 1.7 outlines the significance of the study while section 1.8 provides a summary and outline of the thesis.

1.2 Background

Approximately 50 billion tonnes of sand are extracted globally every year (Madyise, 2013; United Nations Environmental Program [UNEP], 2014; Bari & Haque, 2022; Zhu, 2022). However, only 15 billion tonnes of sand is thought to be traded legally (Mahadevan, 2019) suggesting massive levels of illegal sand mining. While sand has created a lucrative business for illegal sand miners (Zhu, 2020), the activity has become a serious global socio-environmental problem. The literature indicates that sand is mainly used in the construction sector (Jacob, 2010; Kamis, 2011; Chevallier, 2014; Adedeji et al., 2014, Lempriere, 2017) due to urbanisation, especially in third world countries (Dawson, 2020; Milton, 2010; Muchadenyika & Williams, 2016). According to Lempriere (2017), relative sand demand during the 20th century was highest in China, Singapore and India. Table 1.1 indicates some of the global production volume requirements of sand from 2010 to 2023.

Production statistics clearly show that sand demand is high and as an export commodity, many countries are key exporters of sand (Gavriletea, 2017; Harris, 2003; Schoof, 2014; Kolman, 2015; Swanson, 2015; Murdoch, 2016). Most sand production and export occurs in countries surrounded by the desert in the Middle East (Gavriletea, 2017). Although the economic value of sand mined illegally is not known in these countries, sand mining in the formal sector has resulted in significant revenues for governments through exports (Gamage et al., 2020). Countries such as Qatar are among the largest importers of sand where, for example in 2012 alone, its import value was approximately US\$6.5 billion and so ranking as the world's largest importer for that year (Schoof, 2014). It was followed by the United Arab Emirates whose

import value was approximately US\$456 billion (Churchill, 2016). In 2020, the United States exported the highest share of sand of any nation worldwide, accounting for a 24% share of the global sand exports based on value that year. The Netherlands was the next largest sand exporter that year, accounting for 13.3% of all exports (Garside, 2021).

Table 1.1: Industrial sand and gravel production worldwide from 2010 to 2023 (*in*

<i>Year</i>	<i>Production in million metric tons</i>
2010	113
2011	126
2012	130
2013	147
2014	195
2015	189
2016	180
2017	273
2018	335
2019	325
2020	235
2021	353
2022	359
2023	400

million metric tons)

(Source: Statista, 2024)

The above global production trend suggests that illegal sand mining may be an inherent feature of the global extractive sector. According to UNEP (2023), 60 billion tonnes of sand is mined every year globally for multi-purposes, and of this around 85% of all mining activity in the world involves sand and gravel mining. Of this, illegal sand mining accounts for approximately a third of global sand mining (Torres et al., 2021), mainly for construction purposes (Lempriere, 2017; Peduzzi, 2014; Propescu, 2018; Gavriletea, 2017). Although the exact amount of sand consumption from illegal sand mining for construction purposes is not known, estimates show that more than 12% of annual sand consumption, estimated at 55 billion tons, is illegally mined (Sverdrup et al., 2017; Mark, 2021). This translates to about 16% of illegal sand used for various purposes.

Sand is used to manufacture concrete (Duan et al., 2019) and the cement industry is the largest consumer of sand and gravel (Edwards, 2015). In response to economic growth and rapid

urbanisation, China used more cement between 2011 and 2013 in infrastructure development than the U.S. used in the entire 20th century (Swanson, 2015; Gong et al., 2012).

It is such sand demand that has culminated in illegal sand mining in countries such as Brazil, Indonesia, Turkey, Vietnam and South Korea (Plummer, 2014; Chilamkurthy et al., 2016; Suchitra, 2019). In Indonesia, coastal illegal sand mining accounts for 10% of total sand consumption per year (Beiser, 2017; Soelistijo, 2011). Similarly, in Brazil more than 30% of natural resources are extracted illegally and sand accounts for more than half of illegally mined resources annually (Sverdrup et al., 2017; Gong et al., 2012). As indicated, in developing countries, urbanisation remains a leading factor as to sand demand for construction purposes (Torres et al., 2021; Ye et al., 2020). However, unemployment is one of the major drivers of illegal sand mining (Torres et al., 2021; Milton, 2010; Saviour, 2012; Business Monitor International (BMI), 2014). This suggests that urbanisation and unemployment are central to global sand mining problems.

This is despite existing laws and regulations to address both population mobility and socio-environmental issues such as illegal sand mining (Mando et al., 2019). In Nepal, all mineral development activities are regulated under the Mines and Mineral Act, 1985 and its amendment in 1993 and the Mines and Mineral Regulation, 1999 (Sada & Shrestha, 2013; Dahal et al., 2012). Similarly, in Iceland, the 2000 Law on Environmental Impact Assessment and the 1997 Planning and Construction Law (Agenda 21, 1997) regulates all land resources. In Africa, legislative frameworks do exist, so that in Kenya, sand mining and all other mining operations are regulated under the Mining Act Cap.306 (Arwa, 2002; Obala & Mattingly, 2014). In Ghana, sand mining is regulated through the Environmental Protection Agency (EPA), local authorities and police (Andrews, 2015; Jonah et al., 2015; Mensah & Okyere, 2014) while in South Africa, illegal sand mining is regulated through the Department of Environmental Affairs (DEA) (Chevallier, 2014). In Zimbabwe, sand mining is regulated through a set of legislations that includes the Environmental Management Act and the Mines and Minerals Act together with other supporting instruments (Mandondo, 2000; Chigudu & Chirisa, 2020) including illegal sand mining (Chimhete, 2004; Dalu *et al.*, 2017).

However, studies show that weak governance is the main obstacle to the efficacy of existing legislation in combating illegal sand mining and related conflict (Komnitsas, 2020; Padmalal & Maya, 2014; Green, 2012; Saviour, 2012; Ashraf et al., 2011; Chilamkurthy et al., 2016, Azhary *et al.*, 2020; Mark, 2021). In West Africa, existing mechanisms and policies fail to

effectively regulate illegal sand mining due to poor enforcement (Word Bank, 2018 and corruption (Green, 2012). In Nigeria, citizens castigated government's failure to address illegal sand mining activities across the country as they engaged in a series of demonstrations (Adedeji, 2014). Similarly, Chevallier (2014) criticised poor illegal sand mining regulation in KwaZulu-Natal and the Eastern Cape, South Africa and attributed this to lack of financial and human resources support to ensure environmental compliance and protection. However, some scholars identified stakeholder collaboration deficiencies as responsible for environmental malpractices, weak governance and conflicts (Lim et al., 2021; Gunarathne et al., 2016; Ranängen & Zobel, 2014). Clearly, all these issues indicate that the existence of legislative frameworks does not automatically translate into efficacy, efficiency and effectiveness, unless there is proper governance. Indeed, reflexive governance remains a fundamental aspect of achieving sustainable mining.

Nevertheless, other scholars feel that limited reliable global data on the pattern and quantity of sand consumption hinder effective management of illegal sand mining (Krausmann et al., 2009). According to the United Nations Environment Programme Global Environmental Alert Service [UNEP-GEAS], such an information gap makes in-depth environmental assessment of illegal sand mining very difficult (UNEP-GEAS, 2014). Similarly, reports noted that lack of reliable global data on sand production and consumption weakens evidence-based sand governance, including illegal sand mining (Ghosh, 2012; Liu et al., 2021). Churchill (2016) also argued that world consumption of sand aggregates, estimated at 30 billion in 2012, cannot provide adequate evidence and direction on the current rate of illegal sand mining. For example, between 2010 and 2015, the United States of America (USA) was the largest sand producer, followed by Italy, France and Germany (Gavriletea, 2017). Accurate global data on illegal sand mining and consumption patterns also remains scarce as to the large volumes of illegal sand consumption (Ali, 2020). This suggests that measures adopted by governments to curtail the problem may not be relevant and adequate to achieve reflexive governance status.

In addition to quantifying the costs and benefits of illegal sand mining, reports indicate that illegal sand mining has resulted in a myriad of socio-economic and environmental impacts including multistakeholder socio-environmental conflicts (Duncan, 2020; Robinson & Brown, 2002; Masalu, 2010; Steinberger et al., 2010; Valéro, 2015; Elavenil et al., 2017). Environmental impacts mainly include environmental degradation, pollution and alteration of geomorphological systems (Ratnayake, 2013; Singh et al., 2014; Mah, 2015). Social impacts

range from crime, prostitution, displacements and conflicts (Huang & Xu, 2020, Davey, 2001; while economic impacts mainly include interference with other productive sectors (Duncan, 2020; Adedeji, 2014; Mwangi, 2007; Madyise 2013). Because illegal sand mining is a lucrative business, particularly in developing countries with high unemployment (Madyise, 2013), there remains resistance to national regulations (Davey, 2001; Bagchi, 2010; Chevallier, 2014; Mngeni et al., 2017). Indeed, recent studies confirm that illegal sand mining is still an ongoing global issue (Mark, 2021; Bendixen et al., 2021; Purnomo et al., 2021; Dawson, 2021; Abraham et al., 2021; Rokhim et al., 2021; Bhattacharya & Das Chatterjee, 2021). Although no substantial evidence is currently available to quantify global illegal sand production and consumption rates, there are fears that illegal sand mining is much more extensive and environmentally worrisome (Dawson, 2021). The extraction rates of sand and gravel are higher than renewal rates through erosive processes (UNEP, 2014, Chevallier, 2014). Furthermore, illegal sand mining often involves rudimentary methodologies in the excavation, transportation and consumption of sand, thereby exposing the environment to massive degradation (Padmalal et al., 2008; John, 2009; Saviour, 2012; Ashraf et al., 2011; Frohlich, 2017; Propescu, 2018).

All these issues clearly show that illegal sand mining is indeed an interconnected and complex issue that requires a broader oriented management approach. Sadly, relatively little of the available literature highlights the intertwining issues that underpin illegal sand mining and associated socio-environmental conflicts on a global, regional and local scale, suggesting a limited adoption and application of political ecology in addressing these issues. In Africa, few academic studies have employed a political ecology approach to present a broader picture of illegal sand mining and associated conflicts. In particular, no academic studies have explored illegal sand mining within Zimbabwe from a wide political ecology perspective and mainly media reports have attempted to unearth illegal sand mining issues in Zimbabwe (Chimhete, 2004; Lange, 2011; Mushonga, 2022; Saunyama, 2017).

Figure 1.1 indicates some of the academic studies involving illegal sand mining since 2010. These reflect concern over the adverse impacts of these illegal activities. Although a significant number of studies were conducted in Europe, Africa and Asia, there are relatively few academic African studies that examined local illegal sand mining issues (Nguru, 2008; Arwa, 2013; Greens, 2012; Chevallier, 2014; Adedeji, 2014). In Zimbabwe, the few recent qualitative studies on illegal sand mining mainly focused on environmental impacts and governance but were silent as to conflict issues (Mushonga, 2022; George & Steven, 2022).



Source: Researcher’s compilation from Scopus literature search in 2023.

Figure 1.1: Global distribution of studies on illegal sand mining

As depicted above, while there is a substantial number of studies on sand mining have been conducted in Africa, there remains relatively fewer studies that focused on illegal sand mining and particularly from a political ecology lens. Against that backdrop, this study examines a political ecology of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province to bridge the existing knowledge gap and proffer reflexive governance solutions to the problem of illegal sand mining and associated conflicts in Zimbabwe.

1.3 Research problem

Reports indicate that there is rampant, illicit sand mining in Zimbabwe (Chimhete, 2004; Lange, 2011; Mushonga, 2022). Illegal sand mining is more pronounced in big cities such as Harare, Bulawayo and Gweru. In Harare Metropolitan Province, illegal sand mining hotspots in and around Harare include Harare south, Zengeza and Epworth (Ibid). Previous studies showed that illegal sand mining in developing countries is mainly attributed to urbanisation and unemployment (Davey, 2011; Green, 2012; Madyise, 2013; Chevallier, 2014). Zimbabwe also experiences a high unemployment rate so that in 2016 and 2017, the unemployment rate in Zimbabwe stood at 5.18% and 5.16%, respectively (Trading Economics, 2018). The 2011 Labour Force Survey revealed that at least 3.7 million Zimbabweans were involved in informal sector activities with a significant number engaged in illegal sand mining for a living. More recently, the International Labour Organization (ILO) reported an increase to approximately 5.2 million people trading in the informal economy in Zimbabwe (ILO, 2021). From an urbanisation perspective, the Zimbabwe National Statistics Agency 2012 Census Provincial Report showed that Harare had a population of 1 485 231, Epworth 167 462 and Harare Metropolitan Province 2 013 048 individuals (Brinkhoff, 2017).

Illegal sand mining is unfortunately associated with various socio-environmental impacts (Torres et al., 2017; Tastet & Beaches, 2019; Hübler & Pothen, 2021). In Zimbabwe, illegal sand mining has increased in scale and scope over the years raising concern over sustainability of sand mining. According to Whitlow, as cited by the Environmental Management Agency (EMA), about 1.848.000 hectares of land in all agro-ecological regions in Zimbabwe are eroded and an average of 76 tonnes of soil is lost per hectare through soil erosion (EMA, 2015). While no specific studies have quantified the involvement of illegal sand mining on such environmental degradation, undoubtedly, illegal sand mining has contributed to this loss. Media reports indicate gullies caused by illegal sand mining have become breeding grounds for mosquitoes and traps for animals as well as people in the local communities (Lange, 2011; Mushonga, 2022) and Saunyama (2017) reported the tragic loss of a teenager during sand abstraction in Seke district.

The Environmental Management Act, Chapter 20:25 provides for the protection and management of natural resources (Muringaniza et al., 2022) and the 2013 Constitution refers to environmental rights while the Urban Councils Act and the Mines and Minerals Act also refers to sustainable land use and sustainable sand mining, respectively (Mushonga, 2022). In

addition, local authorities, town and rural councils are mandated to manage and protect all areas under their jurisdiction including designating sand mining sites, land rehabilitation and reclamation as an environmental protection responsibility (Saunyama, 2017). Despite the existence of state institutions to regulate sand mining, the laws are inadequate to address illegal sand mining. Saunyama (2017) noted that citizens have long grumbled over the inept governance of sand and gravel in the country, citing poor enforcement and corruptive practices among local authorities. More so, penalties are inadequate and do not deter illegal sand miners (Madyise 2013, Kafe, 2017; Saunyama, 2017). In addition, other government policies such as land reform and indigenisation policies appear to accelerate land conflict and social malpractices (Shoko et al., 2020; Mkodzongi & Lawrence, 2019; Cliffe et al., 2011). Given that Zimbabwe has an existing legislative framework related to mining and environmental management, yet illegal sand mining and associated socio-environmental conflicts persist, this prompted the researcher to examine the political ecology of illegal sand mining and the socio-environmental conflicts in Zimbabwe using a case study of Harare Metropolitan Province.

Despite the foregoing reports suggesting that illegal sand mining is indeed a problem in Zimbabwe, there remains a paucity of academic literature on illegal sand mining and this may be reflected at the global level (Elavenil et al., 2017; Chevallier, 2014; Green, 2012; Lawal, 2011; Madyise, 2013; Chilamkurthy et al., 2016; Leal Filho et al., 2021, Mark, 2021). Such reports appear deficient as to the interconnectedness of social, economic and political issues and illegal sand mining. More specifically, very few recent studies have employed a political ecology approach to examine the nexus of illegal sand mining with socio-environmental conflicts (Nnatuanya, 2021; Dawson, 2021; Miller, 2022). Against this background, this study seeks to address the key question; how does political ecology of illegal sand mining shape various socio-environmental conflicts in Zimbabwe?

1.4 Study aim, research questions and objectives

This section presents the aim of the study, and the specific research objectives and questions that emanated from the aim. A total of four research questions were thus formulated to enable the researcher to critically examine the political ecology of illegal sand mining and the socio-environmental conflicts in Zimbabwe.

1.4.1 Study aim

Thus, the present study seeks to examine how political ecology of illegal sand mining has shaped various socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe.

1.4.2 Research questions

1. What are the social, political and economic drivers for illegal land mining in Harare province, Zimbabwe?
2. What are the impacts and the associated conflicts of illegal sand mining in Harare province, Zimbabwe?
3. How are the various social stakeholders (i.e., community, government, industry and civil society) working collectively to combat illegal sand mining in Zimbabwe?
4. What is the efficacy of existing legislative framework and governance of illegal sand mining in Zimbabwe?

1.4.3 Research objectives

1. To critically determine the social, political and economic drivers for illegal land mining in Harare, Zimbabwe
2. To critically examine the impacts and the associated conflicts of illegal sand mining in Harare, Zimbabwe
3. To critically evaluate how affected communities, government, industry and civil society work collectively to combat illegal sand mining in Zimbabwe.
4. To critically analyse the legislative framework and governance of illegal sand mining in Zimbabwe.

1.5 Data collection

This section provides a brief background to the data collection and analysis techniques used in the study. More details about the methodological approach are available in Chapter 4. The following sections provide a summary of methods used in collecting primary and secondary data and the procedures adopted in data analysis.

1.5.1 Primary data

Primary data were collected using semi-structured interviews with key participants from government, industry, local communities and non-governmental organisations (NGOs). The study involved conducting, and recording, face-to-face or telephone interviews with individuals from environmental management agencies (EMA), respective local authorities, industry (sand mining companies), and NGOs, including local community-based organisations. The target population included only organisations and persons whose work concerned environmental matters, particularly sand mining. Due to the COVID-19 pandemic during the period of the study (2019), some interviews were conducted via telephone, particularly in the case of organisations that did not allow face-to-face interactions with outsiders during that period. However, most interviews were face-to-face with participants that were accessible while observing all COVID-19 protocols such as social distancing, hands sanitization, masking-up, and thermal testing where applicable.

1.5.2 Secondary data

Secondary data were collected using document analysis particularly to address research question 2 that sought to analyse the governance and legislative framework on illegal sand mining in Zimbabwe. The study mainly relied on internet searches to selectively gather literature material as physical access to organisations was restricted due to COVID-19 regulations. Secondary data included online records mainly from EMA and local authorities, published data such as journal research articles, reports and previous academic studies on illegal sand mining and conflicts. However, in some cases hard copies of secondary data were used. Both online and physical academic libraries were consulted, while local and international academic conferences and/or workshops relating to the extractive sector, and in particular the mining sector, and socio-environmental issues were reviewed to gather knowledge and information from experts and governmental organisations.

1.6 Data analysis procedures

Thematic analysis, as informed by the grounded theory method, was used in data analysis. Data were prepared and organised in a manner to facilitate analysis. Documents, notes and other material were gathered while sources were marked regarding demographics and other information useful in the analysis. Data were reviewed including re-reading of notes and repeated listening to recorded voice notes. Initial codes were created, reviewed and combined into themes. The themes were presented in a cohesive manner as informed by the sequence of research questions of the study. Hence, themes included drivers of illegal sand mining (social, economic and political) (objective 1), socio-environmental impacts of illegal sand mining and associated conflicts (objective 2), collaborative roles of social stakeholders (government, industry, community and civil society) in combating illegal sand mining (objective 3) and legislative framework and governance of illegal sand mining in Zimbabwe (objective 4).

1.7 Significance of the study

Illegal sand mining is associated with adverse socio-environmental impacts (Chevallier, 2014; Beiser, 2017; Mark 2021). For this reason, there remains global concern over the sustainability and governance of sand mining (Davey, 2001; Arwa, 2013; Chevallier, 2014; Bäckstrand & Kronsell, 2015; Mark, 2021; Bvirindi & Chikwawawa, 2022). Previous studies on environmental impacts (Abdus, 2008; Bagchi, 2010; Ashraf et al., 2011) and socio-economic impacts of illegal sand mining (Jacob, 2010; Kamis, 2011; Beiser, 2017; Madyise, 2013; Chevallier, 2014; Adedeji, 2014) all exposed the need for further studies on political ecology and reflexive governance of illegal sand mining - as this study endeavours to do. This is because there is a paucity of academic literature that unpacks the broader socio-economic and political nuances of global illegal sand mining and associated socio-environmental conflicts.

Previous studies on illegal sand mining were aligned either on environmental impacts or governance without examining the interconnectedness of such dimensions with socio-environmental conflicts. For example, Elavenil et al. (2016) used a case study of illegal sand mining in Tamil Nadu, India, to explore alternative ways of replacing natural sand by manufactured sand. Similarly, Ogaluzo, Dienye and Horsfall (2016) focused on the emergence of illegal dumpsites due to sand mining in Nigeria. Similar studies also focused on the governance of sand mining (Green, 2012; Saviour, 2012; Manoj, 2018; Prestianawati et al., 2019; Mark, 2021; Liu et al., 2021). Other recent studies also focused on the impacts of illegal sand mining on society and the environment (Lawal, 2011; Gavriletea, 2017).

It is clear that previous studies employed a one dimensional approach to illegal sand mining - either focusing on impacts, governance or strategies for sustainable sand mining, while leaving illegal sand mining-induced conflicts marginalised. Furthermore, there was no appreciation of a political ecology approach to illegal sand mining and, thus, available relevant literature appears starved of other key political, economic and social issues associated with illegal sand mining. As supported by Elavenil et al. (2017), a number of studies on illegal sand mining do not expose the interconnectedness of social, political and economic issues. These scholars highlight that conflict is one of the fundamental aspects of any illegal mining operation and which can be addressed through good governance. Indeed, various scholars show that variously effective governance systems may be closely linked to mining-associated conflicts (Alimin, 2019; Qurbani, 2020; Bezzola et al., 2022). However, the connection within the literature of links between governance and societal, economic and political issues is limited.

In Zimbabwe, the relatively few studies conducted on illegal sand mining are silent on how illegal mining relates to socio-environmental conflict. Mushonga (2012) analysed socio-political and economic dynamics of sand extraction but remained silent on the aspect of conflict. Similarly, George and Steven (2022) focused on the assessment of sand mining environmental externalities as a source of market failure but did not extensively examine the illegal sand mining and conflict nexus. Other studies rather focused on illegal gold mining and not sand mining (Bhebhe et al., 2013; Dalu et al., 2017). Thus, there is a need to bridge the literature gap in order to allow for reflexive governance of illegal sand mining and associated conflicts.

Against this backdrop, this study examines the political ecology of illegal sand mining and socio-environmental conflicts in order to provide a more extensive picture on the intertwining social, political and economic issues related to illegal sand mining and conflicts in Zimbabwe. This study as informed by the political ecology approach to unpack issues and proffer solutions on illegal sand mining and induced conflict management in a broader context. Thus, policy and practice recommendations may be used to inform policy makers on more inclusive and comprehensive sustainable approaches to addressing illegal sand mining in Zimbabwe and beyond.

1.8 Summary and Thesis Outline

Table 1.2 thesis outline

Chapter 1 Introduction and background	The introductory chapter of the thesis comprised an introduction to the research topic undertaken, as well as a description of the background to the research problem. The chapter also detailed the study problem, research questions, leading to the study aim and objectives. The chapter also provided an outline of data collection and analysis and the significance of the study.
Chapter 2 Theoretical and conceptual framework	This chapter provides a review of the principal frameworks and approaches in which the current study was premised. These include the Political Ecology Framework, Reflexive Governance, Land-Resources Conflict Theory and Stakeholder Theory.
Chapter 3 Literature Review	Chapter three is devoted to the development of a literature review. A comprehensive analysis and evaluation of international literature related to the research topic is presented. Of key focus are such issues as drivers of illegal sand mining, socio-environmental impacts of illegal sand mining, governance of sand mining and illegal sand mining- induced conflicts.
Chapter 4 Methodology	Chapter 4 details the processes and procedures used for collecting data. The chapter focuses on providing justification for the case study areas chosen for examining the research objectives. Furthermore, the chapter elaborates on the background to the study areas and methods for reaching conclusion on the study aim. These include research philosophy, research methodology, research methods and tools, population and sampling, data availability and validity and ethical considerations
Chapter 5 Results	This chapter presents the results obtained from the implementation of the methodology described in Chapter 4.
Chapter 6 Discussion	This chapter makes a critical analysis and discussion of the results following main and sub-themes created in Chapter 5 on results presentation.
Chapter 7 Theoretical Contribution	This chapter provides a more detailed analysis of findings in relation to theories adopted by the study, particularly how theories explain the results including applicability in the context of Zimbabwe.
Chapter 8 Conclusions and Recommendations	The final chapter includes an evaluation of the research, through the presentation of a summary of key findings and themes emanating from the results, a reflection on the theoretical and conceptual framework employed, as well as a discussion of the contribution made by the study. As a final point, recommendations of the study are presented.

1.8.2 Summary

The purpose of chapter 1 was to introduce the research. It incorporated the introduction of the research and provides the general background to the study, that is, on sand mining, illegal sand mining and conflicts. Next, it reveals the details of the study area and the problem statement of why the research was conducted. Further, it details the main and secondary research questions before outlining the objectives of this research. The following chapter (Chapter 2) will provide an overview of geotourism literature and its related topics.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

Sand is the second most consumed natural resource after water (World Bank, 2018). Thus, researchers are concerned about the sustainability of sand mining the world over (Alfvin, 2019; Saviour, 2012; Quinn et al., 2018; Pereira, 2012; Lloyd et al., 2022; Katisya-Njoroge, 2021; Zhu, 2020; Zhu, 2022). Sand mining varies in terms of scale, methodologies, impact and legality status (Peduzzi, 2014; De Jong et al., 2016; Lempriere, 2017). Robinson and Brown (2002) noted that sand aggregates contribute up to 90% of asphalt pavements and 80% of concrete roads. According to the UNEP (2014), the mining of sand and gravel accounts for about 85% of all world mining activities. Approximately 53 billion tons of sand are mined every year globally (Steinberger et al., 2010; Peduzzi, 2014). Due to sand demand, there are concerns over the growing trend in illegal sand mining, for example in China, Singapore and India (Alfvin, 2019; Lempriere, 2017; Murdoch, 2016; Peduzzi, 2014). Alfvin (2019) highlighted the disturbing costs of illegal sand mining on ecosystems in India.

In Africa, studies confirm a similar trend (Edwards et al., 2014; Ashton et al., 2001) and Zimbabwe is not an exception to this disturbing phenomenon (Lange, 2011). However, academic literature is starved of the connections between social, economic and political links and illegal sand mining and socio-environmental conflicts. This study applies a political ecology approach in examining illegal sand mining and the socio-environmental conflicts in the Zimbabwean context. This chapter reviews available literature regarding sand mining with a focus on illegal sand mining from a global, regional and national context and is divided into several main sections.

Section 3.2 discusses the concept of illegal sand mining; Section 3.3 characterizes illegal sand mining; Section 3.4 reviews the ecological impacts of illegal sand mining while Section 3.5 discussed the socio-economic costs and benefits of illegal sand mining. Section 3.6 discusses the governance of illegal sand mining; Section 3.7 discusses the environmental laws and regulations for sand mining and Section 3.8 reviews the literature on illegal sand mining and socio-environmental conflicts.

2.2 The concept of illegal sand mining

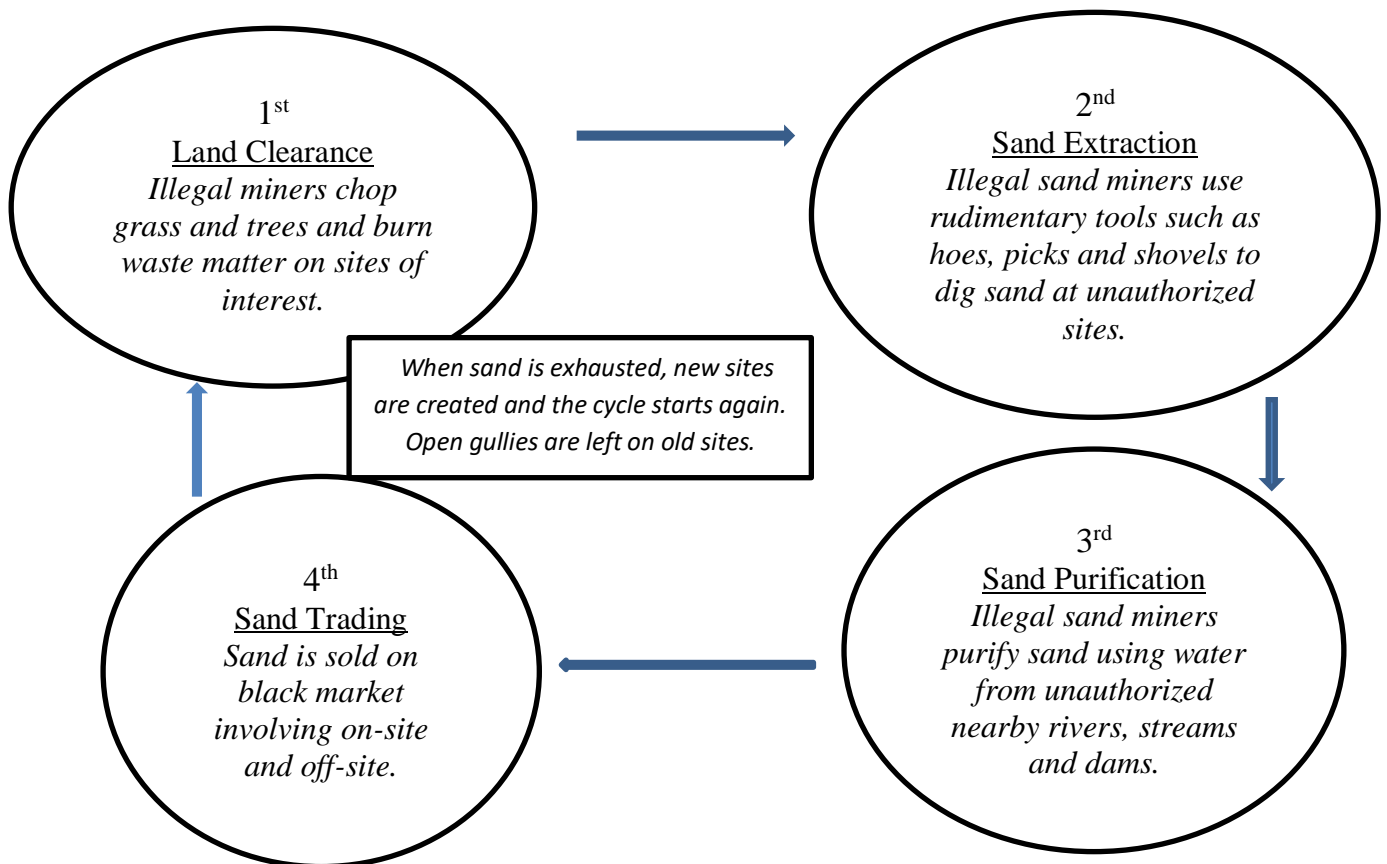
Despite the variation in terms of contextual application, most scholars highlight that illegal sand mining includes the extraction and trading of sand without permission from authorities, usually using unorthodox means (Schoof, 2014; Propescu, 2018; Lempriere 2017; Manoj, 2017). According to Environmental Technology (2017), illegal sand mining is the extraction and dredging of sand usually from open pits, sand dunes, beaches or riverbeds outside the legal jurisdiction. In India, illegal sand mining involves the indiscriminate and illicit abstraction of sand, both onshore and offshore (Bagchi, 2010; Ghosh, 2012; Manoj, 2018). Similarly, Mah (2015) defined illegal sand mining as the extraction of sand without permission of authorities. From all these definitions, it shows that illegal sand mining is an informal, non-compliant and indiscriminate type of mining that is associated with adverse socio-environmental impacts. This study defines illegal sand mining as a process of sand extraction by unauthorized persons from undesignated sites.

The above literature indicates that countries have laws and regulations that govern sand mining. Illegal sand mining suggests that sand miners, whether individuals or entities, violate legislations. This is despite the existence of institutional and legal frameworks that regulate their activities (Propescu, 2018; Lempriere 2017). Clearly, sand mining activity that does not comply with environmental and mining laws is illegal. In Zimbabwe for instance, sand mining is regulated under a set of legislations that include Environmental Management Act, Mines and Minerals Act and many other supporting instruments (Chimhete, 2004; Veranda, 2010; Lange, 2011; Mushonga, 2022; Saunyama, 2017; Muringaniza et al., 2022). These government laws prohibit extraction of sand without approval from responsible authorities such as Environmental Management Agency and local authorities. Hence, any sand activity including mining, transport and selling that do not comply with these laws becomes illegal. Miners mainly extract sand in residential areas and other open and idle spaces belonging to local authorities, individuals and even companies resulting in stakeholder conflicts.

Notwithstanding government efforts to regulate this activity, illegal sand mining remains a global problem (Schoof, 2014; Propescu, 2018; Lempriere, 2017; Manoj, 2017) and there remains a dearth of literature painting a clear picture on the various processes and issues such as land clearance, sand mining, sand purification and sand supply that underpin illegal sand mining. The current study therefore utilizes this continuous cycle of environmental exploitation

to examine social, economic and political issues related to illegal sand mining and associated conflicts to bridge the literature gap.

As shown by Figure 2.1, illegal sand mining involves a sequence of processes from land clearance to sand trading. Clearly, there are socio-environmental issues associated with these activities hence an understanding how such issues are interconnected and result in conflicts is a major aspect of this study.



Source: Author, (2023).

Figure 2.1: Illegal sand mining cycle in Zimbabwe

In Zimbabwe, Saunyama (2017) reported that illegal sand miners often transport sand during the night with poorly maintained vehicles and so risk road accidents. According to Lange (2010), such trucks are usually not roadworthy and cause road damage. Mushonga (2022) also noted that the purification process of sand degrades the environment by causing water pollution. In this study, any activity of sand mining including land clearance, abstraction, purification and supply that is unlicensed is therefore considered to be illegal. Milton (2010)

and Gavriletea, (2017) posited that because sand is a cheap natural resource, this has also attracted illegal miners. These authors further highlight that due to the environmental impacts from these activities, illegal sand mining has sparked conflicts between the various stakeholders - the miners, communities, and authorities, to mention but a few. In some countries such as India, many reports confirm that the conflicts have subsequently led to loss of human lives. Thus, the sustainability of sand mining has been of great concern to researchers (Komnitsas, 2020; Aquaknow 2014; Bardi 2013; Giljum et al., 2011; Heinberg 2011; Horwath 2004; Krausmann et al. 2009; Meadows et al., 2005; Morigan 2010; Nickless et al., 2014; Peduzzi 2014; Sverdrup & Ragnarsdottir, 2014). This study builds on that concern to examine further the political ecology of illegal sand mining and the socio-environmental conflicts in Zimbabwe using a case study of Harare Metropolitan Province.

2.3 Characterizing illegal sand mining

Illegal sand mining takes various forms depending on the physical landscape upon which extraction takes place and the scale of mining operations (Masalu, 2010). Studies show that most illegal sand mining takes places along the coasts and beaches (Bardi 2013; Giljum et al., 2011; Pilkey & Cooper, 2014; Heinberg 2011; Jonah & Adu-Boahen, 2016; Frohlich, 2017). Sand mining can generally be classified as foreshore and offshore (Mah, 2015).

2.3.1 Foreshore sand mining

Foreshore sand mining is a coastal mining activity that involves the actual removal or extraction of sand from foreshore water systems such as rivers, lakes, dams and streams (Singh et al., 2014; Rochayati et al., 2019). As noted by these scholars, this type of mining is common in Europe and North America where population density is very high near that coast. Sand is abstracted from beaches and inland dunes and dredged from riverbeds or ocean beds (Sverdrup et al., 2017). Masalu (2002) relates this process to the mining of mineral sand. This is typically combined with ordinary sand and to then separate valuable minerals from water through filtration. The scholar noted that the separation process utilizes the variation in densities of substances to segregate minerals, and so the remaining ordinary sand can be re-deposited.

The demand for sand for construction purposes has resulted in large scale illegal foreshore sand mining in North America, Western Africa (Mark, 2021). Increasing demand by private companies and individuals has placed sand under threat of illegal sand mining, so much so that researchers express concern over foreshore illegal sand mining and its impact on societies and

ecosystems (Masalu, 2010; Lawal 2011; Chevallier 2014; Jonah & Adu-Boahen, 2016). Liu et al (2021) particularly predicts serious environmental degradation and resource depletion under the current extraction rates if illegal sand mining continues unabated.

Figure 2.2 and Figure 2.3 show examples of foreshore illegal sand mining activities. In Sierra Leone, this sand mining mainly takes place along the beaches. In Figure 2.2, illegal sand mining was taking place few kilometers away from the capital city, Freetown. This is affecting the coastline, destroying property and the landscape and, indirectly, tourism (Trenchard, 2013).



Source: Trenchard, (2013).

Figure 2.2: Foreshore sand mining in Sierra Leone.

As shown in Figure 2.3, illegal miners have transformed a dune field along the Wild Coast into a mined-out wastelands and destroyed the fragile coastal ecosystems for quick profit (Davies, 2015).



Source: Davies, (2015).

Figure 2.3: Foreshore sand mining at the Wild Coast, South Africa.

As shown in Figure 2.4, sand mining has led to accelerated erosion and collapse of a Sri Lankan riverbank. Most sand is mined from riverbeds and riverbanks, coastlines and river deltas in the country, hence predominantly foreshore sand mining. The researcher noted that illegal sand mining along the Maha Oya is changing the river's course and diminishing land viability for agriculture and livelihoods.



Source: Weerasekera, (2014).

Figure 2.4: Foreshore sand mining along the Maha Oya, Sri Lanka.

Foreshore sand mining occurs mainly along the coasts and riparian environments and is illegal in most cases. However, this has generally caused land degradation as wide pits are created to pose the risk of landslides. In terms of demand, beach sand is particularly needed for construction and manufacture of concrete aggregate due to its relative uniformity in size and purity (Robinson & Brown, 2002). Beach sand is easily mineable and does not contain silt and clay that affects its quality (Arwa, 2013; Nguru, 2008).

However, foreshore mining occurs at various scales. In countries such as Singapore and Morocco, large scale sand mining occurs (Green, 2012; Frohlich, 2017; Propescu, 2018). Masalu (2002) noted that in North Africa, wood is inadequate for construction purposes and this has placed an additional demand for sand as an alternative resource. Unfortunately, much of this foreshore sand mining is illegal in Morocco and many other African countries as miners do not comply with the laws (Madyise, 2013; Gavriletea, 2017). In Singapore, foreshore sand mining varies with geography. However, over the years sand mining involved large scale operations due to national infrastructural and geographical expansion (Levitt, 2010; Suchitra, 2019; Prestianawati et al., 2019). The researchers indicated that while some sand is mined from

the sea floor, substantial quantities of sand are mined from beaches in the neighbouring countries such as Malaysia, Laos, Viet Nam and Indonesia.

In Sierra Leone, illegal sand mining mainly occurs along the beaches and on a relatively small scale for construction and particularly refurbishment of infrastructures that were destroyed during civil wars (UNDP, 2014; Beiser, 2017). Unlike in Morocco, beaches in Sierra Leone are relatively small and do not have extensive dunes and thus may be easily and completely removed (Propescu, 2018). Similarly, in the Caribbean, foreshore illegal sand mining occurs along the beaches in the island of Barbuda and unsustainable sand mining for export to other Caribbean islands for construction purposes is more prevalent (Ibid). Unfortunately, beach mining is destroying the tourism industry, ecosystem function and natural storm defence provided by the beaches (Schoof, 2014; Propescu, 2018; Lempriere 2017; Manoj, 2017).

Figure 2.5 shows beach mining activities in Morocco. As depicted, such mining has led to extensive illegal sand mined and silting of river banks. The intensity of sand mining type depends on the demand from end-users (Aquaknow, 2014).



Source: Lempriere (2017).

Figure 2.5: Beach sand mining involving horse-drawn transport system in Morocco

A study by Lempriere (2017) revealed that most tipper-truck based sand mining operations are commercial and done by contractors that supply sand and other building materials to the builders. Sand supplies involve both localized vicinities and distant areas from the coast.

Most studies show that sand mining often employs local communities for loading and offloading of sand (Lawal, 2011; Chevallier, 2014; Adedeji et al., 2014; Masalu, 2010; Arwa,

2013; Ali, 2020). In contrast, low capacity, truck-based sand miners may involve more illegal sand mining by local communities or residents who use their own vehicles for subsistence sand consumption (Lempriere, 2017). Contractors without adequate resources also engage local communities and pay them for their sand mining and transportation services. Communities also pay illegal sand miners for the supply of sand they cannot access on their own from the beaches, thereby promoting illegal sand business. Zimbabwe does not have beaches and hence has not experienced beach sand mining but, rather, illegal sand mining occurs mainly in riverbeds, along streams and sand-rich open spaces.

2.3.2 Offshore sand mining

Illegal sand mining also takes the form of offshore sand mining that is viewed as an alternative to foreshore sand mining and, particularly, beach mining (Bagchi, 2010; Chevallier, 2014). Due to the rising demand for river sand for construction purposes (Jacob, 2010; Kamis, 2011; Chevallier, 2014; Adedeji, 2014, Lempriere, 2017), researchers are increasingly concerned with the sustainability of offshore sand mining (Jonah & Adu-Boahen, 2016; Rochayati et al., 2019; Mark, 2021). Mark (2021) also asserted that offshore sand mining presents potential storm disasters when large quantities of sand are removed from sand banks in areas where replenishment does not occur. According to UNEP-GEAS, (2014) there exists a complex relationship between sand banks, coral reefs, marine biota, current circulation, waves and swell patterns.

Globally, regulations vary regarding offshore and foreshore sand mining despite countries adopting the general criterion of using minimum water depth as a restrictive benchmark for mining licensing. Thus, extensive research is required prior to granting mining permission to legitimate miners (Rochayati et al., 2019). In India, Kerala offshore is the main source of sand due to numerous supplies from its catchment offshore bars (Bagchi, 2010; Singh et al., 2014). However, Beiser (2017) warned that offshore sand mining requires caution as offshore sand is washed on the site itself to form suitable granular aggregate, a procedure that can create turbid and muddy environments that are detrimental to marine organisms. In addition, offshore sand is usually salty which may not be good for construction purposes as salt can corrode metallic surfaces and degrade concrete (Dugan et al., 2008; Kamis, 2011; Jonah & Adu-Boahen, 2016). In France, offshore sand mining occurs as part of efforts to clear river mouths, thus facilitating illegal sand mining (Gavriletea, 2017).

As shown in Table 2.1, illegal sand mining in beaches takes various forms including tipper-truck-based, low-capacity truck based and manual transport. This suggests that most processes underpinning illegal sand mining potentially cause socio-environmental impacts and trigger conflicts.

Table 2.1: Characteristics of illegal beach sand mining

Category	Sub-category	Nature	Description
Beach sand mining.	Tipper-truck-based.	Commercial, large scale.	This includes sand transported by tipper trucks.
	Low-capacity, truck-based.	Small scale, non-commercial to large-scale commercial.	Sand transportation using low-capacity trucks such as pickups and small trucks, etc.
	Manually transported.	Small scale, non-commercial to small scale commercial.	Sand is manually transported using pushcarts, wheelbarrows, basins, buckets, etc.

Source: Jonah & Adu-Boahen, (2016).

In Ghana, coastal sand mining has been a common practice over the years (Karikari, 2013; Jonah et al., 2015). Here, illegal sand mining, such as occurs at Mbofra Akyinim, mainly occurs along beaches and involves both large-scale and small-scale mining with the latter characterised by manual and low-capacity truck-based transport systems (Jonah & Adu, 2016; Davey, 2001; Greens, 2012; Chevallier, 2014; Adedeji, 2014; Andrews, 2015; Bosco & Sumani, 2019). Based on the foregoing, understanding illegal sand mining in Zimbabwe in a broader political, economic and social context is key. The following section provides a background on the ecological impacts of illegal sand mining in various settings.

2.4 Ecological impacts of illegal sand mining

The influx of illegal sand mining activities has impacted artificial and natural ecosystems such as water, land, trees and other biological organisms (Dawson, 2021; Nalule, 2020; Milton, 2010; Gavriletea, 2017; Ali; 2011). Although the magnitude of these environmental impacts varies across regions, they range from biodiversity and habitat loss, deforestation of land with the consequent elimination of vegetation, soil erosion, desertification and pollution (Willis & Garrod, 1999; Abdus-Saleque, 2008; Jacob, 2010; Kamis, 2011; Chevallier, 2014; Adedeji,

2014; Asabonga et al., 2017). This section reviews literature on the impacts of illegal sand mining on various ecological components.

2.4.1 Destruction of vegetation and loss of habitat

Globally, illegal sand mining has caused massive environmental degradation (Dahal et al., 2012; Micomyiza, 2018). Both legal and illegal sand mining cause vegetation destruction that disturbs natural habitats (Mazikana, 2022; Gómez-Betancur et al., 2022; Davey, 2001; Nguru, 2008; Greens, 2012; Karikari, 2013; Arwa, 2013; Chevallier, 2014; Adedeji, 2014; Jonah et al., 2015). Vegetation in riparian zones is most affected by coastal sand mining yet is the main habitat for many organisms.

Jonah et al. (2015) noted that riparian vegetation along the Chalakudy River in Ghana was highly degraded due to rapid illegal sand mining at the mouth of the river. Similarly, the severe erosion of riverbanks due to indiscriminate illegal sand mining has gradually led to the extinction of medicinal plant species on Meenachhik river basin in India (Vijith & Satheesh, 2006). Indeed, illegal sand mining on the river basin threatens floral ecosystems (Jacob, 2010; Arthur, 2016; Kamis, 2011; Chevallier, 2014; Adedeji, 2014). Indiscriminate marine sand mining particularly affects seabed fauna and flora (Micomyiza, 2018; Padmalal, 2008; Kamis, 2011). Saviour (2012) also noted that dredging and abstraction of sand aggregates from the seabeds destroys aquatic organisms and their habitats. The biodiversity, faunal biomass and species composition are severely affected with illegal foreshore and offshore sand mining activities (Padmalal et al., 2008; Saviour, 2012; Madyise, 2013; Adedeji et al., 2014; Gavriletea; 2017). Saviour (2012) noted that the dust plumes from fine sand aggregates change water turbidity and alter aquatic habitat systems over large areas.

Illegal sand miners turn their focus to ocean floors once land quarries and riverbeds are depleted (Jonah et al., 2015). In the United Kingdom, one fifth of its sand is derived from the ocean floor (Giljum et al., 2011). The removal of millions of tonnes of sand from the seabed damages habitats and muddies waters that disturbs aquatic life (Chilamkurthy et al., 2016). Natural beach growth including seagrass and seaweeds is therefore affected by indiscriminate sand mining (Adu-Gyamfi, 2016; Masalu, 2010; Jonah & Adu-Boahen, 2016).

In Europe for example, deforestation, land degradation, pollution and destruction of infrastructures have been experienced in Portugal and Bosnia and Herzegovina due to illegal sand mining (Beiser, 2017; Ejatlas, 2018; Beiser, 2017; Duncan, 2020). According to Ejatlas

(2018), extensive sand and gravel extraction has resulted in severe degradation of the Drina River that borders Serbia and Bosnia and Herzegovina, so that siltation has resulted in decreased fish stocks in major rivers. With the United Kingdom obtaining about one fifth of the nation's sand from the ocean floor, Beiser (2017) highlighted that sand extraction have stripped riverbeds and left beaches bare whilst destroying farmlands and forests. In a similar environmental tragedy in Australia, sand mining has damaged flood plains (Dales, 2011).

In the USA, a study of beaches in southern California observed a massive loss of dry beach, wrack accumulation and associated invertebrate fauna on sea walled beaches (Dugan et al., 2008; Beiser, 2017; van Arragon, 2021). In Wisconsin and Minnesota, farmers have raised their concerns over pollution of their water and air due to sand mining (Beiser, 2017, Power & Power, 2013). Despite federal government's shutting down of sand mines in the late 19th century, mining companies continued to operate extracting colossal amounts of sand due to weak governance (Beiser, 2017). In Asia, sand mining has damaged ecosystems and environments (Ghosh, 2012; Chilamkurthy et al., 2016; Elavenil et al., 2017).

In Ghana and many other tropical parts of Africa, studies show that sand mining has been a major cause of deforestation (Andrews, 2015; Jonah and Adu, 2016; Bosco and Sumani, 2019). As indicated, Kenya experienced similar impacts because of sand mining (Nguru, 2008; Arwa, 2013). In South Africa, sand mining has resulted in significant losses of sand at the rate higher than replenishment leaving riparian vegetation and causing unproductive and unrestored land. (Davey, 2001, Greens, 2012, Chevallier, 2014). Reports on the impact of illegal sand mining on vegetation and habitats have focussed on beach sand mining that is not experienced in a landlocked country such as Zimbabwe. Nonetheless, the present study uses a political ecology perspective to examine the interconnections between illegal sand mining and associated conflicts in Harare Metropolitan Province, Zimbabwe.

2.4.2 Alteration of river systems

Illegal sand mining alters river systems (Mwangi, 2007; Abdus-Saleque, 2008; Jacob, 2010; Kamis, 2011) Both inland and foreshore sand mining cause land degradation, and alter the landscape and geomorphology (Lucrezi et al., 2009; Masalu, 2010; Beiser, 2017). In the USA, stream mining caused severe riverbed degradation (Robinson & Brown, 2002) and channel incision resulting from pit excavation and bar skimming (Gob et al., 2005). Jonah and Adu-Boahen (2016) noted that head cutting on active channels lowers the streambed, subsequently

steepens channel slope and increase energy flow. It is clear from these studies that illegal sand mining is responsible for soil erosion and cause massive land degradation if it is properly regulated. Elavenil et al. (2017) observed that direct illegal removal of sand from beaches causes serious soil erosion. A study by Gavriletea (2017) also showed that indiscriminate sand mining in China has deepened and widened Lake Poyang channel compromising the exceptional ecological function of the lake.

Similarly, other studies from Africa such as Nigeria (Willis & Garrold, 1999; Lawal, 2011; Ogaluzo et al., 2016; Atejiroye & Odeyemi, 2018), Tanzania (Masalu, 2010), Botswana (Madyise, 2013) and South Africa (Davey, 2011; Green, 2012; Chevallier, 2014; Davies, 2015) revealed that illegal sand miners cause land degradation that seriously altered landscape and river systems. In South Africa, a study by Chevallier (2014) noted that illegal sand mining particularly reduces sediment delivery from the rivers to the coasts causing beach erosion at a long-term erosion rate of 0.5 to 1.5 metres a year in coastal dune systems. Findings by Mngeni et al. (2017) assert that sand mining of streams destroys riparian zones, changes channel morphology and lowers flood plain by changing water flow patterns and accumulation of suspended sediment that reduce the penetration of photosynthetic light to aquatic flora. In Ghana, studies also showed that the annual coastal erosion rates of over a metre in Accra, Moree and the Cape Coast resulting from coastal sand mining are much higher than the natural coastal erosion rate in 2005 or 2012 of -0.85 metres per annual (Jonah & Adu-Boahen, 2016). This evidences confirms that illegal sand mining changes physical landscapes as evident in most African countries.

Other similar studies also indicate that illegal sand mining causes beach erosion (Jonah et al., 2015; Bosco & Sumani, 2019). In particular, the study by Jonah et al. (2015) revealed that widespread unregulated beach sand mining for construction purposes in most countries led to beach sediment starvation and subsequent retreat of coastlines. Dean and Dolan (2004) argued that sand extraction can be viewed as 'digging a hole' in the surf zone and it would be expected that sand would be drawn from both up coast and downcoast as well as onshore and offshore to fill the hole. This suggests that coastal erosion and land degradation makes coastal communities and investments more vulnerable to sea destruction. This is a clear indication of existing unsustainable sand mining practice. More so, most published reports provide ample evidence showing that illegal sand mining is widespread and rapidly becoming an ecological problem in the region (Lawal, 2011; Chevallier, 2014; Adedeji et al., 2014).

Goddard (2007) noted that sand abstraction and processing have adverse effects on scenic landscapes as occurred following hillside erosion and destruction of geomorphological features that are centres of tourist attraction. Pereira (2012) also noted that unregulated mining activities and subsequent shoreline erosion create pathways for flood disasters increase the vulnerability of communities against future disasters such as destructive storms. Excessive sand mining has resulted in distortion of topography particularly due to compaction of ground by heavy vehicles transporting sand from illegal mining sites (Lawal, 2011). Trucks destroy riparian zones during sand transportation in and around mining sites (Kuttipuram, 2006; Simeipiri & Brown, 2017)).

2.4.3 Impact on water quality and quantity

Illegal sand mining affects water quantity and quality. In addition, Pereira (2012) reported that indiscriminate sand mining lowers the alluvial water table resulting in water insecurity. Most illegal sand mining destroys groundwater storage, for example, in Kerala district in India, where a study by Singh et al. (2014) revealed that the levels of the major Pamba and Manimala rivers lowered by four to six metres due to sand mining. Vijith and Satheesh (2006) noted that the water table would drop by 2537 square metres by 2050 if indiscriminate illegal sand mining continues unabated. This clearly suggests that indiscriminate sand mining threatens water security and subsequent livelihood activities such as subsistence agriculture. Similarly, suspended solids caused by illegal sand mining compromise water quality (Mark, 2021). This author noted that suspended solids pose health risks to downstream water and this in turn demands high treatment costs. In a similar study, Saviour (2012) observed that dissolved suspended materials from mining sites polluted surface and underground water. Oils spills and leakages from trucks and excavation equipment, and sand residue also pollute water (Ibid). Stebbins (2006) noted that contaminated water disturbs and destroys aquatic life as organisms such as fish. In his study in Australia, Goddard (2007) also reported that sand mine waste dumps have become a health concern for communities and the government. However, this study does not explain the relationship of such impacts with conflicts and the present study seeks to bridge that gap.

In Africa, available literature also indicates that sand mining has caused water pollution in most countries (Mazikana, 2022; Saviour, 2012; Muringaniza et al., 2022; Thavarajah et al., 2016). Mwangi (2007) noted that some abandoned mining sites were converted to waste dumping sites that affect water quality in Kenya. Similarly, in Botswana illegal sand and gravel mining has caused air and water pollution through burning and improper waste disposal, respectively, and

that tailings and waste dumps arising from mining processes pollute ground water and soil (Alfvén, 2019). In addition, Saviour (2012) asserted that sand mining processes such as purification alter the physio-chemical and biological properties of water. Although the study focused on mineral mining, Ashraf et al. (2011) also noted the negative impact on soil properties caused by a high concentration of sulphate ions, dissolved oxygen, copper and zinc as well as iron and other heavy metals. These substances contaminate water, thus illegal sand mining is a global public health concern (Erskine & Green, 2000).

Case analysis on the effects of river sand mining on the surface and ground water resources in India revealed that large quantities of particulate matter in water from sand mining sites impair river ecosystems (Singh et al., 2014). Similar studies showed that water quantity was also severely affected by sand mining, particularly illegal sand mining. Thus, in California in 1992, channel incision has reduced alluvial aquifer storage by 1% to 1.6% depending on geology and aquifer geometry (Pranzini et al., 2015; Kondolf et al., 2002). Kondolf et al. (2002) also noted that channel incision due to illegal sand mining lowered groundwater in adjacent areas. Robins and Lewis (2006) focused on the effect of gravel mining on water supplies in Maine, USA, and showed a significant correlation between mining and lowered water tables. This clearly shows that unregulated sand mining cause water quality and quantity problems the world over. However, the present study examines illegal sand mining and conflicts in Zimbabwe from a broader social, economic and political perspective to bridge the knowledge gap on interconnectivity of issues linking illegal sand mining and socio-environmental conflicts.

2.4.4 Impact on climate change

According to Greenfacts (2022), the extraction and burning processes involved in stone and sand manufacturing and transportation directly emit greenhouse gases into the atmosphere. Thus, about 1.65 million tonnes of carbon dioxide (CO₂) was produced in 2010 alone from cement production using sand and gravel, equivalent to roughly 5% of total greenhouse gas emissions, while carbon emissions from cement alone account for close to 30 billion tonnes of carbon dioxide. Liu et al. (2021) observed that each tonne of cement produces an average of 0.9 tonnes of CO₂ – of concern as illegal sand mining persists in a bid to meet global construction demands.

Continued illegal sand mining and associated greenhouse emissions will have climate impacts. Unfortunately, the absence of global monitoring systems for aggregate production makes it

difficult to quantify the impact of illegal sand mining on climate change (Leal Filho et al., 2021). Mark (2021) noted that the actual rates of extraction of sand aggregates remain estimates and, thus, compromise the introduction of effective remedial action plan. While relatively few studies have exposed the impacts of sand mining on climate change, there are even fewer publications explaining the interconnectivity of such issues towards socio-environmental/economic conflicts. Thus, the present study further examines social, economic and political nuances of illegal sand mining and the socio-environmental conflicts in Zimbabwe’s Harare Metropolitan Province in an attempt to bridge that knowledge gap. Table 2.2 presents a summary of the general ecological consequences of illegal sand mining.

Table 2.2: Summary of the main ecological impacts of illegal sand mining

<i>Impacts on</i>	<i>Description</i>
Biodiversity	Impacts on related ecosystems (for example fisheries)
Land losses	Both inland and coastal through erosion
Hydrological function	Change in water flows, flood regulation and marine currents
Water supply	Through lowering of the water table and pollution
Infrastructures infrastructures	Damage to bridges, river embankments and coastal
Climate	Directly through transport emissions, indirectly through cement production
Landscape Pollution of rivers	Coastal erosion, changes in deltaic structures, quarries,
Extreme events	Decline of protection against extreme events (flood, drought, storm surge)

Source: Greenfacts, (2022).

2.5 Socio-economic costs and drivers of illegal sand mining

Illegal sand mining has had various ecological as well as socio-economic impacts. The costs include loss of land, loss of productive industry, human rights violations and interference with sources of livelihoods. The benefits include employment and income generation. Most studies however show that the costs outweigh the benefits. (Isung, 2021; Ali, 2020; Masalu, 2002; Jacob, 2010; Kamis, 2011; Madyise, 2013; Chevallier, 2014; Adedeji, 2014; Beiser, 2017). This section therefore reviews the socio-economic costs and benefits of illegal sand mining.

2.5.1 Costs of illegal sand mining

Loss of land by local communities

Where illegal mining takes place, the likelihood of land conflict is high, as mining interferes with community activities in both rural and urban environments (Zhenyuan et al., 2020; Sonna et al., 2022; Nalule, 2020; Rochayati & Herianto, 2020). Studies show that illegal sand mining activities tend to encroach on territories owned by other individuals and companies (Mushonga, 2022; Nur, 2020; Msalu, 2002; Dean & Dolan, 2004; Adu-Gyamfi, 2016; Elavenil et al., 2017; Boström, 2012). In Tanzania, a study by Masalu (2002) revealed that most nocturnal illegal sand miners mine, store and transport sand in and through privately owned land. In Dakar and in Mbour, Kenya, studies also indicate that coastal houses were devastated by the coastal floods caused by illegal sand mining along the beaches (Nguru, 2008; Arwa, 2013). Subsequently, communities were relocated further inland while economically there was a reduction in hotel and tourism facilities. Ali (2020) studied the socio-environmental impacts of sand mining and confirmed that unregulated sand mining results in forced migration, social malpractices and destruction of economic facilities.

Studies also show that illegal sand mining results in the loss of socio-economic resources and assets such as residential houses due to forced migration and land degradation (van Arragon, 2021; Masalu, 2010; Bosco and Sumani, 2019). Van Arragon (2021) noted that unregulated mining also results in the destruction of pre-existing infrastructure such as parks and cemeteries. Masalu (2010) noted that walls of houses in the catchment area of Vembanad in Tanzania developed cracks due to the impacts of blasting processes during illegal sand mining. This author also feels that such social ramifications are an economic liability to families and governments as huge amounts of funds may be required to repair and replace damaged structures. An example of such expenses is that each tonne of aggregate mined from a

California River caused \$3 in infrastructure damage – costs that are borne by taxpayers (Guardian, 2017).

In Ghana, illegal sand mining had exposed the foundations of hillside buildings exposing people to the risk of landslide disasters (Bosco & Sumani, 2019). Indeed, the costs of socio-environmental damages of illegal sand mining may continue to outweigh the benefits if illegal sand mining continues unabated. In India, studies showed that substantial funds were allocated to local authorities and ministries to restore ecosystems damaged by indiscriminate sand mining (Lempriere, 2017; Peduzzi, 2014, Singh et al., (2014). Therefore, invasion and displacement of communities directly and indirectly burden governments in addressing the adverse impacts of illegal sand mining. Stacey et al. (2010) further explained that the closure of illegal mining areas may continue to have long-term socio-environmental impacts particularly in the absence of proper governance.

Interference with other productive industry

Illegal sand mining has affected the performance of other economic activities such as agriculture and tourism. A study by Maconachie and Binns (2007) noted that diamond mining resulted in the invasion of agricultural land to cause massive conflicts between the miners and farmers in Sierra Leone. Other studies also indicated that illegal beach and coastal mining interferes with fishing and tourist activities (Erskine & Green, 2000; Power & Power, 2013; Beiser, 2017; Simeipiri & Brown, 2017). The excessive removal of sand from beaches for construction purposes has resulted in the loss of beauty of landscapes in some regions such as North America, South East Asia and Africa (Bagchi, 2010). Some coastal regions are natural attraction areas especially the beaches, and literature shows that unregulated sand mining destroyed beach landscapes making it unattractive to tourists in India (Singh et al., 2014, Rochayati et al., 2019). Similarly, indiscriminate sand mining has affected traditional and commercial fishing in most coastal regions worldwide (Jonah & Adu-Boahen, 2016).

The destruction of benthic fauna due to land degradation and subsequent decrease in water table has disturbed the habitat of aquatic organisms. Although no scientific studies quantified revenue losses from the fish industry due to illegal sand mining, they confirm that illegal sand mining significantly affect the fishing industry, reduces the fish population and deprives local communities of their source of livelihood (Wegenast & Beck, 2020; Jonah & Adu-Boahen, 2016; Beiser, 2017; Bosco & Sumani, 2019). In a similar study on the causes and effects of

illegal gold mining, Azumah et al. (2021) noted that most school-going children dropped out of school and engaged in income-generating but illegal gold mining. Stewart et al. (2020) asserted that illegal mining is often associated with violation of education rights among teenagers. In Kenya, illegal sand mining similarly resulted in adverse educational outcomes in public primary schools (Nthambi & Orodho, 2015). Although this sector is non-profit, these authors argued that this has a long-term effect on the education standards and subsequent economic sustenance of the country.

Like other sectors, published research also shows that illegal mining affects the tourism sector following landscape alteration (Beiser, 2017; Bagchi, 2010). Extreme land degradation caused by illegal sand mining makes the tourism and fishing industry more vulnerable to natural disasters such as floods (Bendixen et al., 2019). The erosion of coastal areas and beaches decreased the bed load to undermine engineering structures for water supply and storage and other conditions for marine life (Bosco & Sumani, 2019). Thus, there is a strong link between social, economic and political matters on illegal sand mining and socio-environmental conflicts.

Safety and health issues of illegal sand mining

There are also concerns over the safety and health impacts of illegal sand mining on both illegal sand miners and the public. Stewart et al. (2020) noted that illegal mining was associated with serious safety issues in South African local communities. Masalu (2010) also noted that the rudimentary methods of sand mining exposed illegal sand miners to the risk of infections and injuries, among other occupational hazards. Similarly, Simeipiri and Brown (2017) in their study on the socio-economic consequences of sand mining along the Victory River in Port Harcourt, Nigeria revealed that illegal sand mining resulted in a high rate of communicable diseases in illegal sand mining hotspots in the country. Other scholars also noted that unregulated mining activities tended to contaminate both surface and underground water systems causing health problems among the consumers (Chevallier, 2014; Adedeji, 2014). A study by Quinn et al. (2018) revealed that any detrimental effect on the hydrological system has subsequently impacts public health. Studies revealed that most communities in Africa depend on raw water from natural sources such as rivers for domestic purposes such as washing, and contamination from illegal sand mining exposes such individuals to waterborne diseases (Nguru, 2008; Arwa, 2013; Greens, 2012; Chevallier, 2014; Adedeji, 2014).

In Tanzania, a study conducted by Masalu (2010) on coastal erosion and its social and environmental aspects revealed that some communities suffered skin allergies and respiratory infections due to contaminated water resulting from illegal sand mining processes. Other studies also showed that open pits left after sand mining claimed the lives of children, especially during rainy season when they are filled with water (Ladlow, 2015; Chevallier, 2014; Nguru, 2008, Arwa, 2013; Beiser, 2017). In some cases, open pits trapped livestock (Lempriere 2017). Similarly, in Zimbabwe, there are concerns over the risk of infection with malaria due to illegal sand mining-induced breeding conditions (Mushonga, 2022; Saunyama, 2017). According to a January report by the rights group South Asia Network on Dams, Rivers and People (Bavadam, 2021), in India, 193 people died in accidents related to sand mining operations or sites in 2019-2020. Drowning from sand mining pits alone accounted for close to 50% of these deaths including 76 children who accidentally fell into the pits (Bavadam, 2021; Mahadevan, 2019).

Furthermore, pollution from mining activities and processes is a cause for concern for public safety and health. Studies also showed that truck fumes and dust from the mining sites contaminated the air in Nigeria (Simeipiri & Brown, 2017), Botswana (Alfvín, 2019; Madyise, 2013), India (Bogcha, 2010; Lawal, 2011; Singh et al., 2014; Peduzzi, 2014; Lempriere, 2017). These authors indicated that tippers used for transporting sand were old and inefficient and produce dangerous greenhouse gases (GHGs). In addition, air pollution caused by dust particles cause respiratory disorders such as asthma and lung cancer (Saviour, 2012). Perira (2012) also noted that vibration caused by mining and blasting processes is a safety and health concern for local communities. Communities expressed annoyance over blasting, excavation and transport processes of illegal sand miners. In India, the noisy mechanical processes of dredging sand 24 hours a day hindered effective learning processes at nearby schools (Beiser, 2017; Lempriere, 2017). In Portugal, illegal sand mining weakened a bridge that claimed the lives of 70 people when it fell whilst a bus passed over it (Beiser, 2017). Despite these safety and health issues, the interconnection between these issues with economics and politics in illegal sand mining-induced conflict is poorly reported.

2.5.2 Drivers of illegal sand mining

This section reviews the drivers of illegal sand mining. These include unemployment and poverty that discussed concurrently in this section.

Unemployment and poverty

One of the reasons why illegal sand mining has been on the rise, particularly in developing countries, is poverty and unemployment (Maconachie, 2022; Ali, 2020; United Nations, 2018; Maconachie & Hilson, 2011). In his study on artisanal mining and livelihoods in the global south, Maconachie (2022) noted that illegal mining forms a significant basis for local community livelihoods. Similarly, illegal sand mining has employed a substantial number of local communities in the extraction of sand, its transport and selling (Marschke & Rousseau, 2022; Lange, 2011; Mushonga, 2022; Davey, 2001; Greens, 2012; Chevallier, 2014). Even though the income is low, illegal sand mining generates an income for local communities (Marschke & Rousseau, 2022). In Zanzibar, illegal sand mining is one of the major sources of income for youths, including school-leaving boys and girls (Masalu, 2002). Studies showed that extraction of sand on behalf of some landowners, loading and offloading sand, and transporting and selling of sand generate an income for local communities (Chevallier, 2014; Green, 2012; Lawal, 2011;). A study by Masalu (2002) in Tanzania revealed that the delivery of sand using carts generates roughly USD 1.50 per cart containing 6 m² of sand. There is also a growing vending business in the sand mining sector particularly at illegal sand mining sites. In Botswana, Madyise (2013) noted that both young and old people, men and women have created temporary vending points selling foodstuffs, electrical devices, cosmetic products and clothing. In most developing countries, vending is expanding and improving livelihoods for communities (Mitullah, 2003; Brown, 2018). This clearly indicates that illegal sand mining provides a livelihood for local communities.

Statistics from Mine Safety and Health Administration in Nigeria indicates that Niger state alone employed over seven hundred sand and gravel miners, accounting for 40% of the total employment in the informal mining sector in the last quarter of 2001 alone (Lawal., 2011). Similarly, in Kenya, Mwangi (2007) noted that most teenagers aged around 18 years were engaged in illegal sand mining and employed as manual sand loaders at the extraction sites. Similar findings emerged in other Southern African countries such as Botswana (Alfvín, 2019) and Zimbabwe (Mushonga, 2022). These studies show that giant illegal sand mining operations

are employers of other miners as agents in their illegal activities such as land clearance, extraction, transport, and market generation. In some countries, well-regulated informal sectors make a significant contribution to the national income through taxation. This way, illegal sand mining can be harnessed for national socio-economic development (Power & Power, 2013). Lawal (2011) noted that the government earns about 8% of profits from each sand miner and the miner gets 2% of accrued revenue. While there is a lack of global data on actual financial gains and losses due to illegal sand mining, most researchers agree that some governments benefit from sand and gravel mining in the informal sector (Jonah & Adu-Boahen, 2016; Bosco & Sumani, 2019). In Kenya, local authorities require unregistered sand miners to pay a small fee for short-term sand mining in a bid to harness the economic potential of illegal sand mining (Mwangi, 2007).

In India, as is the case in most African countries, a substantial population of impoverished communities have been employed by illegal sand mining to meet their basic needs (Saviour, 2012). Although illegal sand mining is relatively more violent, the large-scale operations may significantly generate income for individuals, communities and the government. Nalule (2020) noted that illegal sand mining could potentially provide a significant source of revenue through profit-related royalty payments and through fixed taxation, if well regulated. Poor sand governance of illegal sand mining is one of the reasons for poor economic performance of the formal sector. Mark (2021) noted that the influx of illegal sand miners and abundant supply of sand on the informal market is a major blow to tax-burdened, registered miners. The subsequent impact of their poor revenue is a reduction in government income, thus illegal sand mining requires more than just regulation activities for real, national, socio-economic development.

Despite these socio-economic benefits of illegal sand mining at the individual, community and national level, a lack of transparency and accountability over ownership of land, registration and licensing of illegal sand miners remains a sustainability issue (Chevallier, 2014; Adedeji, 2014; Manoj, 2017; Liu et al., 2021; Nwoke et al., 2022). Prestianawati et al. (2019) noted that revenue generated from this sector does not significantly feed into the national income basket due to corruption, bribery and poor governance system. The rate of environmental degradation is also a cause of concern, as illegal sand miners do not prioritize this. Indeed, politics, economies and society have influence over illegal sand mining processes, reinforcing the need to unpack illegal sand mining and associated conflicts in Zimbabwea.

2.6 Governance of illegal sand mining: Concept, practices and issues

Most countries have existing institutional and legislative frameworks that regulate sand mining, including illegal sand mining. However, its regulation remains questionable given that illegal sand mining remains an ongoing socio-environmental problem. Section 3.6.1 reviews aspects of governance while section 3.6.2 discusses various institutional measures for curtailing Illegal sand mining.

2.6.1 The concept of governance

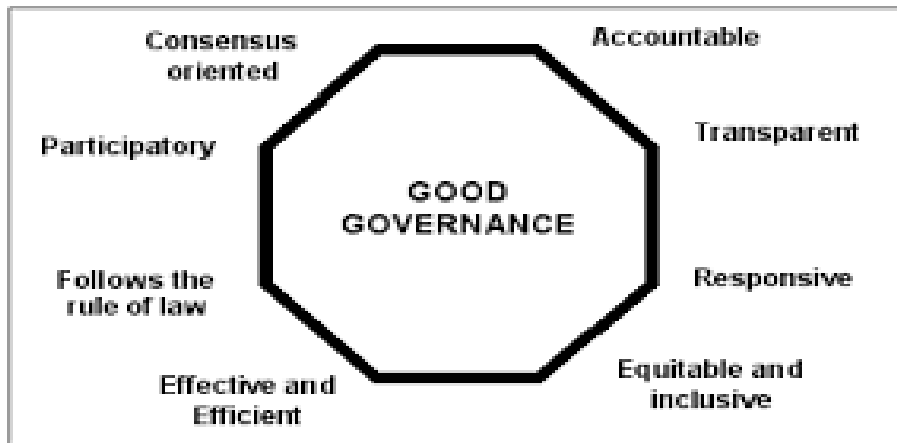
Reports show that good governance is a key element in addressing global social, environmental, economic and political issues (Zahiri et al., 2022; Asare et al., 2021; Hasibuan et al., 2021; Hübler & Pothen, 2021, Mekuriya et al., 2021). Governance is applied in various contexts such as corporate governance, national governance, international governance and local governance (Mark, 2021; Sonna et al., 2022; Bvirindi & Chikwawawa, 2022; Hamann, et al., 2018; Murimoga & Musingafi, 2014). Zahiri et al. (2022) further explained that good governance is key to achieving sustainable development. This clearly shows how critical proper governance is in any national, regional and international system. This is evident in the government formulation and implementation of national legislation and policies that regulate mining and other activities (Kadoe, 2018; Lilende, 2018; Mahadevan et al., 2019; Knill et al., 2019). The concept of governance is extensively utilized in social sciences (Elander, 2022; Pierre and Peters, 2000; Benz, 2011; Hale & Held, 2011; Levi-Faur, 2012). However, there remains a wide spectrum of scholarly perspectives of the concept of governance.

According to UNESCAP (2006), governance is defined as the process of decision-making and the process by which decisions are implemented or not implemented. This suggests that governance can be good or bad. However, the concept of governance is variably applied across disciplines (Mark, 2021; Chevallier, 2014; Cheshire et al., 2014). Ysa et al. (2014) stated that governance varies depending on three elements, namely: discipline, approach and area considered. In their definition, governance is the interaction of governments, non-profit organisations, and business stakeholders in policy decisions. Emphasis is therefore on stakeholder engagement, collaborative decision-making and implementation. Similarly, Mark (2021) whose study focused on environmental governance also identifies stakeholder networking as key in the concept of governance. Bierman et al. (2010) defined governance as the interrelated and increasingly integrated system of formal and informal rules, rulemaking systems, and actor-networks at all levels of human society (from local to global) that are set up

to steer societies towards preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development. Despite the varied perspectives and application of the concept, stakeholder collaboration is a common feature in academic conceptualisation of governance.

Based on the foregoing definitions, stakeholder participation is a key aspect of good governance. Arwa (2013) emphasized that governance involves formal and informal stakeholders making decisions implemented through both formal and informal structures. Clearly, this scholarly argument highlights the essence of stakeholder collaboration in good governance. According to Beevers (2019), good governance entails stakeholder engagement that results in a positive governance outcome. These include government, the NGOs, research institutes, academia, political parties and community (Shaikh & Randhawa, 2022; Zhang et al., 2022; Conde et al., 2022; Ysa et al., 2014; Noreau & Boschen, 2010). The key question is whether institutions observe and implement these key elements of good governance. Hence, this study evaluates the collaborative roles of such key stakeholders in addressing illegal sand mining in Zimbabwe, as well status of reflexive governance. Springer (2016), whose study also focused on natural resource governance noted that elements of good governance, such as inclusive decision-making and coordination that engages the interests and initiatives of all key stakeholders often result in positive conservation outcomes. Similarly, engaging indigenous peoples and local communities in natural resource governance promotes stewardship, responsibility, and accountability of own resources - and this ultimately results in sustainable development (AbouAssi & Trent, 2016; Desportes et al., 2016, Grin et al., 2010; Aurah, 2013).

According to UNESCAP (2006), governance has eight major characteristics, including participation, consensus, transparency, accountability, responsiveness, equity and inclusivity, effectiveness and efficiency, and the rule of law. The latter is critical in addressing problems of corruption and marginalization of vulnerable groups in societies. Figure 2.6 below illustrates these elements of good governance.



Source: Thomas, (2010).

Figure 2.6: Elements of good governance

The above elements are important in reflexive governance of illegal sand mining. The UNESCAP (2006) highlighted the importance of participation in governance, and both men and women are viewed as key elements in good governance. This reflects the essence and importance of stakeholder engagement. In this study, the gender perspective was examined more from the context of illegal sand mining impacts than governance. However, as highlighted by Widanti (2022), participation could be through legitimate institutions or representatives in societies. The current study further interrogated how government and non-government institutions, industry and community collaborate to building effective governance of illegal sand mining. In a similar way, Wilkes (2022) emphasized informed participation, freedom of expression and association and organized civil society as key elements of good governance. Springer (2016) also noted that participation should be inclusive including taking on board people at grassroot levels. Oyono and Madondo (2016) also asserted that participation should involve creating conditions that accommodate both marginalized persons and conventional decision makers. Participation itself is a procedural right that further enables the realisation of multiple substantive rights (Ibid).

The rule of law is also an important component of governance. Good governance is characterized by existence of fair legal framework/s that are applied and enforced impartially (Berendieieva et al., 2022; Guma et al., 2021). Laws and regulations should be cognisant of human rights especially the minority groups (Zahiri et al., 2022; Makwerere et al., 2012). In this study, this relates to marginalized and impoverished groups of communities who view

illegal sand mining as their only means of livelihood. Cognisant of the harsh economic conditions facing the country, the study attempts to analyse existing legislations from a broader socio-economic, political, and socio-environmental context. Good governance should avoid rather than perpetrate socio-environmental conflicts emanating from illegal sand mining. Nwoke et al. (2022) also argued that legislative impartiality is achieved when independent judiciary and incorruptible police force exists. Building on these key elements, the current study interrogates legislative and institutional frameworks on sand mining and broadly on environmental issues in Zimbabwe. Thus, the study examines the utility of Zimbabwe Republic Police (ZRP) and other government institutions or authorities in reflexive governance of sand.

Like participation, reports show that transparency is one of the key elements in governance. According to Marschke and Rousseau (2022), transparency is the enforcement of agreed decisions whilst conforming to prescribed rules and regulations. In a similar light, Cooray and Gamage (2016) noted that transparency involves the free access of information on decisions made and their enforcement. These authors further note that information should be given in an understandable form and media to every stakeholder. In this study, however, the focus of the study is to understand the process of land acquisition, rights and land-use for sand mining, residence and other land use within the context of socio-environmental conflicts. Transparency means that decisions and subsequent enforcement are done in a manner that follows rules and regulations. It also means that information is freely available and directly accessible to those affected by such decisions and their enforcement. It also means that sufficient information is provided and in an easily understandable form and available media.

Katsamunskaja (2016) noted good governance is evident in the institutional capacity of public organizations or authorities to provide public and other goods demanded by a country's citizens or the representatives thereof in an effective, transparent, impartial, and accountable manner, subject to resource constraints. Asare et al. (2021) whose study focused on natural resource governance, accountability, and legitimacy in Ghana maintain that good natural resource governance is characterised by legitimacy, transparency, accountability and equitable integration in a manner that benefits all the actors. However, Springer (2016) argued that governance is often marred with obstacles such as corruption and inconsistent or poor understandings of what good governance constitutes. In a similar view, Franco and Ali (2017) also noted that limited skills in facilitating good governance hamper the integration of elements that constitute good governance of natural resources. Therefore, counteracting these obstacles

is key to implementing good governance towards sand mining in Zimbabwe. Thus, the study attempts to unravel salient issues on the current legislation that cover illegal sand mining. One key element of governance that the present study interrogates is responsiveness - how institutions and processes serve socio-environmental needs within reasonable timelines (Evans, 2012; Widanti, 2022). Wilkes (2022) noted that institutional and legislative frameworks should be consensus-oriented and involve mediation of different interests in a society. Given that sand is on demand due to urbanisation and urban development (Lempriere, 2017; Dawson, 2020, 2021), the interests of localities and protection of the environment are all-important.

As discussed, equity and inclusivity are also key elements of governance closely linked to participation. Zahiri et al. (2022) stated that equity and inclusivity mean that every member feels that he/she has a stake in policy and program formulation and implementation. In the present study, this relates to decision-making in the management of natural resources, and sand in particular, and also the utilisation or consumption of natural resources. Land use is also of particular concern in this study as sand consumption involves land acquisition and abstraction that in most cases is marred with socio-environmental conflicts, which this study attempts to address. Equity and inclusivity ensure that all groups including the most vulnerable populations should have the opportunity to influence their well-being. Conde et al. (2022) noted that inclusivity attempts to mainstream every member of society in decision-making and effective governance. Therefore, the present study examines ways in which various stakeholders influence or are influenced by illegal sand mining, their roles in governance and how far existing policies are inclusive and equitable in Zimbabwe.

Effectiveness and efficiency are also fundamental aspects of good governance (Zahiri et al., 2022; Berendieieva et al., 2022; Widanti, 2022). According to Widanti (2022), governments should set up both institutional frameworks and legal frameworks that fully address issues within a particular discipline. Berendieieva et al. (2022) emphasized that good governance involves processes and institutions that address the needs of society while promoting sustainable utilisation of resources at their disposal and protection of the environment. In this study, this researcher evaluated the adequacy of existing legal and institutional framework in addressing illegal sand mining and the socio-environmental conflicts in Zimbabwe given the literature gap.

Studies also identify accountability as crucial in defining good governance (Springer, 2016; Moore et al., 2010; Marschke & Rousseau, 2022; Zhang et al., 2022). According to Moore et

al. (2010), accountability involves the acceptance of responsibility and accountability of actions. Whilst accountability is critical in governance, Arwa (2013) felt that transparency and impartial application of the rule of law are key to effective, good and reflexive governance. Springer (2016) noted that accountability is widely recognised as a fundamental principle of good governance, including natural resource governance, and widely recognised in natural resource governance frameworks such as the Natural Resource Governance Framework (NRGF) II and the NRGF 25 that reviewed these aspects during the development of the NRGF. However, with regards to natural resource governance and accountability in Africa, Ribot (2006) points to the complex nature of motivations behind legitimising actions and states that the desire to demonstrate legitimacy is driven purely by the need for accountability discharge, which threatens local equity and sustainable utilisation of resources. Thus, the present study is interested in understanding legitimate processes involved in land use for sand mining in Zimbabwe. As Akintola and Fakoya (2016) noted, accountability is a requirement for all stakeholders including the government, community, non-governmental institutions and the industry itself in the case of sand mining. However, Davey (2001) emphasized that accountability cannot be enforced without transparency and the rule of law. In light of the above, governments, research institutions, academia and other stakeholders have shifted their attention towards reflexive governance. The following section explains the concept of reflexive governance and further relates this to governance of sand mining with a focus on illegal sand mining in Zimbabwe.

2.6.2 Institutional measures for curtailing illegal sand mining

Reducing the consumption of sand

Reducing the consumption of sand is one of the strategies that can help address sand mining issues (Abraham et al., 2021; Leal Filho et al., 2021; Springer, 2016). In a study by Abraham et al. (2021) focusing on the monitoring of sand mining sites and post management techniques in sand dredged environment, it emerged that indiscriminate sand mining and consumption can be reduced through intensive monitoring of illegal sand mining. Some scholars suggested reducing sand consumption through optimized use of existing infrastructures and buildings (Leal Filho et al., 2021) for instance, using recycled building or quarry as a substitute of sand (Gunaratne, 2015; Patil & Shinde, 2016). In a similar study on alternatives to sand mining, Elavenil et al. (2016) observed that alternative sources of sand can be made use of such as sand that accumulate at the bottom of dams. However, these authors pointed out that the process could be more expensive as it requires technologies and equipment that is able to flush out sand aggregate from the dams. MacLean and Nelson (2021) further noted that most developing countries do not have adequate technological systems to monitor sand consumption patterns.

Against that background, a study by Pahl-Wostl and Patterson (2021) proposed a conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. Despite their study being generic, these authors felt that capacity building is a key element in achieving sustainable resource utilisation. Azhary (2020) asserted that a positive environmental care attitude is key in creating lasting solutions to illegality in the mining sector. Relating to earlier scholars, his findings confirm the importance of a political ecology approach in addressing illegal sand mining and conflicts. Thus, society plays a key role in sustainable sand mining and conflict resolution systems (Ibid).

Other studies viewed the use of alternative raw materials to sand for construction as instrumental in addressing illegal sand mining crisis (Sverdrup et al., 2017). Concrete manufacturing, one of the highest consumers of sand can be alternatively made from concrete rubble rather than relying on sand aggregates. A study by Quinn et al. (2018) revealed that sand can be replaced by quarry dust and incinerator ash with 40% of the latter exhibiting higher compressive strength than regular cement mortars. Furthermore, people can use alternative materials such as wood, straw and recycled materials for construction purposes (Padmalal & Maya, 2014). While this can go a long way in reducing indiscriminate sand mining, particularly

illegal sand mining, Sayami and Tamrakar (2008) noted that adopting alternative materials and optimizing existing infrastructures requires intensive training as to best practice to reduce use of sand. Similarly, Farahani and Bayazidi (2017) argued that the current building industry demands more concrete, thus a shift to low sand construction demands the training of engineers and architects to re-design infrastructure. New policies and incentive system to reduce use of sand can significantly decrease sand consumption and this can have a ripple effect on illegal sand mining.

Mining tax and permit system

Taxation is widely used as a form of sand mining regulation. Like any other commercial activity, governments set activity or industry-specific taxes that contribute to government revenues (Söderholm et al., 2015). Giljum et al. (2011) noted that setting taxes on sand aggregates could help governments in generating funds for implementing low-sand use infrastructure including a shift to alternatives for sand use. Taxation of sand discourages indiscriminate illegal mining activities when proper enforcement is implemented (Kervankiran et al., 2016). However, Green (2012) argued that a well-coordinated enforcement system towards illegal sand is required in order to tax the informal sector more effectively. Similarly, Mngeni et al. (2016) warned that illegal sand mining may continue if sand extraction taxes are too costly. Studies conducted in Botswana (Alfvin, 2019, Madyise, 2013), India (Sverdrup et al., 2017); Ghana (Bosco & Sumani, 2019) and Nigeria (Ogaluzo et al., 2016) indicated that most individuals and small entities tend to avoid mining taxes by engaging in illegal sand mining. In India, mining royalties were too high for small-scale miners to be registered (Mahadevan, 2019). This contributed to the rise in illegal sand mining in India and other countries worldwide (Ibid). Bouterige et al. (2020) suggested that there be correct pricing and taxing of sand extraction in order to enable viability of alternative use of materials for construction. There are also issues with incentives for sustainable sand mining. Gavriletea (2017) also felt that even though incentivising sand mining can help addressing illegal sand mining, the cheap and free accessibility of sand leaves little or no incentive to induce realistic, positive consumption rates. Despite this scientific evidence, in Zimbabwe, there is a paucity of literature linking illegal sand mining and conflict with economic issues among other political and social issues. The present study, therefore, sets out to determine links between these three main pillars in terms of drivers of illegal sand mining, impacts of illegal sand mining, and governance and institutional practices within a Zimbabwean context.

Most governments have environmental policies that regulate sand mining, including illegal sand mining, to specific areas. This is the case for Zimbabwe (George & Steven, 2022), Sweden (Sverdrup et al., 2017), India (Bogcha, 2010), China (Liu et al., 2021) and Indonesia (Rochayati et al., 2019). The permit system is widely adopted in the regulation of sand mining in countries such as Canada, Australia, Sweden, Russia and Finland to achieve positive environmental outcomes (Komnitsas, 2020, Keeling & Sandlos, 2015). In-stream sand mining, particularly illegal mining, is strongly regulated in countries such as Portugal, New Zealand and Italy (Gavriletea, 2017). Thus, Cooray and Gamage (2016) noted that environmental laws and regulations are important in combating illegal sand mining.

Similarly, in India, in spite of beach sand mining being regulated through stringent laws, the problem of illegal sand mining remains a problem (Mahadevan, 2019; Chen, 2017; Upadhyay, 2019; Filho et al., 2021). In countries such as Malaysia, Vietnam and Indonesia, governments have set up extraction limits for sand by banning its export to Singapore (Franke, 2014; Gavriletea, 2017; Torres et al., 2017; Tastet & Beaches, 2019; Hübler & Pothen, 2021). All these regulations demonstrate how the global community is concerned about the socio-environmental implications of illegal sand mining. Pothen (2021) highlighted the need for a complex regulatory system to regulate land use, the environment and sand mining. Other reports suggest an urgent adoption of comprehensive and specific policies towards sand mining to regulate illegal sand mining while counteracting the long-term difficulty in quantifying the socio-environmental impacts of the activity (Torres et al., 2017; Tastet & Beaches, 2019; Hübler & Pothen, 2021). Lempriere (2017) noted that permit systems should demand comprehensive environmental impact assessment study in order to achieve broader environmental outcome.

As part of evaluating compliance with environmental laws, most governments have set up institutions to enforce sand mining laws. These institutions monitor mining sites, suggest penalties and condemn illegal sand mining activities, as in the case with Malaysia (Wajid, 2011), Nigeria (Arabi, 2019; Afolayan et al., 2021) and South Africa (Swart, 2003; Chevallier, 2014; Mngeni et al., 2016; Mngeni et al., 2017). However, various reasons have been attributed to weak governance of illegal sand mining including corruption in developing countries (Padmalal et al., 2008; Saviour, 2012; Ashraf et al., 2011; Chilamkurthy et al., 2016), unemployment and poverty (Chevallier, 2014; Adedeji, 2014), inadequate resources (Tastet, 2019) and institutional incompetency (Gondo et al., 2019)

2.7 A global overview of legislative and institutional framework on sand mining

As indicated on page 55, studies show that most countries demand a permit for any sand mining activity (Mark, 2021; Lim et al., 2021; Rochayati et al., 2019; Rege, 2016; Boling, 2010; Mandelker, 2010) and this is the case Zimbabwe (George & Steven, 2022), Sweden (Sverdrup et al., 2017), India (Bogcha, 2010; Rege, 2016), China (Liu et al., 2021), and Indonesia (Rochayati et al., 2019). Canadian, Australian, Swedish, Russian and Finnish sand mining permits are designed to achieve environmental outcomes (Komnitsas, 2020). Thus, environmental laws and regulations are important in combating illegal sand mining.

Published studies have also indicates that national constitutions are also used as tools for governing environmental malpractices such as illegal sand mining in countries such as the Democratic Republic of the Congo (Geenen, 2012; Bindu, 2006), Kenya (Mwenda & Kibutu, 2012), Nigeria (Oluduro, 2010); South Africa (Scholtz, 2005) and Canada (Gibosn, 1973; Keeling & Sandlos, 2015). Like the Zimbabwean constitution, section III of the Constitution of Namibia also focuses on a critical consideration of particular constitutional provisions and their formative role in a number of policy and legal domains, such as environmental rights and justice, the paradigm of equality and its actualisation, and a consideration of intellectual property rights (Bösl et al., 2010). Similarly, Indonesia's Constitution specifically provides for the right to a clean environment and other environmental matters (Murharjanti, 2019). In contrast, the 2013 Constitution of Zimbabwe incorporates environmental issues from a human rights perspective, and the right to a clean environment is a clause in the national legislation, the Environmental Management Act. In Canada, studies show that the constitution continues to divide environmental jurisdictions between the federal government and provincial authorities. Local communities have constitutional rights over indigenous resources (Cook et al., 2016). This clearly concurs with the Stakeholder theory that sees everyone as key to achieving social and corporate sustainability (Freeman et al., 2010).

However, other state constitutions do not place greater importance on environmental issues (Rahman, 2010; Maidan, 2012). In Malaysia, there is no specific provision relating to environmental protection in the Constitution (Maidan, 2012). Similarly, the Constitution of the USA does not provide for environmental rights but should have a good environmental performance (Scott, 2016). Uyigue and Ogbeibu (2007) also criticized the Nigerian Constitution for its deficiency in administering environmental rights to people. Such deficiencies can be responsible for indiscriminate, non-environmentally friendly activities in

some countries. Communities are particularly the custodians of their indigenous resources, and policy makers should recognise their rights to the environment (Rahman, 2010). The above issues set the basis empirical inquiry into the utility of Zimbabwean's constitution in promoting institutional practices and policies that specifically address illegal sand mining and the subsequent socio-environmental conflicts in Zimbabwe.

Nevertheless, most governments have existing mining and environmental laws on sand mining that significantly address illegal sand mining. In Ghana, for example, studies indicate that schedule II, undertakings of L.I. 1652 of 1999 of the EPA Act requires project environmental impact assessment (Amankwah, 2013; Debrah et al., 2021; Olagunju et al., 2021). A study by Taabazuing et al. (2012) indicated that the mining grant process in Ghana involves various authorities including the Mining Inspectorate, EPA, Forestry Commission and Ministry of Mines and Energy. Wireko-Gyebi et al. (2020) also noted that those small-scale miners particularly register through the Minerals Commission, a process which these authors viewed as cumbersome and marred with corrupt practices. Despite submission of all requirements, it was not surprising to see an application rejected or delayed for no apparent official reason (Teschner, 2012). There also emerged issues of improper keeping and maintenance of legal records of mining licenses and leases. Andrews et al. (2018) also noted that the legislative frameworks that gave the state exclusive rights and control of mining concessions triggered conflicts with communities. The latter felt to be superimposed over the traditional tenure system without prior consultation.

A review by Ogaluzo et al. (2016) also showed that the Nigerian Mineral and Mining Act of 2007 prohibited all illegal mining activities. The Act provides for reclamation work after extraction of mineral deposits. The authors commented on the non-compliance of mining companies with the provisions of the Act leading to illegal sand mining. Similarly, in South Africa, the Mineral and Petroleum Resources Development Act (MPRDA) of 2002 puts all the minerals including sand under the custodianship of the state (Chevallier, 2014). This is the main national instrument governing mining including illegal mining in the country. Like the Environmental Management Act of Zimbabwe, this law also demands for an application and approval of sand mining. Furthermore, the Transkei Decree Act Number 9 of 1992 section 39 clearly stipulates that any activity of clearing or removal of sand within 1 km from the high-water mark is unlawful (Mngeni et al., 2017). The Mineral and Mining Act of 2007 of Nigeria also emphasizes a plan for reclamation of land after mineral extraction (Ogaluzo et al., 2016).

In Iceland, the EIA Act 106/2000 and the 1997 Planning and Construction Law (Agenda 21, 1997) are the two main instruments governing illegal sand mining and other environmental issues (Árnadóttir, 2002; Cook et al., 2016; Cook et al., 2018). In Australia, the federal government has the power to prohibit any activity that threatens biodiversity and communities in terms of the Environment Protection and Biodiversity Conservation (EPBC) Act of 1999 (EPBC Act, 1999; Gordon et al., 2009; Dales, 2011; Macintosh et al., 2017). In Nepal, sand is regulated by a set of instruments that include the Mines and Mineral Act, 1985 and its amendment, 1993 and the Mines and Mineral Regulation, 1999. These constitute the legal framework for administration and regulation of all mining and mining development activities (Sada & Shrestha, 2013).

As with the Mines and Minerals Act in Zimbabwe, this Act also gives the state exclusive powers and control over all minerals lying or discovered underground or on the surface, irrespective of land ownership. Indeed, this confirms the existence of institutional and legislative frameworks that govern sand mining among other socio-environmental issues. The efficacy of law enforcements by these institutions however remains questionable given the persistent occurrence of illegal sand mining. Zelli and Van Asselt (2013) see the domains of global environmental governance such as climate change, biological diversity, renewable energy, and forestry as already fragmented.

Although enforcement flaws and institutional fragmentation exist, most country legislations are clear on the requirements of sand mining and regulations prescribe extraction limits for sand. This is the case, for example, in Belgium (Degrendele et al., 2017) and the USA (Vila et al., 2018). A study by de Jong et al. (2015) showed that the Dutch authorities recommend sand abstraction to a depth of at least 2 meters for projects over 10 million cubic meters (10 M m³) of sand to reduce surface area of impact. Similarly, the Transkei Decree Act Number 9 of 1992 section 39 prohibits land clearance and sand removal within 1 kilometre from the high-water mark (Mngeni et al., 2017). These instruments attempt to quantify the usage rates of sand in order to promote sustainable utilization of the resource, and indirectly curb illegal sand mining. Shaji and Anilkumar (2014) argued that the lack of scientific information on the impact of sand mining on the environment leads to piecemeal and incomprehensive legislations.

Local authorities also play a key role in local environmental management in terms of respective laws and legislations. Kirama and Mayo (2016) noted that municipalities use by-laws to govern activities within their jurisdiction, including environmental management. In Uganda,

environmental issues are regulated under the Local Government Act (1997). As with Zimbabwe's Urban Councils Act, these urban councils possess full authority to develop their own by-laws (Okot-Okumu & Nyenje, 2011). In Zimbabwe, section 205 of the Urban Councils Act also empowers councils to administer, control and manage land vested in the council, on its own and on state land (Murimoga & Musingafi, 2014; Mhlahlo, 2007). Such power of local authorities in terms of the Act provides for both land use planning and regulation.

However, most studies confirm that the lack of clear regulatory sand extraction frameworks coupled by poor enforcement facilitate the rapid increase in illegal sand mining (Masalu, 2002; Saviour & Stallin, 2012; Saviour, 2012; Peduzzi, 2014; Martinez-Alier et al., 2016; Mark, 2021). Mining companies, contractors and individuals take advantage of poor standardisation of mining activities by government and local authorities to extract sand indiscriminately, thereby destroying the environment and disrupting communities (Msalu, 2002; Kadoe, 2018). Thus, a firm and comprehensive legislative and institutional framework should be operational to curb illegal sand mining. The following section reviews the general challenges encountered in the governance of illegal sand mining.

2.8.1 Challenges to effective governance of illegal sand mining

Resource scarcity

Although most governments have existing policies for regulating sand mining, including illegal sand mining, some researchers feel that the application of such policies remains more theoretical than practical, especially in underdeveloped countries (Takeuchi & Aginam, 2011; Mngeni et al., 2017; Gondo et al., 2019). These researchers highlight a financial and human resource scarcity as impeding effective governance systems regarding illegal sand mining. In addition, Tastet and Beaches (2019) noted that a combination of human effort and commitment, time and financial resources are key to finding real solutions to illegal sand mining. Gavriletea (2017) also noted that implementation of clean mining technologies is a challenge for some countries due to the expensive technology required for sustainable sand mining. However, Filho et al. (2021) laments that the transfer of investment technologies to recipient countries results in environmental adding the burden of governance on recipient countries. Despite some notable efforts by the government of India to stop illegal sand mining by roughly 40%, illegal sand mining remains a problem as communities continue to experience threats, displacement and environmental degradation (Chen, 2017). This is attributed to lack of adequate equipment,

technologies and other resources that enable effective governance systems. Bouterige et al. (2020) suggested that governments should upscale taxation of all sand miners in order to boost financial resources needed for technology import. This suggests that resource availability is key to sustainable mining systems. However, these studies do not address the interconnectedness of social, political and economic issues underpinning illegal sand mining and conflicts and the present study has a focused on a political ecology and reflexive governance of illegal sand mining in Zimbabwe.

Poor governance systems

Extant literature indicates that weak governance, poor enforcement and corruption as the main barriers to sustainable sand governance (Juju et al., 2020; Padmalal et al., 2008; Saviour, 2012; Davey 2001; Manoj 2017; Chevallier, 2014; Adedeji, 2014; Ashraf et al., 2011; Chilamkurthy et al., 2016; Mngeni et al., 2016; Cooray & Schneider, 2018; Chen 2017; Bvirindi & Chikwawawa, 2022). In addition, Chilamkurthy et al. (2016) reported that a lack of monitoring systems, regulatory policies and environmental impact assessments have contributed to indiscriminate mining, triggering severe damage to the environment and related ecosystem services. Thus, the rudimentary methods of river sand mining coupled with weak governance and corruption have led to indiscriminate mining (John, 2009; Saviour, 2012; Ashraf et al., 2011; Basu et al., 2015). In Cambodia, for example, studies revealed that the government banned the export of sand in 2007 but illegal sand dredging operations by foreign companies continued, due to weak governance. In this regard, the NGO, Global Witness, estimated that, despite the regulations, 796 thousand tonnes of sand with a retail value of US\$248 million was exported annually from Cambodia to Singapore from just one province, Koh Kong (Sankara & Sultana, 2019). In the same vein, the scale of illegal mining has remained high in China despite the Chinese government's ban on sand mining in the Yangtze River in 2000, and the setting up of a strict management plan in 2012 (Chen, 2017; Chen et al., 2015).

In West Africa for example, the World Bank (2017) stated that most countries have put in place mechanisms and policies to control illegal sand mining but due to weak enforcements, these illegal activities are still rampant. In Nigeria, poor governance and failure to control illegal sand mining activities in most parts of the country emerged a major concern for citizens (Adedeji, 2014). Chevallier (2014) noted that South Africa (especially in KwaZulu-Natal and the Eastern Cape) has also been plagued with illegal sand mining activities for years with the governance system lacking the necessary financial and human resources support to ensure

environmental compliance and protection. In Kenya, the government had to draft the National Environmental Management authority (NEMA) - a policy that governed all mining activities, sand and gravel mining included, in response to massive socio-environmental degradation caused by sand mining activities in the country (Nguru, 2008; Arwa, 2013). Sadly, illegal sand mining continues with local communities bearing the adverse impacts of the activities socially, environmentally and economically (Adedeji, 2014). Generally, illegal mining activities have remained prevalent the world over despite well-documented research confirming the existence of such national legislative frameworks.

However, Mark (2021) argued that in most developing countries, a lack of adequate information on sand mining, including illegal sand mining, exacerbates governance challenges. A study by UNEP (2019) revealed that access to data is difficult while availability of standardized data is also a challenge. Indeed, the economic value of sand contributes to widespread illegal sand mining, yet the data on the costs and benefits of sand remains scarce and not standardized. Duit et al. (2016) also noted that poor structural mechanisms of dealing with environmental matters obstruct good governance of sand and its mining. This confirms that poor governance of mining is the norm and that good governance structures are key to sustainable natural resource management. However, the European Union has improved regulatory efforts as compared to developing countries (Sreebha & Padmalal, 2011) due to concerted enforcement efforts and holistic natural resource management approaches.

Poor stakeholder collaboration

Literature indicates that stakeholder collaboration is key to effective environmental management and governance (Berkowitz et al., 2020; Lee, 2021; Jaafar et al., 2021; Lloyd et al., 2022; Shaikh & Randhawa, 2022; Zhu, 2022; Camilleri, 2015, Sobrino; 2015; Mirvis & Shani, 2013). Findings by Lee (2021), whose study focused on participatory ecosystem service assessments, indicated that effective ecological systems management requires a holistic approach. The participation of government and non-government stakeholders in designing, implementing and reviewing policies and programs is key in achieving sustainable sand mining (Ilker et al., 2016; Berkowitz et al., 2020; White, 2012).

Unfortunately, a lack of stakeholder collaboration in the mining sector remains one of the key obstacles to effective governance of illegal sand mining (Mekuriya et al., 2021; Jaafar et al., 2021; Lloyd et al., 2022; Dashwood & Puplampu, 2015). In addition, multistakeholder

partnership is key to sustainable mining and development (Valéro, 2015) and managing risks requires adoption of multistakeholder-centric governance approach (Shaikh & Randahawa, 2022). This suggests that any mining that is not governed and managed through a multisectoral approach to the formulation and implementation of appropriate policies and practice for sustainable sand mining can generate socio-environmental problems. A study by Liu et al. (2021) revealed that lack of coordination between sand mining industry and marine research institutions left policy makers void of evidence-based policy directions. Except in the European Union where regulation is relatively more effective, most developing countries continue to struggle in regulating illegal sand mining due to paucity of scientific knowledge (Poncian, 2021).

In a study conducted by UNEP, GEAS (2014) involving global sand governance, lack of monitoring systems and environmental impact assessments (EIA) in most developing countries also underpinned indiscriminate sand mining activities, serious environmental damages and stakeholder conflicts. Thus, the existing literature knowledge gap on the trends of sand mining in terms of form, scale, impact and consumption rate could be complicating the prediction of the interlinkage or nexus between social issues, political issues and economic issues of illegal sand mining and conflicts. Hass (2021), in his study on criminality in the sand mining sector proposed an integrated approach to address illegal mining activities. This author criticized political leadership for lack of urgency in implementing collective and integrated action towards sustainable mining. His study exposed reflexive governance gaps that exist in most legislative frameworks in many countries. Other researchers feel that illegal sand mining issues have not yet reached international agendas (Mark, 2021; Torres et al., 2017) - a situation that questions governance system, commitment and institutional efforts towards regulating illegal sand mining and reducing socio-environmental issues.

The absence of a specific international convention regulating sand extraction, consumption and training (UNEP, 2014) reflects flaws in the international governance towards sand mining (Jaafar et al., 2021). Ma (2019) noted that the United Nation Convention on the Law of the Sea (UNCLOS), 1982 only provides for the delimitation of maritime zones and regulates rights and obligations in respect of usage, development and preservation for these zones, including resource mining. Thus, a lack of specific international and national laws and regulations that seek to tackle illegal sand mining compromise good and reflexive governance. In addition, sound scientific assessment of sand mining should be a priority and informative of what policy

actions must be implemented at international, regional and local levels. These are some of the factors that prompted the present study to examine the current legal framework and institutional governance of sand mining in Zimbabwe

2.9 Illegal sand mining and conflicts

Studies indicate that illegal sand mining results in socio-environmental conflicts (Zhu, 2022; Mushonga, 2022; Guma et al., 2021; Willis & Garrod, 1999; Mwandosa et al., as cited in Davey, 2001; Kim, 2009; Adedeji, 2014, Mwangi, 2007, Madyise 2013; Qurbani, 2020). Due to the very high level of material consumption of sand per capita in industrial economies, local and global conflicts over the sharing of the burdens of environmental impacts and over access to natural resources has significantly increased (Martinez-Alier et al., 2016; Davidson et al., 2022; Özkaynak et al., 2012). Such conflicts represent what has been called "the environmentalism of the poor", also referred to as popular environmentalism, livelihood ecology, liberation ecology, and the environmental justice movement (ibid). In the context of illegal sand mining, conflicts have reported the world over among different social actors, mainly involving social justice and ecological sustainability (Rochayati & Herianto, 2020; Qurbani, 2020; Hoberg & Phillips, 2011, Kamis, 2011). This section reviews sand mining-induced conflicts in their various forms including conflict over land use, mining rights, poor enforcement and socio-environmental impacts of illegal sand mining.

2.9.1 Conflict over land use

Globally, conflict over land use characterises most illegal sand mining activities (Zhu, 2020; Purnomo et al., 2021). This is explained by Homer-Dixon's land resource conflict theory that views land as a common resource upon which conflict of land use occurs (Beevers, 2019). Besides sand mining, land can be used for residential, agricultural and commercial purposes and most tensions arise from conflicts of interest over the value and use of land (Poncian & Kigodi, 2015; Church & Crawford, 2018; Bezzola et al., 2022. In parallel to mining-related conflicts, there exists socio-economic and political conflicts associated with tourism (Leonard & Musavengana, 2022). In Northern Ireland and Southern England, for example, unsustainable sand mining activities have drawn the attention of activists calling on governments to condemn illegal sand mining for its interference with other community land usage (Beiser, 2017). Such illegal sand mining induced conflicts often takes a violent approach causing injuries, fatalities and loss of property (Qurbani, 2020).

According to the Mahadevan (2019), in general, sand mining in Asia and Africa is relatively more violent. In China, for example, conflicts have developed between fishermen and unlicensed sand mining companies that operate in their vicinity without complying with environmental standards. In India, most studies showed that illegal sand mining has been directly associated with a pattern of brutality, violence, law defiance and human rights violations (Alfvén, 2009; Padmalal et al., 2008; Bagchi, 2010). These authors also point to asymmetric power structures as contributing to weak regulation of illegal sand mining and its subsequent conflicts. Other researchers highlighted that illegal sand mining disrupts cultural and traditional values and sites of societies (Plummer, 2014; Alimini, 2019). Besides the mining of sand within traditional sites such as graveyards, the transport of sand itself has involved creation of roads within private land where they interfere with gardens and agriculture fields (Rokhim et al., 2021; Edwards, 2015; Elavenil et al., 2017; Alimin, 2019). Concurrently, efforts to compensate such losses among the victims of sand mining have been faced with resistance and open defiance due to an unsustainable compensation system. Farahani and Bayazidi (2017) noted that protagonists of the conflicts observe non-monetary value of their land such as sacred environments and view compensation as not necessary (Ibid). This creates conflicts between government, mining companies and the local community.

Thus, local grassroot communities are usually on the losing side as either they are given paltry compensations or are relocated leaving their traditional land use activities such as agriculture (Pearson, 2013; Rochayati & Herianto, 2020; Espin & Perz, 2021; Hasibuan et al., 2021). This has created tension between the government and local communities as the latter defy government initiatives to relocate them. A study by Abdullah et al. (2019) from Indonesia indicated that the government employed extensive use of police to deal with local communities that ventured into illegal sand mining instead of relocating. In addition, conflicts arose between the mining operators and the farmers with the later raising concern over the encroachment of mining activities into their farms (Beiser, 2017). This clearly shows that sand mining, whether legal or illegal, is often associated with land use interferences and marginalisation of grass roots communities. That draws attention to the utility of governance systems in regulating illegal sand mining and promoting social sustainability within resource-endowed areas as in the case of Zimbabwe's Harare Metropolitan Province.

Qurbani (2020) noted that mining conflicts often emerge from the processes of land claims, mining rights and mineral exploitation. A study by Pearson (2013) indicated that most

governments relocate local communities to pave way for sand mining and generate national revenues. Sadly, processes for mining rights often involve dubious and corrupt practices that tend to favour illegal, indiscriminate and unregulated sand mining (Olufemi et al., 2018; Ayee et al., 2011). This tends to create conflicts between mining companies or illegal sand miners and the public, particularly when local communities find that their land use, such as residential houses and agricultural land, is destroyed. Özkaynak et al. (2012) criticised the often insufficient compensation that is prescribed without engaging affected communities in the decision-making processes. According to Miller (2022), surveying and exploration of any mining sites also often marginalises local communities and their engagement in the process, particularly when they are victims of land use disturbance and alteration. Espin and Perz (2021) asserted that most governments outlaw such land-use ramifications as they create an atmosphere of persistent grievance, conflict and underground economies. Researchers observed a rapid outbreak of conflict among land users in countries such as the DRC, Sierra Leone, Angola, Sudan, and Liberia due to indiscriminate and illicit sand mining. Unfortunately, illegal sand miners are often violent and have high criminal tendencies and, hence, they are responsible for human rights violations including the right to land, health and security (Arwa, 2013).

Shaji and Anilkumar (2014) described how illegal Indian sand miners with strong political support forced local communities to sell their land. These authors add that any defiance would attract attacks and this clearly shows that illegal sand mining is a land-use and security threat to society. In Zimbabwe, Mushonga (2022) analysed the dynamics of Zimbabwe's sand mining frontier but only unravelled conflict over land rights. Similarly, a study in Ghana showed that unresolved land ownership and boundary issues emerged as central to conflicts (Andrews et al., 2017). These findings indicate that illegal mining is associated with significant loss of land by local communities.

Taabazing et al. (2012) noted that government-initiated compensation does not adequately represent the value of land and land use lost by the victims. Furthermore, this relates to unregulated sand mining activities that arise whenever a mining company acquires mining rights. Bradshaw and McElroy (2014) noted that some mining companies do not fulfil their social obligations to the local community. As suggested, there is a tendency by the private sector to violate laws, regulations and agreements made. Besides individuals, this is how the private sector also perpetuates illegal sand mining. Against that background, this study engages

community, private sector, and government and non-government stakeholders to understand governance issues, collaborative gaps and areas of conflicts in the sand mining sector.

2.9.2 Conflict over law enforcement and governance

Most governments have existing laws that guard against social, economic, political and environmental malpractise (Ashraf et al., 2011; Chilamkurthy et al., 2016; Azhary et al., 2020; Mark, 2021). Most research shows that illegal sand mining is often regulated through relevant institutions or authorities that enforce legislations on sand mining (Akinyemi et al., 2019; Franco & Ali, 2017; Mark, 2021). These institutional and legislative frameworks protect the environment and society from indiscriminate activities such as illegal sand mining. Unfortunately, poor enforcement enables a social environment marred with multistakeholder conflicts. Conflicts often erupt when governments' laws fail to protect human welfare (Franco & Ali, 2017; Sauer & Hiete, 2020). This is true as environmental problems are interconnected with societal issues such as health, safety, living standards and culture. Andrews et al. (2017) noted that poor governance eliminates trust by society towards its government. In their study, it emerged that government failure to represent the interests of its people at Haqaira-Las Bambas resulting in tension between mining companies and government, on the one hand, and the local citizens, on the other.

Other studies confirm that unfulfilled legal commitments by governments attract community resentment, frustration and conflicts (Hilson & Yakovleva, 2007; Mensah & Okyere, 2014; Kwofie et al., 2016). Mining-induced conflicts also result from restricted mining access to the indigenous people at the time when anticipated local socio-economic developments were not realised (Hudayana & Widyanta, 2020; Chipika & Malaba, 2011). Similarly, conflicts emerged over land and mineral tenure that did not involve public consultation (Burgess & Clark, 2017; Bhatasara, 2020). This clearly shows that governance is a key component in promoting sustainable sand mining. Evidence from the above literature suggests that institutional and legislative measures may rather perpetrate illegal sand mining. As such, carefully thought measures are critical in achieving good governance. For example, in Ghana, a study by Andrews et al. (2017) revealed that the government's regulatory systems had failed to curtail invasion of illegal miners onto mining concessions despite the deployment of army and police to force them out of mining sites.

Weak governance is indeed a widespread problem attributed to persistent illegal mining (Duit et al., 2016; Moore et al., 2021; Saviour, 2012; Ashraf et al., 2011; van der Jagt et al., 2021; Vadrot et al., 2022). Indeed, governance is central to addressing illegal sand mining and gain public support. This is evident in a study by Green (2012) who observed a deficiency of compliance and enforcement systems as drivers of conflicts in the mining sector in South Africa. This author noted the existing regulatory conflict between environmental and mining authorities that has pitted mineral regulation, on the one side, against environmental and land use planning regulation, on the other. And this has been simmering for over a decade and been characterised by strained relations between the regulators and political brinkmanship. In South Africa, empirical evidence shows that regulatory conflict emanates from three interconnected regulations - minerals, environment and land use planning (Davey, 2001; Green, 2012; Chevallier, 2014; Gondo et al., 2019). In addition, mineral regulations no longer take precedence over environmental and land use planning regulations, while mining is marred with overlapping mandates (Green, 2012). Clearly, this conflict over mining governance suggests further examination in the present study in a bid to proffer much more sustainable governance solutions in Zimbabwe's sand mining sector.

In a similar study, Baba (2016) noted that the absence of by-laws regulating illegal sand mining was criticised by the public as a governance failure, given the persistent illegal sand mining activities in the country. Similarly, Musah (2009) attributed socio-environmental conflicts in East Gonja district as an outcome of poor law enforcement. Saviour (2012) also observed that many sand mining communities had no laws regulating how sand mining was conducted in such places. The various obstacles to good governance of sand mining include corruption, lack of stakeholder collaborations and inadequate resources (Baba, 2016) and according to Chevallier (2016), South Africa's legislative and institutional frameworks lack financial and human resource capacity to effectively enforce laws and promote compliance in the mining sector. Conflicts often arise when the private sector and citizens feel unprotected from the actions and activities of illegal sand miners. Green (2012) noted that in South Africa, there was an outcry by private sector associations and legal sand miners over legitimate governance over illegal sand mining that tends to affect sand availability, costs and the market (Chevallier, 2016).

The governance system should not only be able to curb illegal sand miners but also address the social behaviours and unethical conduct of illegal sand miners with other communities. Various

reports indicate that illegal sand miners killed police officers, government officials and residents in their bid to pursue their illegal mining interests (Mahadevan, 2019; Beiser, 2017). These disturbing events that prompted this study to propose a more inclusive governance framework.

Good governance involves transparency, inclusivity, democracy and participation of all concerned parties (Zahiri et al., 2022; Berendieieva et al., 2022). In contrast, the governance system may remain silent on sand mining when addressing illegal sand mining-induced violations (Martinez-Alier et al., 2016; Widanti, 2022). In addition, this reflects limited stakeholder engagement in programs and policies for addressing sand mining. This draws away public acceptance and appreciation of existing laws and regulations so that, for example, a study by Madyise (2013) in Botswana reported that illegal miners had viciously resisted restrictions by local authorities in terms of mining laws governing their mining sand from rivers and open areas, citing lack of justice, fairness and objectivity of existing laws.

2.9.3 Conflict over costs and benefits of sand

Sand is a precious raw material for construction purposes at subsistence and commercial level and the costs and benefits of sand create a landscape that is characterised by multi-stakeholder conflicts (Jacob, 2010; Kamis, 2011; Chevallier, 2014; Adedeji, 2014; Lempriere, 2017). The demand for this resource has therefore created employment opportunities (Arwa, 2014; George & Steven, 2022), become a source of income (Green, 2012) and a global sustainability issue (Aquaknow, 2014; Bardi, 2013; Giljum et al., 2011; Heinberg, 2011; Horwath, 2004; Krausmann et al., 2009; Meadows et al., 2005; Morrigan, 2010; Nickless et al., 2014; Peduzzi, 2014; Sverdrup & Ragnarsdottir, 2014). In Kenya, sand mining had led to the development of improved infrastructure (Mwangi, 2007). Mbaiwa (2008) noted that sand is an important raw material used to develop infrastructure such as shopping malls and residential areas in Botswana. Likewise, Zimbabwe is not an exception in benefiting from sand and gravel through infrastructural development (Mushonga, 2022).

In India, illegal sand mining created significant employment for local communities (Rege, 2016). Similar findings by Lawal (2011) indicated that in 2001 alone, a total of 7131 sand and gravel miners were employed in Nigeria's Niger State alone. In Botswana, Mbaiwa (2008) noted that citizens and non-citizens were involved in illegal mining, construction sites and sand transport. While law enforcing institutions should make efforts to stop these illegal operations,

resistance has been massive given the foregoing benefits enjoyed by local communities. For example, Stewart (2013), Musah (2009) and Mensah (1997) noted that illegal sand mining results in high income accruing to landowners, truck drivers and others engaged in the sand mining work. Despite being illegal, this has the tendency of pushing all capable individuals into the sand mining trade regardless of its social and environmental consequences (Chilamkurthy et al., 2016; Beiser, 2017; Leal Filho et al., 2021).

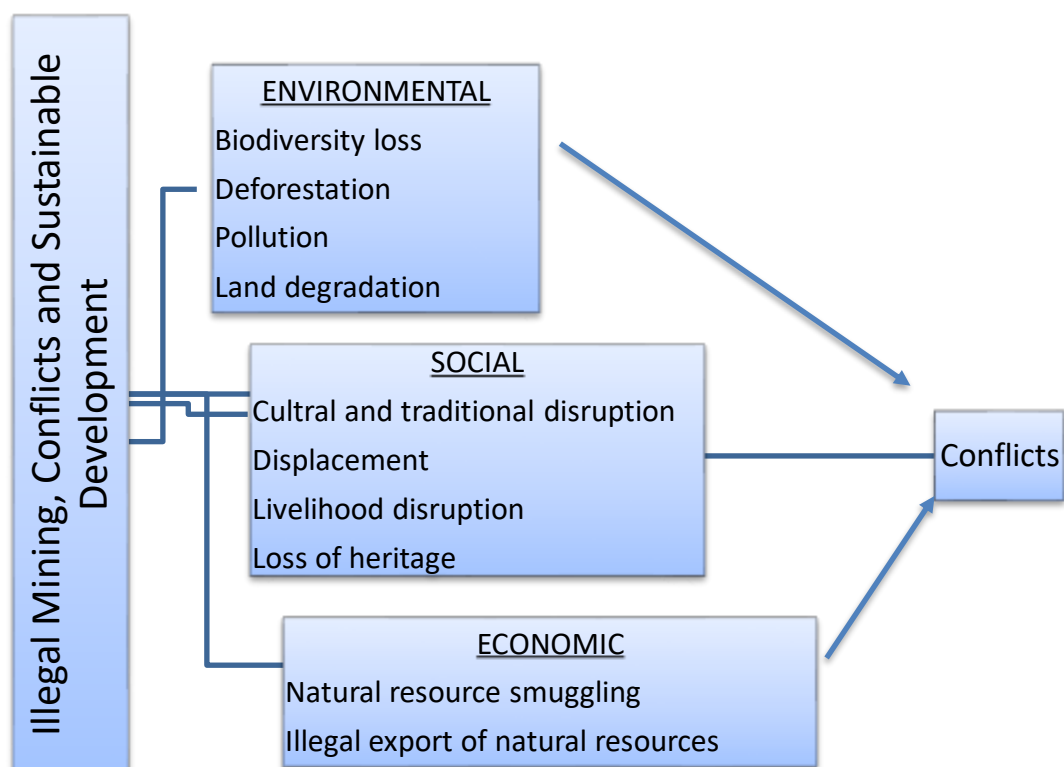
On the hand, the law has to take its course. Enforcement of relevant laws and regulations has been characterised by tension, defiance and conflict (Chen et al., 2015; Ashraf et al., 2011; Chilamkurthy et al., 2016; Chen 2017, Mark, 2021). Environmental authorities have taken serious punitive measures against illegal sand miners in an attempt to promote sustainable sand mining. Together with other stakeholders, there are concerns over the social and environmental impacts of illegal sand mining. In Nigeria, for example, the location of more sand excavation sites in urban and residential areas has caused mounting conflicts between sand mining operators, citizens and the government (Willis & Garrold, 1999). These authors further stated that conflicts have centred on environmental and social issues such as noise, truck traffic, dust, stream-water quality, reclamation, biodegradation, pollution and visually unpleasant landscapes. These conflicts may arise because some residents have to live with noise and dust pollution, sleepless nights, cracking of buildings, occasional hurling of rocks onto buildings, increased frequency of snakebites in some communities, and pollution of water bodies near settlements (Musah, 2009). Similarly, Bagchi (2010) noted that illegal sand mining resulted in serious environmental degradation resulting in perennial water insecurity among local communities.

All these socio-environmental ramifications sparked conflicts and public outcry over governance of illegal sand mining particularly as illegal sand mining activities weaken the livelihood foundation of people through land use and various conflicts (Turner, 2010; Turner et al., 2007; Rodriguez & Beard., 2006; Willis & Garrod, 1999). Forced displacement and associated resentment have become a lingering legacy issue in the sand mining sector (Andrews et al., 2017). Indeed, unsettled land ownership and boundary issues persist, contributing to inter-community conflict and being used by some communities to improve their position with respect to the distribution of company benefits (Ibid).

There is a close link between illegal mining and sustainable development (Rodriguez & Beard., 2006; Willis & Garrod, 1999; Berkowitz et al., 2020; Bendixen et al., 2021). Illegal mining

conflicts are inseparable from sustainable development in terms of cause and effect. The current study builds on this interconnectivity to illustrate how illegal sand mining and socio-environmental conflicts are attributed to social, economic, environmental forces and further considers politics in the interplay to bridge the current literature gap.

Although some recent studies focused on the mining of minerals (Berkowitz et al., 2020; Bendixen et al., 2021), their findings revealed that illegal mining cause social, economic and environmental impacts that ultimately affect sustainable development. In this study, a further examination beyond economic, social and environmental aspects is done to include politics; hence, a political ecology of illegal sand mining and the socio-environmental conflicts is examined. Figure 2.7 below illustrates the link between illegal mining and sustainable development as related to conflicts.



Source: Adapted from Kervankiran et al. (2016).

Figure 2.7. Link between Illegal mining and conflicts and sustainable development

2.10 Legislative framework on sand mining in Zimbabwe

In Zimbabwe, sand mining is broadly regulated by a set of legislations that include:

- The 2013 Constitution of Zimbabwe.
- The Environmental Management Act.
- The Urban Councils Act.
- The Mines and Minerals Act.

The 2013 Constitution of Zimbabwe

The 2013 Constitution of Zimbabwe covers a wide range of issues affecting the country (Dziva, 2018) including socio-environmental issues (Madebwe, 2015). The 2013 Constitution focuses on environmental rights from which issues of sand mining are addressed in section 73. The section provides for environmental rights enjoyed by Zimbabwe citizens. Sub-section 1(a) advocates for an environment that provides for human safety, health and well-being. Similarly, sub-section 1 (b) promotes sustainable development and calls for environmental legislation implementation (Chirisa & Muzenda, 2013). The 2013 Constitution is applauded for its consideration of environment and sustainable development (Gómez-Betancur et al., 2022) but it does not specifically address illegal sand mining issues (Chirisa & Muzenda, 2013).

The Environmental Management Act (Chapter 20:27)

The Environmental Management Act is the main legislation that covers all environmental issues irrespective of sector or industry (Madebwe et al., 2016; Moyo et al., 2018). The Act attempts to address sand mining issues through the Environmental Impact Assessments (EIA) and Ecosystems Protection Regulations SI 7, 2007 that provides for sustainable management and utilisation of sand and gravel (Kwangwama et al., 2022). The Environmental Management Act addresses the extraction of clay and sand, environmental impact assessment procedures and protection of water systems (wetlands and public streams). Projects such as clay and mining abstraction are listed on requirements for EIA that seeks to protect both humans and nature. Madebwe et al. (2006) noted that environments that harbour natural resource are vulnerable to overexploitation and stakeholder conflicts.

Part II of the Act stipulates the processes involved in the acquisition and cancellation of permits for sand or clay mining. Kwangwama et al. (2022) recommended such provisions that promote environmental sustainability in Zimbabwe. Chimhete (2004) pointed out that the adequacy of

such a legislative instrument in curbing illegal sand mining remained questionable, given that indiscriminate sand mining continues to increase in all parts of the country. George and Steven (2022) noted that the permit system does not prescribe parameters for sand processing. Bindu (2006) also argued that most laws in Africa are not comprehensive regarding the standard procedures for sand processing and extraction limits. This could suggest that penalties applied to illegal sand miners are subjective and not categorized according to the nature and impact of the process.

The Urban Councils Act (Chapter 29:15)

One of the instruments that regulates sand mining in Zimbabwe, although more indirectly, is the Urban Councils Act. The Urban Councils Act provides for the establishment of local authorities to administer and govern matters affecting the development and welfare of communities within their areas of jurisdiction (Chatiza & Bandaiko, 2021; Nhamo & Unit, 2003; Mapira, 2011; Parliament, 2013; Madhekeni & Zhou, 2012). In this case, Harare City Council bears the responsibility for social, economic and environmental matters affecting Harare Metropolitan Province including sand mining. Section 96 (4) of the Act provides for the establishment of standing committees of council to deal with environmental matters. Part III of the Act, specifically sub-section 14, prohibits interference of such property including land and its natural resources hence protecting overexploitation of sand resource. The Act makes use of a permit system for individuals to mine sand, failure of which attracts penalties. Activities such as extraction and removal of sand are prohibited unless a license has been granted (Mapira, 2011, Mazikana, 2022). Besides the regulation of land use and conservation of environment as indicated, the Urban Councils Act also decentralises the development and adoption of by-laws by local authorities (Chatiza & Bandaiko, 2021; Muchadenyika & Williams, 2016; Mutema, 2012). By-laws legally empower local authorities to fully regulate destructive activities such as illegal sand mining and augmenting the more generic laws and regulations concerning environmental issues (Mowo et al., 2016; Kamarulzaman et al., 2022). However, Pachawo (2013) criticized that the Act as it is not legally binding on by-laws as it states that councils may make laws.

The Mines and Minerals Act (Chapter 21:05)

As with the Environmental Management Act, the Mines and Minerals Act (Chapter 21:05) is also one of Zimbabwe's legislations that directly regulates illegal sand mining. This Act

provides for the control of mining operations in Zimbabwe (Dhliwayo, 2016). Specifically, Part XII controls illegal sand mining by regulating the mining of alluvial, eluvial and certain other deposits. According to George and Steven (2022), the Act defines alluvial deposit as any deposit, either non-coherent or consolidated, of any geological age, which has been formed by agency of wind or water by any accumulation of sand, gravel or clay deposited by surface-water containing valuable minerals. Sand is listed as one of the mined resources that requires protection and demands permits like any other minerals such as gold, diamonds and chrome. Section 222 clearly spells out control mechanisms for persons working or wishing to work on such sand deposits among other alluvial deposits (Lange, 2011). This suggests that the Act prohibits extractive illegal activities including illegal sand mining.

As with the Environmental Management Act of Zimbabwe and the Urban Councils Act, this law also demands for an application and approval of sand mining and, hence, augers well for other relevant mining and environmental laws and regulations in Zimbabwe. While this Act has a comprehensive strategy for enhancing sustainable sand mining through multi-institutional processes for permit acquisition, most Zimbabwean environmental laws are not holistically formulated and implemented (George & Steven, 2022; Rajah et al., 2012). Despite the utility of penalties prescribed for offenders, community engagement in sand mining and sustainable development is low (Lange, 2011). This author also feels that enforcement of law is poor and so allows for rampant illegal sand mining. The indigenization policy adversely effected sustainable land use by local communities (Mazaranye, 2016; Magure, 2014). This shows that existing policies and practices for sustainable use of natural resources are not adequately reflexive.

2.11 Summary

The chapter reviewed the literature describing various themes as informed by the research objectives and pinpointed literature gaps that the current study sought to address. A description of illegal sand mining was followed by a discussion of the ecological impacts of illegal sand mining. These sections were followed by a review of the socio-economic costs and benefits of illegal sand mining and the governance of illegal sand mining. This chapter ended with sections that discussed the institutional practices, issues, and challenges to illegal sand mining governance, respectively, and the nexus between illegal sand mining and conflicts. The following chapter (3) presents the methodology of the study.

CHAPTER 3 THEORETICAL AND CONCEPTUAL FRAMEWORKS

3.1 Introduction

This chapter presents the theoretical frameworks upon which the study was premised. These include the political ecology framework, the land resource conflict theory, the stakeholder theory and reflexive governance framework. A discussion of these theories is provided regarding their advantages, disadvantages and application to the study.

The political ecology framework considers the connected social, economic and political issues towards an environmental change or phenomenon. This study utilises the theory to examine illegal sand mining and associated socio-environmental conflicts within a Zimbabwean context. The land resources conflict theory also explains how land as a natural resource is subject to conflicts due to its provision for various land use. Similarly, the stakeholder theory was ideally utilised for its emphasis on the essence of multi-stakeholder engagement towards the achievement of sustainability or sustainable development. The study utilised the theory to analyse multi-stakeholder engagement in addressing illegal sand mining. Finally, the reflexive governance framework was utilised to analyse existing institutional and legislative frameworks that deal with sand mining issues, particularly in terms of the relevance of such programs and policies to socio-environmental needs. These theories are explained in more detail in the following sections. Section 2.2 discusses the political ecology framework, section 2.3 discusses the land-resource-conflict theory; section 2.4 details the stakeholder theory and lastly section 2.5 explains the reflexive governance framework.

3.2 Political ecology framework

Political ecology has been widely used by scholars to explain global environmental issues including conflicts (Hershkovitz, 1993; Bassett & Zimmerer, 2003; Leonard, 2012; Baba, 2014; Dawson, 2021; Miller, 2022). However, the concept of political ecology has been variously defined based on study contexts. Some definitions emphasise political economy (Blaikie & Brookfield, 1987), others place more stress on formal political institutions (Peet & Watts, 1996), some view environmental change as being most essential (Watts, 1985), while others accentuate narratives about environmental changes (Escobar, 1996). According to Bryant (1992), political ecology attempts to understand the sources, conditions and impacts of any environmental change. Political ecology analyses the complexity of social and environmental changes that result from conflicting social, political and economic processes (Blaikie & Brookfield, 1987; Hershkovitz, 1993; Bryant & Bailey 1997; Taylor, 1999; Page,

2003). Batterbury (2018) noted that contemporary political ecology has been widely adopted by scholars due to its ability to explain how and why humans transform nature. In fact, the framework was developed as a regional political ecology in the 1980s as a multi-scale research approach to environmental science using a unique methodology. Batterbury (2018) further noted that the political ecology framework entered Anglo-American geography and development studies through Piers Blaikie's analyses of soil erosion (Blaikie, 1985) and land degradation (Blaikie, 1989b, 1991; Blaikie & Brookfield, 1987). The above scholars further highlight that the growing interest in the utilisation of the political ecology approach initially followed the concern of stakeholders regarding environmental security, and the prevalence of conflicts due to resource scarcity in the 1980s. Over time, especially from around 1990s, researchers realised that most environmental problems were a result of a broader context of politics, society and economy at various levels (Bryant & Bailey 1997; Dawson, 2021).

According to Robbins (2005), political ecology does not only provide critiques but also alternatives in the nexus between environment on the one hand and political, social and economic factors, on the other. Clearly, the scholar highlights the normative understanding that more sustainable ways of doing things are possible from a political ecology perspective. Equally, an examination of political, economic and social factors influencing illegal sand mining in Zimbabwe can expose gaps in effective governance to trigger the adoption of more sustainable ways of resource extraction and utilisation by the policy makers and other stakeholders. As highlighted by Benjaminsen and Svarstad (2018), political ecology reveals the decisions that local communities make about natural resources in their localities, particularly regarding sand and gravel in the context of prevailing political environment, societal regulations and economic pressure. Indeed, unequal relations over land claims for sand mining, and their effect on environment in relationship with government policies can be unravelled using this framework.

Interestingly, most scholars agree that political ecology is a cross-cutting framework that converge politics, economies and society in explaining environmental changes (Bassett, 1988; Taylor, 1999; Page, 2003; Gray & Dowd-Urbe, 2013). Using Blaike's theory, the political ecology of mining has been relatively more studied in third world countries (Abdus, 2008; Bagchi, 2010; Ashraf et al., 2011), as are the issues of governance (Davey, 2001; Green, 2012; Chevallier, 2014; Boloji, 2010; Arwa, 2013). These studies extensively expose the socio-economic systems involving mining such as income generation, cement production and

employment creation. However, the application in sand mining, particularly illegal sand mining, is low. In this study, political ecology is adopted in the understanding that there are existing institutional and legislative frameworks that govern environmental issues in Zimbabwe, given the outcry over illegal sand mining. According to Baba (2014), political ecology stems from the government functionality to formulate and implement ecological policies that address its environmental needs and problems at the same time monitoring its citizen's interaction with the same environment.

However, despite the growing application of political ecology framework the world over, Leonard (2012) argued that much of the political ecology focus was on rural areas rather than on urban areas. This means that political ecology has not been fully utilised to examine environmental issues in urban areas making the complexities and paradoxes around urban issues not well understood to policy makers. Thus, the study adopted this framework to expose salient issues on illegal sand mining and the socio-environmental conflicts in Zimbabwe's urban and peri-urban spaces. Using this theory, the researcher fully appreciated the possible divergent perceptions of urban environmental risks beyond only civil society power relations against the state and industry. While there is a growing realisation, appreciation and application of this framework within rural landscapes, Veron (2006) similarly argued that most research is biased to natural resources and limited for urban environmental risks. Political ecology was thus used to examine illegal mining in an urban and peri-urban Zimbabwe in relation to socio-environmental conflicts. Schubert (2005) noted that the political ecology framework was widely used by researchers to analyse the interactions between man and the environment despite being a new field of research. The scholar noted that the political ecology framework addressed the following issues:

- how both nature and societal structures determine each other and shape access to natural resources.
- how constructed concepts of society and nature determine human environment interactions.
- the connections between the access to, and control over, resources and environmental change.
- the social outcomes of environmental change.

He further noted that the framework provides conceptual tools for analysis rather than an encompassing theory of human environment such as the neo-Marxist versus the neo-Liberal (Schubert, 2005). The scholar however feels that the political ecology concept remains

ambiguous despite its ability to answer the aforementioned questions. Other scholars also feel that the framework is still new and not comprehensive and see the need to develop a more comprehensive theory that provides a strong foundation for scientific research (Hershkovitz, 1993; Peet & Watts in Schubert, 2005). Most studies conducted on environmental conflict and security issues since the 1990s related previously mentioned issues to resource scarcity (Schubert, 2005). One popular neo-Malthusian scholar is Homer-Dixon. The next section presents the land-resource conflict theory as it is used to explain the socio-environmental conflicts around illegal sand mining in Harare Metropolitan Province.

3.3 Land resource conflict theory

According to Obioha (2005), the Land Resource Conflict theory explains the nexus between land demand and associated conflicts. By the end of the 1980s, and even before, the conventional approach to looking at environmental questions had its base in a neo-Malthusian framework (Schubert 2005). The Homer-Dixon Land Resource Conflict theory emanated from that framework. According to Ujoh (2014), the theory explains the ripple nexus between environmental effects, social effects and conflicts over land and land use. Given that the political ecology framework does not specifically speak about conflicts while stakeholder theory only focuses on stakeholder collaboration, this theory therefore bridges that gap by explaining conflict on sand mining particularly as to land right, access and utilisation. Explaining the land resource conflict theory, Ujoh (2014) highlighted that environmental effects lead to social effects that, in turn, lead to conflicts. This clearly shows the land resource theory appreciates the connectedness between land use, impacts and conflicts.

Informed by the foregoing tenet, the current study therefore utilises this model to explain how environmental impacts of illegal sand mining have created social ramifications among communities and other actors, including socio-environmental conflicts. Obioha (2005) argued that without adopting the land resources conflict approach, it is difficult to comprehend the link between human activity, environmental change, social disruption and conflict. The model states that environmental scarcities have profound social consequences that may include insurrections, ethnic clashes, urban unrest, and other forms of civil violence, especially in the developing world (Homer-Dixon, 2001). Thus, the theory neatly resonates with the stakeholder theory and the political ecology framework to explain illegal sand mining-induced conflicts from a broader socio-economic and political perspective. Like the Stakeholder theory, the Land Resource Conflict theory also is concerned with social sustainability, particularly conflicts

related to natural resource extraction and utilisation. In explaining unarmed conflicts, Homer-Dixon brings in the concept of social and technical ingenuity. In his address to the Royal Society of London, October 2 in 2003, he said;

“Ingenuity, as I define it, consists of “sets of instructions that tell us how to arrange the constituent parts of our physical and social worlds in ways that help us achieve our goals. The value of this ingenuity perspective is clearest when it’s contrasted with the conventional economic view—a view that, in Western societies at least, permeates our understanding of human and social behaviour”.

The above statements show that even when resources are scarce, armed conflicts are resolvable through systematic and integrated efforts towards resources management. Homer-Dixon acknowledges that resource scarcity does not always spark violent conflicts among different stakeholders especially when societies are more comprehensive but failing to further elucidate such tragedies. However, the theory has been criticised for this unconvincing conclusion and methodological shortcomings. Relating to various findings and models employed by other researchers, contrary outcomes of this neo-Malthusian approach has exposed it to both citation and wide criticism in terms of political ecology and the wide environmental research (Tiffen et al., 1994; Barnett 2007 Hagmann 2005; Batterbury, 2018).

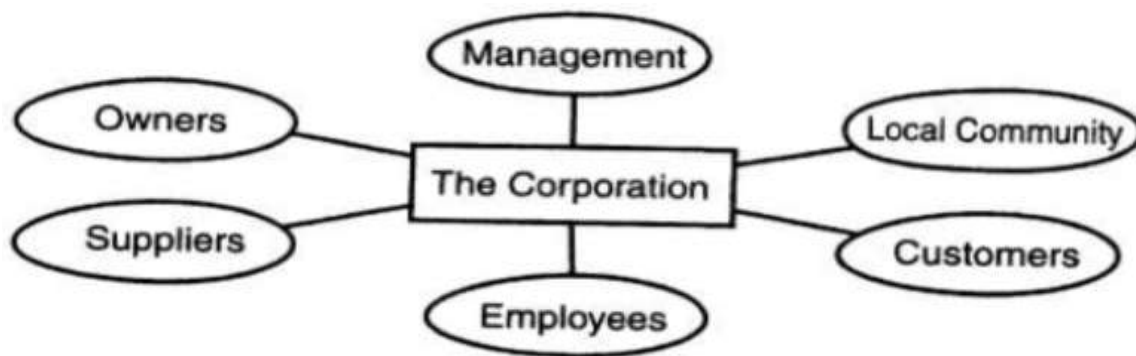
Nevertheless, the framework was necessary in explaining the subsequent socio-environmental conflicts emanating from illegal sand mining in Zimbabwe. Furthermore, the Land Resources Conflict theory was particularly utilised because of its appreciation of environmental scarcities, risks and conflicts in urban setting. According to Homer-Dixon (2001), the land resources conflict model views scarcities as leading drivers of sharpened social cleavages, conflicts and weakened institutions. Thus, the study interrogated issues of land ownership and legitimacy from the perspective of land resource conflict. Indeed, illegal sand mining takes places only in areas with sand endowment, and that means there are issues of land rights among interested miners and the community.

The theory was also utilised because of its appreciation of social, economic and political stresses towards environmental change. In fact, Homer-Dixon states that the effects of environmental scarcity are indirect and act in combination with other social, political, and economic stresses (Ujoh, 2014). With urbanisation significantly contributing to demand of sand the world over, this study therefore used the theory to explore how such demand could

have influenced or been influence by political, economic and social stresses. The theory also helps to explain the relationship between illegal sand mining and various forms of conflicts in Zimbabwe.

3.4 Stakeholder theory

According to Fontaine et al. (2006), the stakeholder framework was first introduced in the mid-1980s. Freeman (1984) defined stakeholders as groups and individuals who benefit from or are harmed by, and whose rights are violated or respected by corporate actions. Figure 3.1 below presents the stakeholders who influence the corporation in stakeholder framework perspective.



Source: Freeman et al. (2010).

Figure 3.1: Stakeholder model.

According to Freeman et al. (2010), the stakeholder theory suggests that analysing the relationship between any business and its stakeholders presents a better chance of addressing common problems. In the present study, the stakeholder theory was particularly utilised to evaluate the multi-stakeholder collaborative efforts in combating illegal sand mining in a bid to achieve social sustainability in Zimbabwe. According to Laura et al. (2014), the concept of sustainability initially highlighted the decline in natural environment and the subsequent adverse impacts on human health, economic growth and societal harmony. However, the concept has been recently utilised to include broader set of social, economic and environmental aspects referred to as *triple bottom line* of people, planet and profit (Boström, 2012; Ehnert & Harry, 2012; Shani & Mohrman, 2011; Garvare & Johansson, 2010). This also augers with the United Nations Brundtland Commission's definition that highlights on the need to meet the needs of the present without compromising the needs of future generations (United Nations' World Commission on Environment and Development, 1987). Based on the foregoing, the economic goal of sand for financial gain is inseparable with social and environmental concerns. Achieving such social sustainability requires the collaborative efforts of stakeholders as

advocated by the stakeholder theory. Thus, the study utilises the stakeholder theory to investigate illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province.

According to Chazal (2010), the stakeholder theory calls for the mobilisation of various stakeholders in order to establish a socially sustainable organisation. Stakeholder management became popular in the mid-eighties (Freeman, 1984; Weiss, 1994; Carroll, 2006). Multi-stakeholder dialogues, in which several stakeholder groups (for example consumers, workers, unions, non-governmental organisations, political actors) are present and other companies such as competitors and suppliers participate, are only one form of stakeholder management among others, albeit a popular one (Roloff, 2006). This clearly shows that stakeholder theory envisages socio-environmental sustainability as an outcome of stakeholder engagement, inclusivity and participation. Thus, the theory addresses objective three of the study that examines stakeholder collaboration in addressing illegal sand mining in Zimbabwe. Roloff (2006) further highlights the need to bring together various stakeholders from business, civil society, governmental and international institutions to find common solution/s towards problems. In this study, stakeholders involved in illegal sand mining include, among others, the government, community, civil society, industry and NGOs.

Specifically, the stakeholder theory helped the researcher in evaluating the roles played by EMA, local authorities, the mining companies, NGOs, community social organisations (CSOs) and the community in addressing illegal sand mining and conflicts. With many other contributions confirming that multi-stakeholder engagement is indeed a necessary tool for building social sustainability (Leonard, 2008; Roloff, 2008; Lifvergren et al., 2009; Laszlo et al., 2010), the current study adopted this concept to equally proffer socially sustainable policies and practices for sand mining in Zimbabwe. In order to generate meaningful collaborative outcomes, social sustainability demands the need for both formal and informal networks, partnerships, alliances, platforms and initiatives (Rogerson, 2011; Roloff, 2008), and this can be achieved through adoption of the stakeholder theory. Similarly, Russo (2010) highlighted that the economic objective of any organisation is achievable when the organisational processes are analysed and optimised through stakeholder engagement. Thus, in doing so, the analysis has to address issues beyond economics to social and environmental. This study views illegal sand mining as a business venture and examines it in terms of socio-environmental conflicts

particularly reflecting on the nature and extent of multistakeholder collaboration to balance the three pillars of sustainable development.

Notwithstanding the utility of the stakeholder theory in this study, the approach has been subject to critics. Mohrman and Worley (2010) argued that stakeholder perspective is insufficient in achieving social sustainability through abstract guidelines or description of practices. Rather, the scholars feel that achieving social sustainability through multi-stakeholder collaborative engagements and processes is complex and requires more than a regulatory approach. In view of this, Shani and Mohrman (2011) proposed combining the attitude of building theoretical models and the need for a practitioner-rooted approach into a renewed methodological perspective. Similarly, Kira and van Eijnatten (2008) attested that social sustainability is more dynamic and complex in stakeholder perspective and argue that it can be achieved depending on the nature of stakeholders involved, the ability to meet their concerns and needs as well as addressing peculiar tensions that arise during collaboration efforts. Notwithstanding these views, the stakeholder theory was very useful in this study as it exposed how various stakeholders are working together in addressing illegal sand mining while promoting social sustainability. Despite the varied tenets of the three approaches adopted in the study, their related emphasis on political, social and economic factors on environmental issues added to strengthening their utility in this thesis. Indeed, illegal sand mining has not only become an environmental issue in Zimbabwe, but also a socio-economic and political issue.

3.5 Reflexive governance framework

The concept of reflexive governance which emerged around the 1990s (van der Jagt et al., 2021; Jordan et al., 2003) has gained momentum in academic discussions on good governance (Voß, & Kemp, 2005; Bäckstrand & Kronsell, 2015), resource governance (Haas & Jasanoff, 2012) and sustainability transitions (Kemp & Loorbach, 2006) in the early decades of the 20th century (Bäckstrand & Kronsell, 2015). Clearly, there has been a growing application of reflexive governance by researchers the world over (Leonard & Lidskog, 2021; Vadrot et al., 2022; van der Jagt et al., 2021; Pahl-Wostl & Patterson, 2021). Findings by Leonard and Lidskog (2021), whose study examined the conditions and constraints for reflexive governance of industrial risks in Durban, South Africa shows that there still exist reflexive governance gaps in the country. In an environmental context, mounting evidence of flawed strategies and policies towards environmental management (Moore et al., 2021); stakeholder participation (Enemy & Newig, 2005) and environmental policy integration (Lenschow, 2002) had not

significantly addressed environmental issues such as resource depletion and biodiversity losses. This marked the inception of better governance through reflexive governance.

Despite the development of institutional and legislative frameworks that qualified as fully developed environmental state (Bäckstrand & Kronsell, 2015; Duit et al., 2016; Mol & Buttel, 2002), the efficacy was hampered by various obstacles ranging from entrenched consumer routines (Shove, 2004) to structural limits of the nation state (Jänicke, 2006). Against this backdrop, reflexive governance was utilised in analysing and formulating more suitable environmental, social and economic programmes and policies. According to Feindt and Weiland (2018), reflexive governance refers to governance actions where institutions provide for reflexive adaptation of regulations or policies. Haas and Jasanoff (2012) similarly presents the concept of reflexive governance as the design problem where rules for reflexive learning are created within a given normative framework that aims at reflexive capacity building that finally leads to new design rules. Reflexive governance that seeks to build reflexive capacity is a means by which underlying assumptions, practices and institutional practices are scrutinized and reconsidered (Hendriks et al., 2007). Thus, this study examined institutional practices from various government institutions using this framework. From a stakeholder perspective, Vadrot et al. (2022) also highlighted that reflexive governance involves development of capacity among the governed to influence the construction of governance objectives. Generally, reflexive governance is an approach that seeks to address socio-ecological vulnerabilities of societies, fragmented governance regimes on human-nature relations and conditions for sustainability transition.

Based on the foregoing accounts, Feindt and Weiland (2018) concluded that reflexive governance therefore occurs:

- where institutional arrangements engage stakeholders from various levels of governance, epistemic backgrounds, and practical contexts.
- in an effort to reflect on and possibly adapt their cognitive and normative beliefs.
- where is cognisance of alternative understandings of the problems.
- with the aim to integrate various approaches to common problem/s solution.

Socio-ecologically, reflexive governance is underpinned by three distinct facets but interconnected strands of environmental governance literature that include transition management (Grin et al., 2010; Jhagroe & Loorbach, 2015), deliberative democracy for

environmental governance (Dryzek & Pickering, 2017) and sustainability governance (Enemy & Newig, 2005). However, the concept of reflexive governance remains ambiguous despite the reverberation of the concept in academic literature on environmental governance (Grin et al., 2010). In this study, the reflexive governance framework explains how the existing institutions demonstrate good governance of sand mining, including illegal sand mining and associated conflicts. These institutions include environmental authorities, mining authorities, local authorities, police and political leadership. The study further utilises the framework to reflect on existing institutional programs and policies in terms of relevance to contemporary sand mining issues in Zimbabwe.

With the political ecology framework applied to include urban environmental risks and conflicts over resources (Leonard, 2012), the land resources conflict theory also attempting to explain socio-environmental conflicts from resources scarcity point of view, the stakeholder theory highlighting the rationalé of multi-stakeholder collaboration on social sustainability, and reflexive governance evaluating the relevance of existing practices in the sand mining sector, the four frameworks enabled the researcher to explicitly examine the political ecology of illegal sand mining and the socio-environmental conflicts in Zimbabwe. Specifically, the study was able to expose salient issues behind socio-environmental conflicts among the miners, residents, the government and the community from a much broader perspective. This set of frameworks also informed the study in unpacking the complexities behind illegal sand mining and the socio-environmental conflicts in Zimbabwe.

3.6 Summary

This chapter discussed the four theoretical frameworks that were used in the present study to explain key areas of focus. These include the political ecology framework, the stakeholder theory, the land resource conflict theory and the reflexive governance framework. The characteristics, tenets and evaluation of each framework in terms of research aim and objectives were explained. The next chapter reviews literature on illegal sand mining and conflicts.

CHAPTER 4 METHODOLOGY

4.1 Introduction

Given that sand mining has increased in Zimbabwe, this study sought to examine the political ecology and reflexive governance of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province. Specifically, the study used a qualitative research approach to analyse the existing legislative instruments and institutional practices for addressing sand mining in Zimbabwe. After analysing the responses to qualitative questionnaires, the study identified the political and socio-economic drivers underpinning illegal sand mining and examined the impacts and subsequent conflicts of illegal sand mining. The study further evaluated the roles of various social stakeholders or stakeholders that include the community, government, industry and civil society. In developing a collaborative effort towards combating illegal sand mining, the study proposed practice and policy recommendations for reflexive governance of sand mining designed to promote sustainable mining within the arena of sustainable development.

4.2 Research philosophy

The study followed the 'Interpretivism' approach to examine a political ecology of illegal sand mining and the socio- environmental conflicts in Harare Metropolitan Province. Interpretivism is an approach to social sciences that asserts that understanding the beliefs, motivations, and reasoning of individuals in a social situation is essential to decoding the meaning of the data collected around a phenomenon (Nickerson, 2022; Nguyen et al., 2015; Goldkuhl, 2012). This research philosophy is widely adopted by researchers for its profound penetration of complex social behaviours and generation of accurate insights (Thanh & Thanh, 2015; Irshaidat, 2022, Nickerson, 2022; Mason et al., 2022, Monaro et al., 2022).

Compared to other research philosophies, ontologically the interpretivism philosophy adopts a relativist view that perceives reality through intersubjectivity by considering meaning in research and understanding of social and experiential aspects (Goldkuhl, 2012; Junjie & Yingxin, 2022). Similarly, other academic studies show that interpretivism philosophy derives rich data through understanding that knowledge and human beings cannot be separated (Goldkuhl, 2012; Knotter, 2022; Monaro et al., 2022). Hence, this study derives meaning, voice, standpoint, experience, thoughts, and feelings from a generally homogeneous subject concerned with sand mining, including miners, government, civil society and community

members. As a research paradigm, interpretive research is based on the premise that social reality is shaped by way of human experience and social backdrop, thereby making it more relevant to examining the socio-environmental conflicts associated with illegal sand mining in Zimbabwe. Given that this study was socio-environmental in nature, and mainly premised on a political ecology lens, this philosophy was therefore more ideal.

According to Nguyen et al. (2015), the interpretivism approach enables researchers to have an in-depth understanding of the relationship between human beings and their environment and the part that people play in creating the social fabric of society. Although this research philosophy utilises both qualitative and quantitative approaches (Irshaidat, 2022), it is essentially applied more in qualitative research (Nickerson, 2022). Informed by this philosophy, I acquire an in-depth understanding of the complex social, economic and political issues associated with illegal sand mining, including reflexive governance issues in Zimbabwe. I also understand why illegal sand miners behave in the way they do given the illegal nature of operations, and how has this relates to socio-environmental conflicts among various stakeholders. The interpretivism approach exposes underlying issues within subject matter (Alharahsheh & Pius, 2020; Pizam & Mansfeld, 2009). Informed by this philosophy, I unearthed salient issues underpinning the socio-environmental conflicts, governance, and multistakeholder engagement as well as the underlying causes of illegal sand mining in Harare, Zimbabwe.

This is because the interpretivist view invites the researcher to investigate meaning behind the understanding of human behaviour, interactions and society. Thus, I also attempted to relate how sand mining was central to various stakeholders including miners, industry and the government- and establishing circumstances leading to conflicts in Zimbabwe. The following section presents the research methodology used in this study.

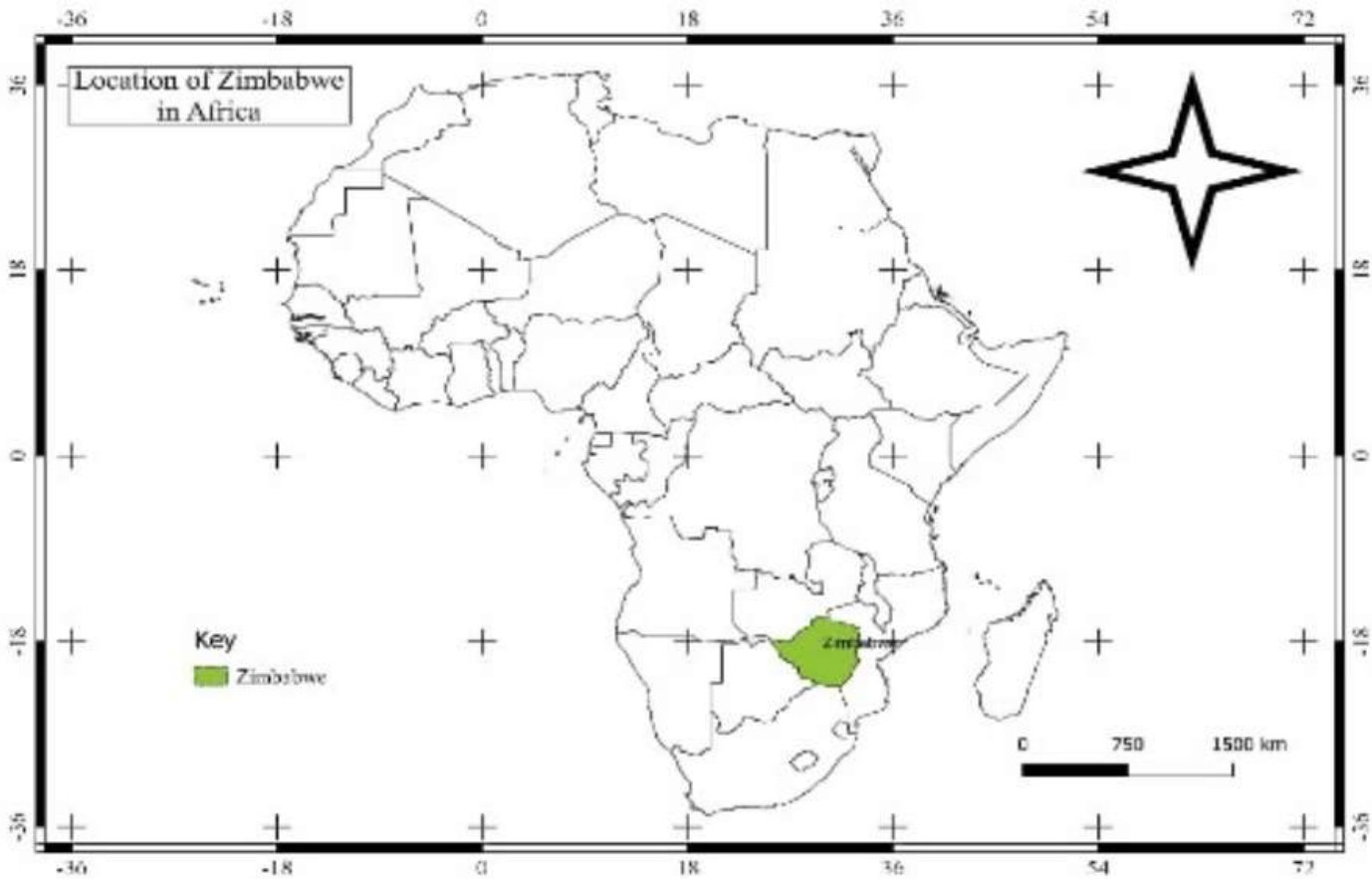
4.3 Qualitative research

Smith (2017) highlighted that the research methodology can be either quantitative or qualitative and points at the need to choose a more suitable research method. This study adopted a qualitative research method as informed by the interpretivism approach as earlier discussed. As opposed to the quantitative approach that involves some statistical measurements, this approach was preferred when interrogating underlying issues on illegal sand mining that do not require statistical testing. Gentles et al. (2015) asserted that qualitative research is committed

to the naturalistic perspective and to the interpretive understanding of human experiences. Indeed, the nature of the present research required an interrogation of underlying issues that underpin illegal sand mining and associated socio-environmental conflicts. Hence, this approach was ideal in understanding human experiences in connection with illegal sand mining. As noted by Nguyen Cao Thanh and Thanh (2015), qualitative research focuses on the phenomena that occurs in natural settings and where the nature of study requires in-depth understanding. Gentles *et al* (2015) also noted that qualitative research ideally takes place in the settings where participants conduct their activities. Thus, the researcher conducted this study in sand mining hotspots in Harare where illegal sand mining is a daily activity. Park and Park (2016) also noted that qualitative approach helps researchers to explore and expose experiences in their natural settings and construct theory that sets the basis for further decision making. Thus, qualitative research assists in gaining a better understanding about the circumstances and experiences of the problem (Pathak et al., 2013; Leedy & Ormrod, 2012).

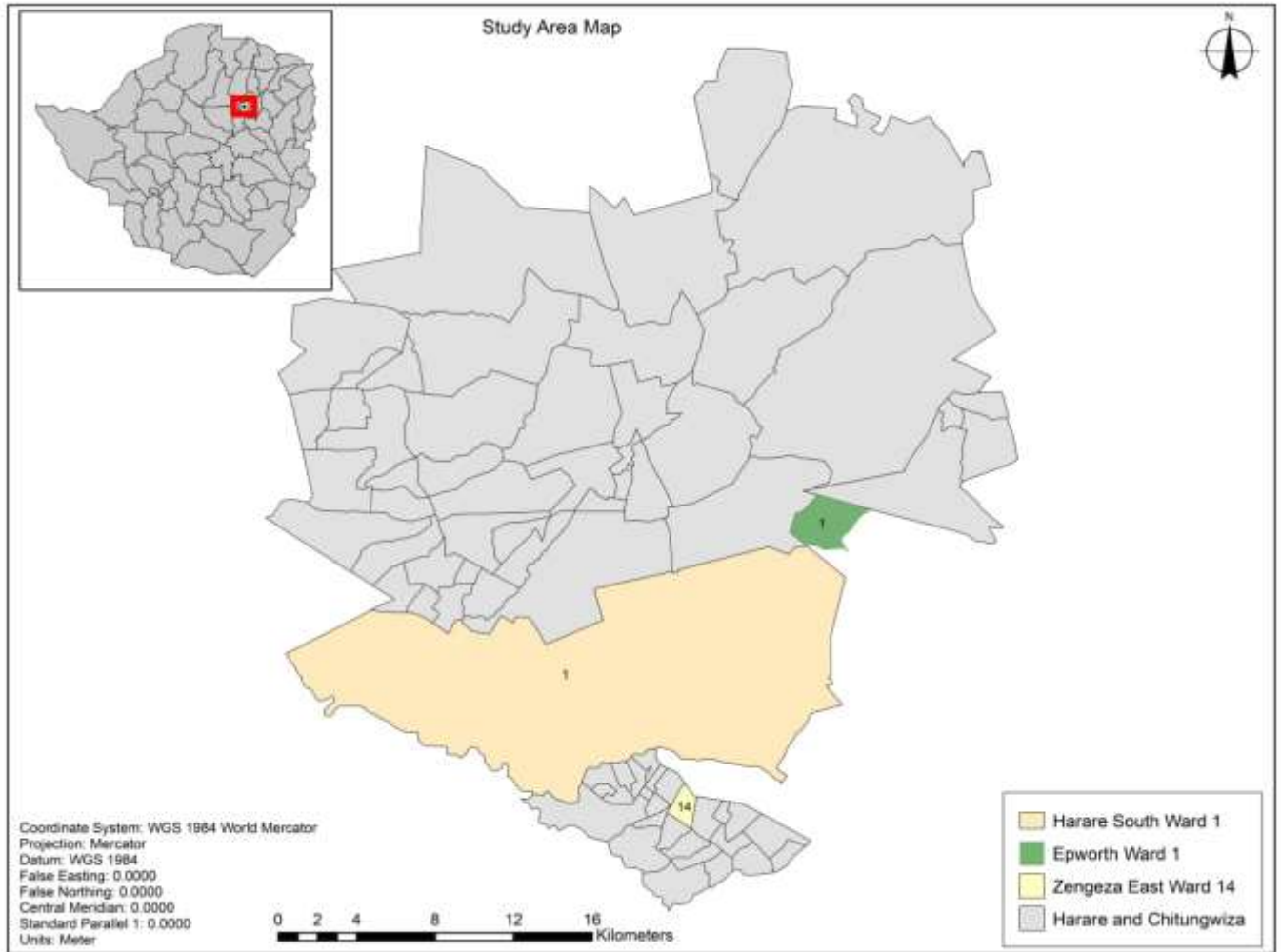
4.4 Study area

The study was conducted in Zimbabwe's Harare Metropolitan Province in which three case sites were identified for study, namely Epworth, Zengeza East and Retreat Farm. Figure 4.1 shows the location of Zimbabwe within Africa while Figure 4.2 shows the location of Harare Metropolitan Province within Zimbabwe. This is followed by individual maps showing the three study sites in the province.



Source: Author, 2023

Figure 4.1: Map of Africa showing the location of Zimbabwe



Source: Researcher, (2023).

Figure 4.2: Map of Harare Metropolitan Province showing 3 case sites

4.4.1 Case site 1: Epworth

Location

Epworth is located about 12 kilometres south-east of Harare Central Business District (CBD) (Parliament Research Department, 2011). Epworth is divided into seven wards. In terms of elevation, it is 1.473 metres above sea level (Butcher, 1993).

4.4.1.1 Population and administration

Epworth is a high-density dormitory town administered by the Epworth Local Board (ELB). A large influx of people occurred during the late 19th century due to urbanisation in Harare, with the population being 20 thousand in 1980 and 35 thousand in 1987. By 2002, the population was 113,884 thousand (Central Statistics Office of Zimbabwe, 2003). According to census 2012, Epworth had 167 462 thousand inhabitants with 83 983 thousand being males and 83 479 thousand being females (Election Resource Centre-ERC, 2018). Estimates indicate that ward 1 of more interest to this study has a population of 50- 60 thousand (Ibid).

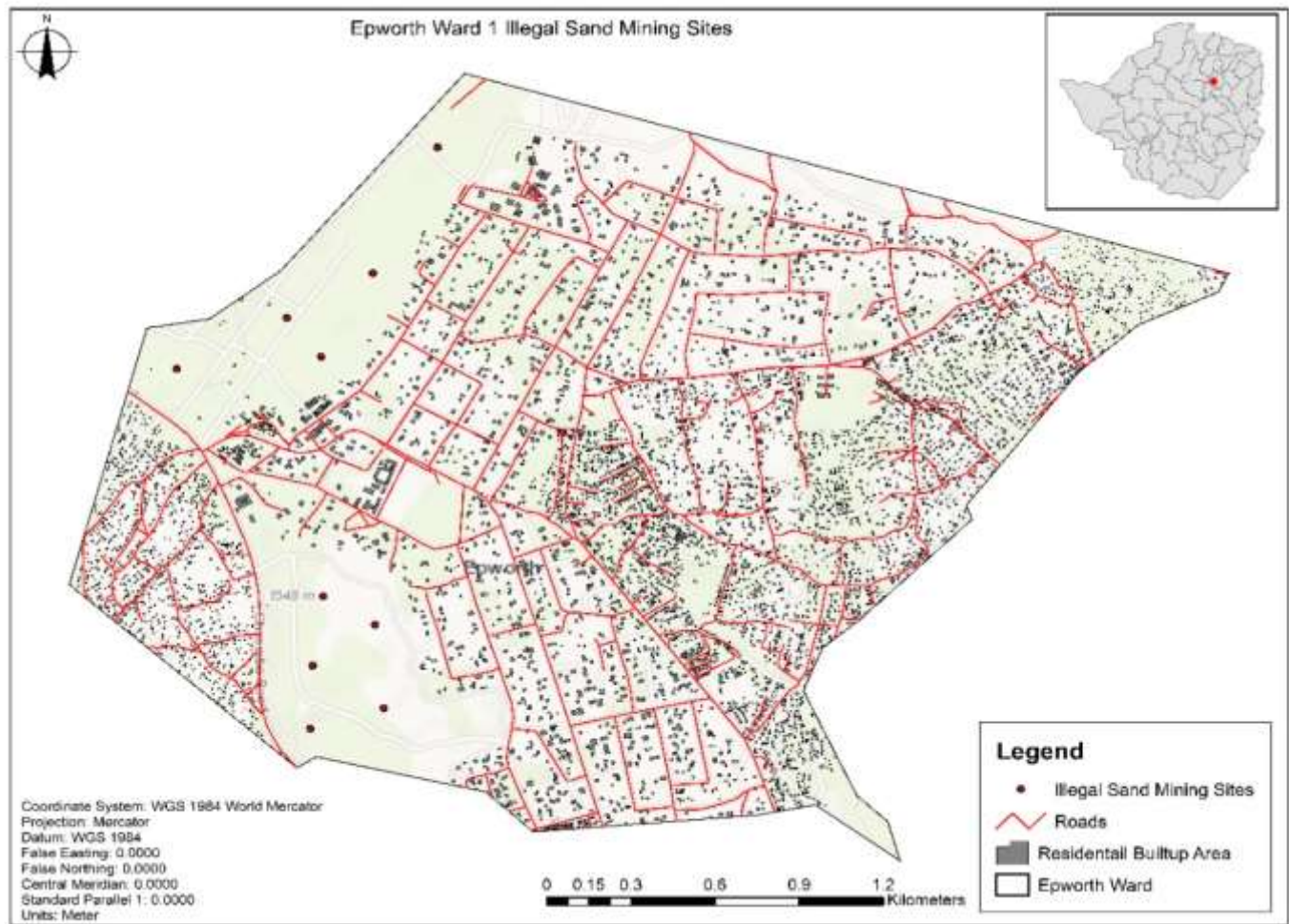
4.4.1.2 Social amenities and facilities

Because town planners or authorities had not considered this area for urban residential purposes, the influx of population was spontaneous – thus, there were limited public social amenities and facilities such as toilets, water, sewage and electricity. The government of Zimbabwe tolerated the informal settlement and upgraded the area (Butcher, 1993). As the population increased, Epworth expanded to extensive squatter settlements with unnamed streets. The building materials are of low standard as, for example, houses are constructed using unbaked clay bricks. There are various urban deficiencies such as a lack of adequate social services, while electricity is only available at service centres, some schools, offices and most of the western suburbs that include Stopover, Chinamano and OverSpill. Generally, the population is poverty-stricken and overcrowded, and street vending and informal manufacturing are the main livelihoods (Gandidzanwa, 2003). The constituency is known for its electoral violence particularly in 2008 with candidates manipulating and abusing citizens, especially the unemployed youths (ERC, 2018).

4.4.1.3 Geology and climate

Geologically, Epworth is characterised by a cooler and drier climate, open woodland vegetation and sand-clay soils. It is bisected by a stream into two parts and possesses the balancing rocks that are featured on Zimbabwean dollar notes issued by the Reserve Bank of Zimbabwe. Illegal

mining practiced is in stream and open pit. This study will only focus on ward 1 of Epworth. Figure 4.3 is a map showing Ward 1 of the Epworth study area.



Source: Researcher, (2023).

Figure 4.3: Map showing Ward 1 in Epworth

4.4.2 Case site 2: Retreat Farm, Harare South

4.4.2.1 Location

Retreat Farm lies between the cities of Harare and Chitungwiza, in the southeastern part of Harare City. It lies within Harare South District. The estimate terrain elevation above sea level is 1463 metres (ERC, 2018).

4.4.2.2 Population and administration

Retreat Farm is an over-crowded new settlement in Harare South Constituency in the peri-urban area of Harare City administered by the Harare City Council. According to Chigudu and Chirisa (2020), the area was formerly owned by Retreat Farm (Private) Limited and later acquired by the Zimbabwe government for residential purposes through General Notice Number (GNN) 474 of 2011. Other residential areas in the constituency include Southlea, Hopley and Irvine's area. The ward under which Retreat Farm lies is one of the mostly densely populated areas in Harare South. Although statistics are not available for Retreat Farm, politically, Harare South alone had 25 698 thousand registered voters in 2008, 29 074 thousand in 2013 and 76 037 thousand in 2018 (ERC, 2018). The astronomic rise in registered voters is evidence of expanding new locations but official data for Retreat Farm are limited due to the nature of settlement and short period since its inception. According to Hentze and Menz (2015), approximately 120 families resided at the farm prior to the land reform program but the number has since more than doubled after the start of the fast track land reform program.

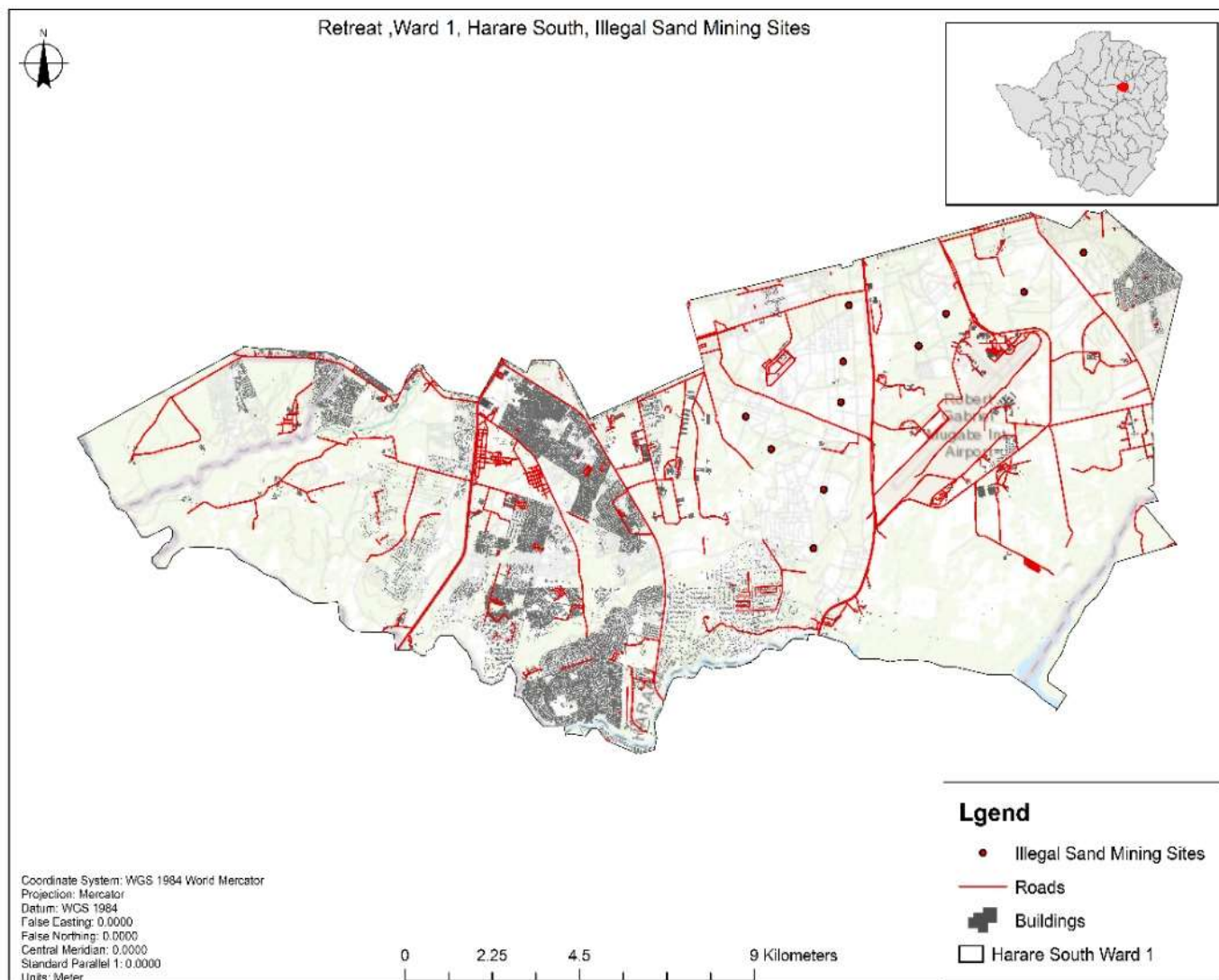
4.4.2.3 Social amenities and facilities

As with Hopley, Retreat Farm generally comprises of victims of the operation Murambatsvina—a government's 'restore order' move that left more than 700 thousand families homeless, according to a UN Report (ERC, 2018). The area is generally an informal settlement that does not have adequate social amenities such as piped water systems, electricity, commercial activities and public health facilities. Most families use other alternative sources of energy for day-to-day household needs and access water from artificial wells and boreholes installed by civil society organisations and NGOs. According to Marongwe (2003), the area does not have adequate amenities such as piped water, flush toilet systems and other hygiene facilities because it is an informal settlement. Shoko et al. (2020) noted that settlers depend on social services provided from nearby areas such as Hatfield, Waterfalls and Sunningdale. The settlers

have also organized themselves housing cooperatives such as Hatidzokere Shure and Chenjerai Hunzvi Housing Cooperatives where members contributed to the schemes (Marongwe, 2003).

4.4.2.4 Geology and climate

Similar to Epworth, Retreat Farm is characterised by a cooler and drier climate, open woodland vegetation and sand-clay soils. The estimated terrain elevation is 1463 metres. Due to the prevailing climatic conditions, the farm was used for both crop and livestock production before the fast-track land reform in 2000, (Marongwe, 2003, Cliffe *et al.*, 2011). Tobacco farming, poultry production, citrus production and cattle ranching were the main agricultural activities on the farm (Shoko et al., 2020). Aquaculture and racehorses rearing were also among some practices done (Ibid). Figure 4.4 below shows a map of Ward 1, Retreat Farm in Harare South constituency.



Source: Researcher, (2023).

Figure 4.4: Map showing Retreat Farm, Ward 1 in Harare South

4.4.3 Case Site 3: Zengeza East

4.4.3.1 Location

The study area is about 30 kilometres southeast of the Harare City centre (ERC, 2018). The elevation is approximately 1432 metres (GeoView, 2023). The constituency has six primary schools and one secondary school. This study focuses on Ward 16 of Chitungwiza.

4.4.3.2 Population and administration

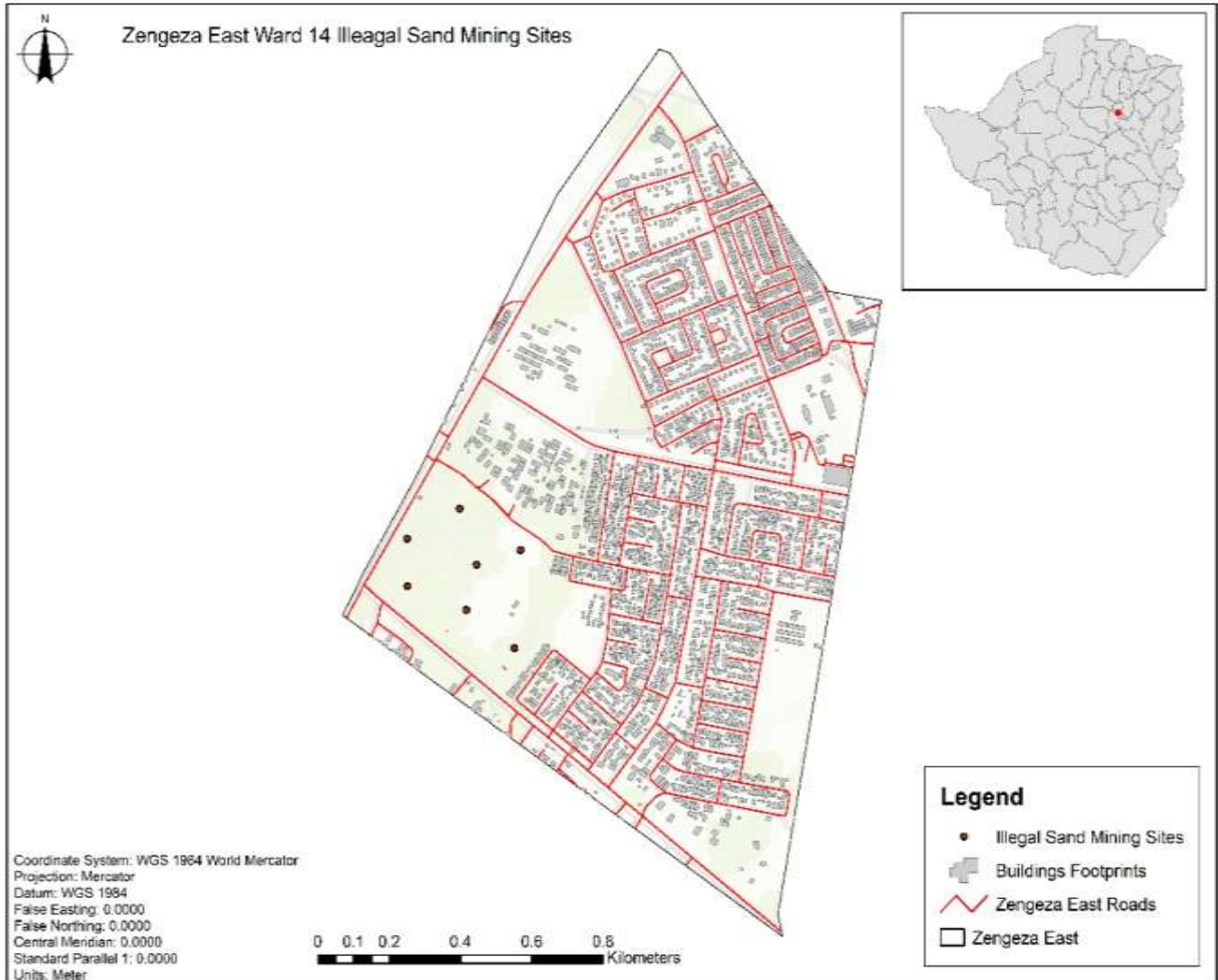
Zengeza falls under the jurisdiction of Chitungwiza Municipal Local Authority. According to the Zimstat Census report of 2012, the constituency has a total population of 189 796 with 89 947 being males making up 47% of the total population and 99 849 being females making up 53% of the total population. The constituency had 43 077 households.

4.4.3.3 Social amenities and facilities

The high-density residential area has deteriorating roads, many potholes, and uncontrolled waste (ERC, 2018). Most residents are employed in the town's industries, many of which have since closed, leading to an increase in the unemployment rate and the influx of illegal, informal income generating activities such as sand mining and selling, brick moulding and street vending.

4.4.3.4 Geology and climate

The area is characterised by a warm and temperate climate and experience less rainfall in winter than summer. There is generally open woodland vegetation and sand-clay soils. Chitungwiza that houses Zengeza typically receives about 142.66 millimeters of precipitation and has 131.2 rainy days (35.95% of the time) annually. Figure 4.5 below shows the map of Ward 14 in Zengeza East.



Source: Researcher, (2023).

Figure 4.5: Map Showing Ward 14 of Zengeza East

4.5 Qualitative sampling

Sampling is a process of selecting participants from the target population (Ilker et al., 2016). After careful consideration of the target population from the government, civil society, miners, local community and industry, sampling was done. The target population is defined as the population with characteristics of interest in a study (Dahabreh et al., 2020; Uprichard, 2013). In this study the target population included industrialists from the sand mining sector, the three selected communities including their residents, community leaders and illegal sand miners, government officials from socio-environmental authorities that include Environmental Management Agency and local authorities, in each case site. These include the Harare City council, Epworth Local Board and Chitungwiza Municipality. The study also included officials from non-governmental organisations focusing on environmental issues. All these subjects are important in sand mining issues as they are all involved in or affected the activities in one way or another.

4.5.1 Sampling methods and techniques

The study adopted a non-probability sampling method as informed by the Interpretivism paradigm. According to Vehovar et al. (2016), the non-probability sampling method relies on a researcher's ability to select members as opposed to random selection. This sampling method involves a fixed or pre-defined selection process, which makes it difficult for all elements of a population to have equal opportunities to be included in a sample (Thompson, 2012). The study used two non-probability sampling techniques - purposive as well as snowball sampling.

4.5.1.1 Purposive sampling technique

Purposive sampling technique involves choosing the participants with specific characteristics of interest in a study (Gentles et al., 2015). This means that the technique follows predetermined criteria and does not offer equal opportunities for involvement of participants without prescribed characteristics (Ilker et al., 2016). In this study, purposive sampling was used to select key participants from the government, non-governmental organisations and the private sector particularly the registered miners based on their experience, expertise and key focus areas. To achieve that, participating organisations were approached and a request was made for each organisation to identify the most relevant participants based on the aforementioned characteristics. Specifically, officials from EMA and local authorities due to their official responsibility in socio-environmental matters. The officials from registered sand mining

companies were sampled based on their sand mining businesses and revealed salient issues related to illegal sand mining. Residents were also purposively sampled to establish socio-environmental issues relative to illegal sand mining and based on their lived experiences. Purposive sampling of all these participants followed a thorough and careful consideration of population characteristics concerning sand mining in Zimbabwe. According to Etikan et al. (2016), the researcher decides what needs to be known, and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. Thus, all these participants equipped the researcher with knowledge relating to a range of critical issues: governance of illegal sand mining, causes and impacts of these activities, the nexus with conflicts as well as the efficacy of current regulations.

4.5.1.2 Snowball sampling technique

Snowball sampling was utilised to select illegal sand miners to participate in the study. According to Smith (2017), snowball sampling is often used to understand subjects who are difficult to trace, for instance shelter less people or illegal immigrants. Handcock and Gile (2011) similarly noted that the snowball sampling method is often applied in situations where the subject matter is highly sensitive and cannot be openly discussed. In this study, snowball sampling was more suitable in selecting the illegal miners who are often difficult to easily access due to illegal nature of their activities. Gentles et al. (2015) noted that in snowball sampling, not many participants will readily respond to the questions, but researchers can contact more familiar people who can facilitate the collection of data on their behalf. Therefore, in reaching the illegal sand miners, the researcher engaged some leading illegal miners at the end of each interview exercise to facilitate in reaching out to other participants. Prior to engagement, the researcher explained the purpose of the study to the facilitators to eliminate perceived fear of their security. That way, a significant number of illegal sand miners participated in the study. This enriched the qualitative data. Table 4.1 below shows the number of interviews conducted from each set of participants including justification for selection.

The sample size for local community particularly the residents from each of the three case sites was determined by saturation, which scholars define as a point when no newer issues emerge from the participants (Hennink & Kaiser, 2022; Uprichard, 2013). Gentles et al. (2015) also asserted that when the same issues emerge across participants, it means that there is saturation, and findings can suffice in making conclusions.

Table 4.1: Justification for participant selection and number of study interviews conducted

Targetpopulation	Reason for selection	Number of semi-structured interviews
Government officials	- to determine the roles played by various government departments in addressing illegal sand mining	9
Local community (leaders)	- to evaluate stakeholder collaboration work	3
Local community (residents)	- to determine the impacts of illegal sand mining and areas of conflict	25
Industrialists	- to establish drivers of illegal sand mining, impacts and sources of conflicts	3
Civil society organisations	- to examine governance of sand mining	1
Non-governmental organisations	- to establish reasons for community engagement in illegal sand mining activities and resultant impacts	2

The position held and relevance to the study focus determined the sample sizes of key participants from different organisations. However, in some cases, sample size was determined by availability and willingness to participate in the study and, hence, this resulted in relatively smaller sample sizes. Despite a small sample sizes, the expertise and experience with most key participants enabled the researcher to gather sufficiently large data to reach an informed conclusion. Smaller sample sizes can generate information essential for understanding the complexity, depth, variation, or context surrounding a phenomenon (Showkat & Parveen, 2007; Gentles et al., 2015; Ilker et al., 2016), and in this study this included political ecology, reflexive governance and conflicts involving illegal sand mining in Zimbabwe.

4.6 Qualitative data collection

Primary data were collected through observation of illegal sand mining activities within the three case sites, as well as semi-structured interviews with key study participants who included officials from government, civil society organisations, non-governmental organisations, local community and industry, particularly sand mining companies within the province. Interviews were also conducted with illegal sand miners and local residents from the three case sites. Secondary data were collected through document review. The next section provides details on the three data collection instruments.

4.6.1 Semi-structured interviews

Qualitative data were collected using semi-structured interviews to inform the study on the political ecology and reflexive governance of illegal sand mining and associated conflicts. According to Roudgarmi (2011), a semi-structured interview is a qualitative research method that combines a pre-determined set of open-ended questions (questions that prompt discussion) with the opportunity for the interviewer to further explore themes or responses (*see annexure A to G*). Magaldi and Berler (2020) suggested that a semi-structured interview is an exploratory interview often used for qualitative research purposes. This instrument allows for discovery and opportunity to follow key trajectories during the conversation, thus generating large amount of data (Adeoye-Olatunde & Olenik, 2021; Mahat-Shamir et al., 2021; Olsen, 2012).

In this study, semi-structured interviews were conducted with key participants from the government (*Annexure C*), local community (*Annexure D*), illegal sand miners (*Annexure E*), industrialists (*Annexure F*), non-governmental organisations (*Annexure G*). Specific government departments of interest to this study included Environmental Management Agency and local authorities - Harare City Council (HCC), Epworth Local Board (ELB) and Chitungwiza Municipality - institutions that have a mandate to protect the environment and community. The private sector included industrialists, particularly registered mining companies (Eyecourt Quarry Pty. Ltd. and Derbyshire Quarry Pty. Ltd.). Local community participants included senior illegal sand miners and community leaders, in particular ward chairpersons. As explained by the interpretivism philosophy, these subjects provided rich data on the interconnectedness of illegal sand mining and conflicts based on their experience and knowledge of the activities within their geographical jurisdictions. Semi-structured interviews with these participants provided the researcher with vast data on typically social, economic, political and environmental issues in respect of illegal sand mining in Zimbabwe.

The COVID-19 pandemic limited physical access to individuals from some organisations such as the Environmental Management Agency, and telephone interviews were rather used to gather data. Face-to-face interviews were conducted with key participants from all local authorities (Harare City Council (HCC) Epworth Local Board, (ELB) and Chitungwiza municipality (CM) as well as Sand Mining Companies (Derbyshire Quarry and Eyecourt Quarry). Face-to-face interviews were also held with officials from relevant non-governmental organisations (NGOs), community-based organisations (CBOs) and local community

leadership, residents and illegal sand miners from the three case sites while observing social World Health Organisation (WHO) standards on COVID-19.

Although telephone interviews equally provided room for interrogation and clarification, in comparison, face-to-face interviews ensured that in-depth data collection was achieved. Drew (2014) noted that face-to-face interviews allow for the collection of rich data and to better understand the relationships and processes involved in a phenomenon of interest. Indeed, interviews with the subjects equipped the researcher with rich information on the political ecology of illegal sand mining and socio-environmental conflicts in Zimbabwe particularly on the drivers, impacts, conflicts, stakeholder collaborations and legislative framework governing the sector.

The involvement of participants from various sectors and settings enriched findings on the underlying economic, social and political issues that underpin illegal sand mining and conflicts. This is in line with the political ecology framework that provide for an understanding of environmental issues from a wide political, economic and social spectrum (Dawson, 2021; Miller, 2022). In addition, the grassroots community participants including the illegal sand miners and residents helped the researcher to establish their experiences and perceptions on illegal sand mining activities within their localities. Specifically, the reasons for, impacts and grievances related to, the extraction, utilization and governance of sand were exposed. Similarly, industrialists or the registered miners explained their experiences with illegal sand miners, areas of conflict and areas of engagement with other stakeholders in regulating the mining activities. Such information was also further generated from the CSOs, NGOs and government, particularly the EMA and local authority responsible for protecting the environment and people's welfare, respectively. The Harare City Council is the local authority responsible for overseeing any activities that take place in the city, including socio-environmental issues. As such, the involvement of this government department together with the community whose welfare remains the responsibility of local authorities was important in gathering experiences from both perspectives. This also combined well with findings from other key study participants from EMA and industry as they also revealed salient issues on illegal sand mining and socio-environmental conflicts.

The open-ended interviews utilised by the researcher provided room for both interviewer and interviewee to discuss related issues in more detail. More so, Gentles et al. (2015) noted that in a semi-structured interview the interviewer has the freedom to probe the interviewee to

elaborate on the original response or to follow a line of inquiry introduced by the interviewee. Thus, semi-structured interviews were used to probe potentially sensitive illegal issues on sand mining, especially with the illegal sand miners, in order to link illegality, governance and conflicts. The researcher systematically scheduled all the interviews with all key study participants after consultations with them. As such, appointments were scheduled to the convenience of both participants and the researcher as most officials had tight schedules at work. By virtue of this, each interview approximately took a minimum of 30 minutes. Although variable, interviews with the community lasted approximately the same length of time.

However, it was impossible to make effective appointments with both residents and illegal sand miners, as the latter feared for their security. Some of these participants rejected the interviews right at the onset of introductions. Nevertheless, all interviews were successfully held with interested community members. The total of sixty-four (n=64) participants were included in the study. These included nine government officials (n=9), twenty-one illegal sand miners (n=21), twenty-five local residents (n=25), three (n=3) local community leaders, three sand mining companies' officials (n=3), two NGO officials (n=2) and one CSO official (n=1) were interviewed in this study. Table 4.2 below shows the characteristics of participants including their interview details.

Table 4.2: Details of study participants

Study participant	Sector	Organisation	Position	Date of Interview
CL 1	Local community	Unemployed	Resident and Community Leader: Retreat Farm, Ward 1, Harare South	03/08/2020
CR 1-5	Local community	Unemployed	Residents (Retreat Farm)	03/08/2020
CL 2	Local community	Unemployed	Resident and Community Leader: Ward 1, Epworth	05/08/2020
CR 6-10	Local community	Vendors (6, 9) and Unemployed (7,8,10)	Residents (Zengeza East, Chitungwiza)	05/08/2020
CL 3	Local community	Unemployed	Resident and Community Leader: Ward 14, Zengeza East	07/08/2020
CR 11-13	Local community	Unemployed	Residents (Epworth)	07/08/2020
IL 1-6	Local community	Unemployed	Residents/Illegal Sand Miners (Retreat Farm)	10/08/2020
IL 7-11	Local community	Unemployed	Residents/Illegal Sand Miner (Epworth)	11/08/2020
IL 12-15	Local community	Unemployed	Residents/Illegal Sand Miners (Zengeza)	13/08/2020
GE 1	Government	EMA	District Environmental Officer (DEO)	14/08/2020
GE 2	Government	EMA	DEO	14/08/2020
GE 3	Government	EMA	DEO	14/08/2020
GE 4	Government	EMA	Provincial inspector	18/08/2020
GE 5	Government	EMA	ESIA and Ecosystems Protection Officer	18/08/2020
GE 6	Government	EMA	District Environmental Officer	18/08/2020
NG 1	NGO	Go-Green Zimbabwe	Program Officer	21/08/2020
NG 2	NGO	Local Development Research and Advocacy Trust (LDRAT)	Executive Director	21/08/2020
NG 3	CSO	Zinyengere Development Association (ZDA)	Chairperson	21/08/2020
GL 1	Government	Harare City Council	Spokesperson	25/08/2020
GL 2	Government	Harare City Council	Head of Housing and Community Services	25/08/2020
GL 4	Government	Chitungwiza Municipality	Environmental Health Technician (EHT)	26/08/2020
GL 3	Government	Epworth Local Board	Environmental Health Technician (EHT)	28/08/2020
IN 1	Private	Derbyshire Quarry	Mine manager	28/08/2020
IN 2	Private	Derbyshire Quarry	Sales and Marketing Officer	28/08/2020
IN 3	Private	Eyecourt Quarry (Pvt Ltd)	Manager	28/08/2020

As noted by Silverman (2017), an interview should be well prepared prior to the data collection exercise. In this study, the researcher formulated in advance an interview guide for each participant type (*see annexure C-G*), reviewed until final drafts developed for the purpose of guiding and aligning the researcher to his research questions during interviews. According to Olsen (2012), an interview protocol is a list of questions that are directed towards the interviewee or participant. An interview guide which is also known as interview protocol, is a pre-requisite that guides the interviewer during the interview and keeps him/her within the scope of the study (Adeoye-Olatunde & Olenik, 2021). An interview guide ensures that all the research objectives are addressed (Savenye & Robinson, 2013; Pathak et al., 2013). In this study, an interview guide was used for each group of study participants (*see annexure C – G*). Four main themes were designed that included:

- . drivers of illegal sand mining.
- . impacts of illegal sand mining and associated conflicts.
- . stakeholder collaboration.
- . governance of illegal sand mining.

4.6.1.1 Digital Recording

In order to further enrich data quality, all face-to-face interviews were recorded using a digital voice recorder, only after consent for its use was provided by the study participants. Similarly, telephone interviews were recorded using a cell phone during the calls. Recording ensured that the researcher had a backup source of field data that could be reviewed later following the interview. Sekaran and Bougie (2013) noted that relying on human memory alone might leave the researcher with shallow data, as large volume of qualitative data may not be easily remembered during analysis. Hence, by recording all the interviews, this improved the quality of the researcher's findings. Besides recording, a diary was used to prepare some notes after each interview. Each interview was fully transcribed using the notes and interview recordings. Both interviewing and recording were done after obtaining informed consent from the participants. The interview questions were guided by the research questions to ensure that the aim of the study was fully addressed.

4.6.2 Observation technique

Primary data were also collected by observation. According to Kawulich (2005), observation is a technique that mainly uses the sense of sight to observe a phenomenon. Sekaran and Bougie (2013) similarly defined observation as a technique that involves the systematic selection, watching, reading, listening, touching and recording the characteristics and behaviour of living beings, objects or phenomenon. Observation can be participant or non-participant and involves direct or indirect observation (Kawulich, 2005; Sekaran & Bougie, 2013; Hughes, 2014). In this study, non-participant observation was used to describe illegal sand activities and the resultant environmental impacts. According to Vehovar et al. (2016), non-participant observation is a method of observation that offers the observer flexibility and freedom to watch the phenomenon openly. The non-participant approach was chosen over participant observation as the latter was a risky practice given that illegal sand miners are sceptical of strangers due to the illegal nature of their activities. Although participant observation was able to generate relatively more in-depth data as noted by (Hughes, 2014), the technique exposed the research team to the risk of attacks by seasoned illegal sand miners for fear of their security.

However, Schober and Vetter, (2020) argued that observation can qualify as a scientific data collection method when it is designed to directly address a specific research question and is systematically planned and executed with proper controls. Boyko (2013) also noted that the technique describes observed phenomenon as it occurs in its natural setting. In this study, observation mainly addressed objective two that sought to determine the environmental impacts of illegal sand mining and the subsequent conflicts. Furthermore, observation technique determined the nature of illegal sand mining activities, processes and population involved. This was important in the researcher's endeavour to establish the political ecology of illegal sand mining, governance and socio-environmental conflicts. Non-participant observations allow the researcher to take note of the external environment, behaviour and interactions as they occur naturally (Delpont, 2002). Thus, observations provided the researcher with visual experiences that complement findings made by interviews. Similarly, Smith (2017) noted that observations further expand the breadth of information obtained from the interviews and provide for comparing findings. Thus, research findings were improved by synthesizing field observations and other qualitative data gathered through interviews.

4.6.2.1 Observation checklist

In order to keep the researcher aligned and searching for points of interest, an observational checklist was utilised. An observational checklist is a pre-defined set of items or groups to be observed with frequently closed coding (Smith, 2017; Boyko, 2013). The researcher designed a comprehensive checklist with all categories of possible observable socio-environmental impacts (*see annexure H*). Using this tool, the researcher was able to gather sufficient data on the socio-environmental impacts of illegal sand mining. Field notes augmented data collection. To enrich the data, indirect observation was utilised. Indirect observation occurs when the researcher records observations using photographic, videotape, mechanical, cameras or any other electronic means (Schober & Vetter, 2020; Vehovar et al. 2016). A digital camera was used to capture data on the illegal sand mining sites, activities, environmental impacts, type of population involved in illegal sand mining activities, mining processes and methodologies. While direct observation is equally a good technique that involves the observer taking more time to concentrate on aspects observed, it prevents safe interaction with illegal sand miners.

4.6.2.2 Global Position System (GPS)

To enrich observations on the environmental impacts and extent of illegal sand mining, a GPS was also used to provide spatial distribution of illegal sand mining points within the three case studies. The GPS is a system that identifies the location or position of objects on earth using satellite signals (Zuliani, Tunini, Traglia, Chersich and Curone, 2022). Therefore, GPS aided the researcher to map illegal sand mining sites. Specifically, Assisted GPS (A-GPS) was used in locating illegal sand mining sites including subsequent environmental degradation points. According to Elevelt et al. (2021), an ‘A-GPS’ is a type of GPS that uses local network sources to locate satellites. An ‘A-GPS’-capable smartphone using 4G network was available and used at all the study sites. Coordinates on illegal sand mining sites were exported into Excel and fed into the QGIS software to develop respective maps of mining sites.

4.6.3 Document review

Secondary data were collected through document review, specifically utilising the organisational records and reports, most of which are available online. According to Morgan (2022), document review involves gathering data from existing literature, reports and records which can be available online or offline in soft or hard copies. In this study, online sources were more convenient to both the researcher and organisations as physical contact was highly discouraged during the COVID-19 pandemic. As such, no hard copies of reports and records from government departments of interest (EMA and local authority institutions) were made available in hard copies. As noted by Kawulich (2005), this saved more time that could be required if hard copies were to be obtained physically from organisations. The data related to policies and other instruments used by organisations of interest in regulating environmental issues and human settlements. This was important in evaluating the efficacy, relevance and applicability to illegal sand mining and socio-environmental conflicts. Document review enabled the researcher to evaluate existing institutional and legislative frameworks regulating sand mining in Zimbabwe.

This secondary data also included organisational reports and documentaries on sand mining in Zimbabwe as well as legislations that regulate sand mining and associated socio-environmental issues. Table 4.3 below presents the documents reviewed in order to examine governance of illegal sand mining in Zimbabwe.

Table 4.3: Documents for review

Document/ Source	Aspect Reviewed
ZBC documentaries	Driving factors, impacts, conflicts and governance.
Legislation - Environmental Management Act. - Urban Councils Act. - Mining and Minerals Act. - 2013 Constitution of Zimbabwe.	Utility and efficacy in addressing socio-environmental issues of illegal sand mining.
Organisational reports.	Causes, impacts and governance of illegal sand mining. Stakeholder collaborations.
Newspaper Reports.	Causes, impacts and governance of illegal sand mining. Stakeholder collaborations.

Source: Researcher, (2023).

4.7 Qualitative data analysis

The study utilised both primary and secondary data. This section outlines data analysis for each data type.

4.7.1 Primary data analysis

The qualitative data were analysed thematically. According to Burnard et al. (2008), thematic analysis involves analysing transcripts, identifying themes within the data and gathering together examples of transcripts from the text that could be assigned to those themes. Similarly, Kracauer (2022) defines content analysis as a research approach that prepares meaningful sets of categories from verbatim responses to open-ended questions. Thematic analysis is therefore a qualitative data analysis that categorises interview responses into meaningful themes and categories in order to present an informed conclusion about the subject matter. Byrne (2017) added that any form of communication such as images, and texts is subject to counting process in content analysis, and based on the following factors:

- The frequency of certain words, phrases, and other linguistic sets.
- The use of an established coding frame designed to generate measurements from qualitative materials.

In this study, thematic analysis was utilised to analyse qualitative data generated from all the participant interviews. The study adopted six general steps that included organising and preparing the data for analysis; reading or looking at all the data, beginning with data coding, using the coding process to describe settings or participants and generate themes, advancing how themes will be presented in qualitative narrative and, finally, interpreting the data (Vaismoradi et al., 2013; Creswell, 2014; Bryne, 2017; Kracauer, 2022). This study adopted manual content analysis that involves the coder's cognitive biases that influence coding (Engstrom et al., 2022). The approach enabled the researcher to acquire in-depth data and allow for efficient data classification. Furthermore, manual coding enabled the researcher to more easily recognise errors in theme and category development and to reflect on participants' responses, as suggested by Creswell (2014). The researcher was also able to identify missing themes and sub-themes that are often missed by software coding systems. To ensure that manual coding was done appropriately and more effectively, the following steps were taken:

Step 1: Transcription of qualitative data

Semi-structured interviews were transcribed after each interview word for word into a Microsoft Word document, eliminating personal identity information such as names to avoid bias in analysis.

Step 2: Reflective reading of data

Semi-structured interview transcripts were printed and re-read in order to identify any mistakes that could have occurred during data transcription (step 1).

Step 3: Re-reading of interview transcripts

The researcher re-read semi-structured interview transcripts in order to familiarise himself with participants' responses. Furthermore, the researcher listened to audio recordings again and compared this against the hard copy transcript to check for any possible omissions, and for coherence. Although the process was time consuming, it enabled the researcher to familiarize himself more thoroughly with the data thereby enabling improved theme development and coding allocation.

Step 4: Theme development

In order to identify emerging themes and to allocate colour codes for each, the researcher re-read the semi-structured interview transcripts. Responses with similar meaning were coded using the same colour, for example where lack of or limited jobs was raised as a driver of illegal sand mining, the emerging theme entitled unemployment was coded with a blue colour under the main theme (drivers of illegal sand mining). Only meaningful and relevant words or phrases were of interest to the researcher, as such, all words such 'the' and 'it' were ignored.

Step 5: Transferring and grouping of emerging themes

Identified emerging themes were transferred and coded with their respective phrases. Keywords were placed into relevant sub-themes and colour code, and further assigned specific letters for precise identification. Environmental pollution for example, fell into the main theme; environmental impacts and conflicts colour coded lime green but further coded as 'EP' for precise categorization. Any emerging issue on environmental pollution was therefore fed into this minor but more specific theme.

Step 6: Validation

Once the emerging themes and sub-themes were identified and coded, the statement of participants who strongly defined those themes and sub-themes were quoted for further validation or confirmation.

Step 7: Comparing responses

After applying the eight steps used for content analysis in this study, the participants were evaluated and ranked to compare their responses and to determine their similarities and differences across themes and sub-themes. This was to ensure credibility of study findings. According to Smith (2017), credibility of findings depends on the coverage of data by identified themes and categories, and on the comparison among the themes. Data from the three case sites (Retreat Farm, Zengeza East and Epworth) was analysed individually, after which comparative analysis was done to establish similarities and differences across these three cases.

Thematic analysis proved useful in other similar past academic qualitative studies (Smith & Leonard, 2018; Smith, 2017; Elo et al., 2014). In the present study, transcribed data from the digital recorder and diary were coded to create themes that resonated with the research objectives of the study. Content analysis was preferred as the systematic coding and classification of extensive data ultimately helped the researcher to identify relationships, word patterns and trends on emerging issues in illegal sand mining and socio-environmental conflicts in Zimbabwe. More so, additional documents obtained during the interviews were analysed and utilised to augment interview content and improve the data analysis outcome. Leedy and Ormrod (2012) noted that thorough examination of these additional documents is key in establishing the pattern and add value to the interview content. This enabled the researcher to explain the main features of the documents and interview content as noted by Vaismoradi et al. (2013) and Elo et al. (2014). In this study, both primary and secondary data was collected from a variety of participants (community, government, civil society and industry) and documents, respectively, through interviews, observations and document review. Interview responses were compared to observation findings and document review outcomes to improve data analysis and credibility of the study conclusions. This approach is supported by Boz and Koç (2022) who noted that triangulation provides a stronger evidence and improved conclusion through merging of multi-source data.

4.7.2 Secondary data analysis

The following steps were taken in analysing secondary data:

1. Coding of research questions: The researcher coded all research questions using the logical order as presented in chapter 1 (*see section 1.4*) and laid down to guide the researcher throughout analysis process.
2. Data sorting: The researcher sorted all the secondary data according to source that include documentaries, newspaper reports, organisation reports and legislations. The sorting was to ensure that the researcher adequately review each data against research questions where appropriate, and this applied to both to hard and soft copies of qualitative data.
3. Data cleaning: Before analysis, the researcher carefully examined the secondary data in each category to verify validity, authenticity and reliability for this study.
4. Data analysis: Findings on each research question where necessary were tabulated against each secondary data. This was done to ensure that emerging issues from all secondary data was captured for analysis (*see Annexure I*).

During the course of both primary and secondary data analysis, the researcher re-checked and carefully organised all the qualitative data generated to ensure consistency and completeness of the analysis primary and secondary data.

4.8 Availability of data

The researcher sought permission to gather data from government departments, private companies, community and NGOs. Upon acquiring approval from the relevant authorities, and once the ethical process is complete, the researcher proceeds to collect the data. Most secondary data were accessed online on organisational websites, on-line newspapers and journals to avoid physical contact with such materials due to risk of COVID-19 infection. Secondary data was particularly required in the analysis of policies and or instruments governing mining including sand mining in Zimbabwe. Appointments were made in time to avoid inconveniences on the day of data collection.

4.9 Validity of data

4.9.1 Credibility

According to Polit and Beck (2012), credibility entails the confidence of the researcher about the truth of his/her study findings. To ensure credibility, data source triangulation was used. Data triangulation is a process of using a variety of data sources including persons, space and time in a study (Singh et al., 2022; Mohammed, 2022; Ranängen & Zobel, 2013).

Credibility was achieved through prolonged engagement with participants to allow for interrogations and clarifications where necessary. Thorough observations were also made in order to develop codes and study the information collected and group concepts together. Member checking was also done to ensure credibility. This involves the sharing of data, interpretation and conclusions with the participants giving room for clarifications, corrections of errors and provision of any necessary additional information (Elo et al., 2014; Thomas & Magilvy, 2011).

4.9.2 Dependability

Dependability refers to the consistency in study findings that should arise when the study is repeated by other researchers (Thomas & Magilvy, 2011). To that end, the supervisor will assist in ensuring that the quality of the data collected is of a high standard and is viable. The supervisor will confirm the findings and ensure that the findings are supported by the data collected. All interpretations and conclusions were examined to ensure they are supported by the data itself.

4.9.3 Conformability

According to Elo et al. (2014), conformability refers to the objectivity of the study during data collection and analysis. A digital audio recording was used to capture data from the participants and audio recordings were saved using pseudonyms to improve objectivity and accuracy of findings. The supervisor made sure that the research findings are based on the participants' narratives rather than potential researcher biases.

4.9.4 Transferability

This refers to the applicability of study findings to other contexts, times, situations or populations (Polit & Beck, 2012; Johns, 2013). According to these authors, transferability requires that the researcher provides as much information as possible including sample size,

interview settings, sample strategy, the context in which the research is conducted and any changes to the interview topics. In this study, the researcher's sample size within the community was determined by determining data saturation. On the other hand, notes and audios of each interview conducted were securely stored.

4.9.5 Authenticity

According to Polit and Beck (2012), authenticity refers to the extent to which researchers fairly and faithfully showed a range of realities. In doing so, the researcher pre-tested the research instruments with a few participants particularly the community that constituted a relatively substantial portion of study population. More so, the researcher ensured that only those participants relevant to this study were interviewed. The researcher carried out some checks prior to initial contact with study participants to make sure that all the relevant participants were part of the study. These included the community (the residents and illegal sand miners), the government officials from various departments (EMA and local authorities), CSO and NGO officials focusing on socio-environmental issues, and registered sand miners (industrialists). This was to ensure that all sand mining issues - political, social, economic and environmental - were examined sufficiently. As previously indicated, the researcher also utilised the data saturation concept to exhaust issues of concern from the study. Only official and verified secondary data were used while recording devices were all pre-tested for accuracy and efficiency during data collection.

4.10 Ethical considerations

The researcher first obtained ethical clearance for the study from the College of Agriculture and Environmental Sciences (CAES) Health Research Ethics Committee (2020/CAES_HREC/088) {see annexure J} permitting the researcher to conduct data collection. Together with a letter from the supervisor, this enabled the researcher to request and be granted research permission from relevant authorities of intended participants. Permission to gather data from the community, EMA, all local authorities, NGOs and registered sand mining companies was acquired, and approval letters were availed during data collection when necessary.

The researcher explained that participation in the study was voluntary and that participants could withdraw from the study at any stage should they feel so. However, the researcher requested for complete interviews where conditions permitted. This proved quite useful except

in certain situations where illegal sand miners felt insecure to continue responding to questions. Interviews were only conducted upon informed consent of the participants, as was the audio recordings and the capturing of pictures. Interview questions were formulated in English with another copy of questions translated into the indigenous *Shona* language to cater for respondent's choice. This was to ensure that study participants were not sceptical but rather objective in their responses.

The anonymity, confidentiality and privacy of participants was ensured using pseudonyms in recording and noting down of responses during data collection. Furthermore, all qualitative data were encrypted in a personal computer that was only accessible to the researcher. However, the data were available to the supervisor upon request. The researcher also maintained the highest level of objectivity in discussions and analysis throughout the research project. The researcher also acknowledged the work of other authors.

4.11 Summary

Chapter 4 presented the research methodology of this research. The chapter outlined the research philosophy and qualitative research approach adopted by the study. It further discussed the research design, sampling procedures and data analysis procedures. The following chapter focuses on analysing and interpreting data obtained from the three case sites within Harare Metropolitan Province on the political ecology of illegal sand mining and the socio-environmental conflicts. In addressing each objective, the chapter presents and analyses data and later makes a discussion of findings.

CHAPTER 5 DATA ANALYSIS AND INTERPRETATION

5.1 Introduction

Sand is a valuable natural resource that draws the interests of various stakeholders and hence the interest to explore illegal sand mining issues and socio-environmental conflicts in Harare Metropolitan Province. This chapter presents the findings of the study and a discussion of the qualitative data gathered through document review, observations and semi-structured interviews with government officials, NGO and CSO officials, local community including leaders and residents, illegal sand miners and industrialists in the sand mining sector. The presentation of the results is informed by the research questions of the study and theoretical frameworks upon which the study is premised. These include the stakeholder theory (*section 2.2.1*), land resource conflict theory (*section 2.2.2*), political ecology theory (*section 2.2.3*) and reflexive governance framework (*section 2.2.4*). Together, the propositions and views put forward by each theory exposed the complex issues of illegal sand mining including the level of impacts, collaborations and conflicts from a wide socio-economic and political viewpoint.

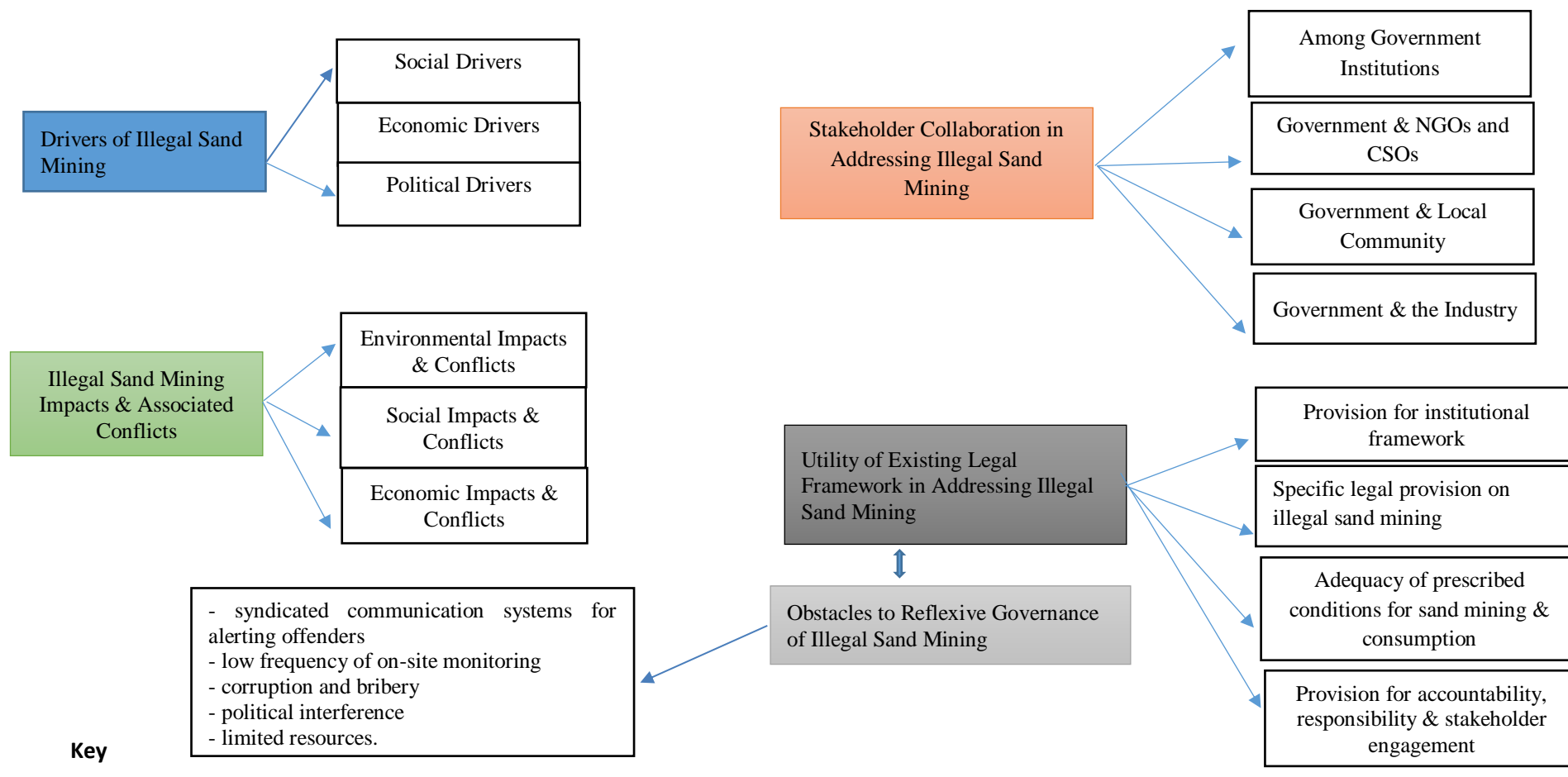
Content analysis was utilised in qualitative data analysis as informed by four main themes namely drivers of illegal sand mining (*section 5.1*), impacts of illegal sand mining and associated conflicts (*section 5.2*) stakeholder collaborations in addressing illegal sand mining (*section 5.3*) and the legislative framework for and governance of illegal sand mining (*section 5.4*). Each main theme emanated into minor themes. The study derived its conclusions based on three study sites within the Harare Municipal Province that include Retreat Farm, Zengeza east and Epworth. The first section presents findings from Retreat Farm on each of the main four themes; the second section presents findings from Zengeza east while the third section presents findings from Epworth.

For ease of data interpretation, a unique pseudonym was allocated to each participant in the form of a code (*see Table 5.1*) below. Government officials were further coded according to their departments or organisations. Table 5.1 below presents the participants and their respective identities as they are used in this study:

Table 5.1: Participant coding

Study participant		Identity code
Government officials:	Local authorities	GL
	EMA	GE
NGO/Civil society officials		NG
Industry officials		IN
Local community/ residents		CR
Community Leader		CL
Illegal sand miners		IL

The coding allowed for identification of the study participants according to their interview extracts or excerpts. Qualitative data from the three case sites were interpreted separately, followed by a comparative analysis for each main theme to establish similarities and variations among the case sites. Figure 5.1 below illustrates how new or emerging themes were generated from the four main themes while Figure 5.2 particularly shows overlapping themes across all three case sites.



Objective addressed	Theme & Colour Code
1. Determining the social, political and economic drivers for illegal land mining	Blue
2. Examining the impacts and conflicts associated illegal sand mining	Green
3. Evaluating how the various social stakeholders (community, government, industry and civil society) work collectively to combat illegal sand mining.	Orange
4. Analyzing the legislative instruments regulating illegal sand mining in Zimbabwe	Dark Grey

Figure 5.1: Main themes and subsequent emerging themes: Source Researcher’s compilation, (2023)

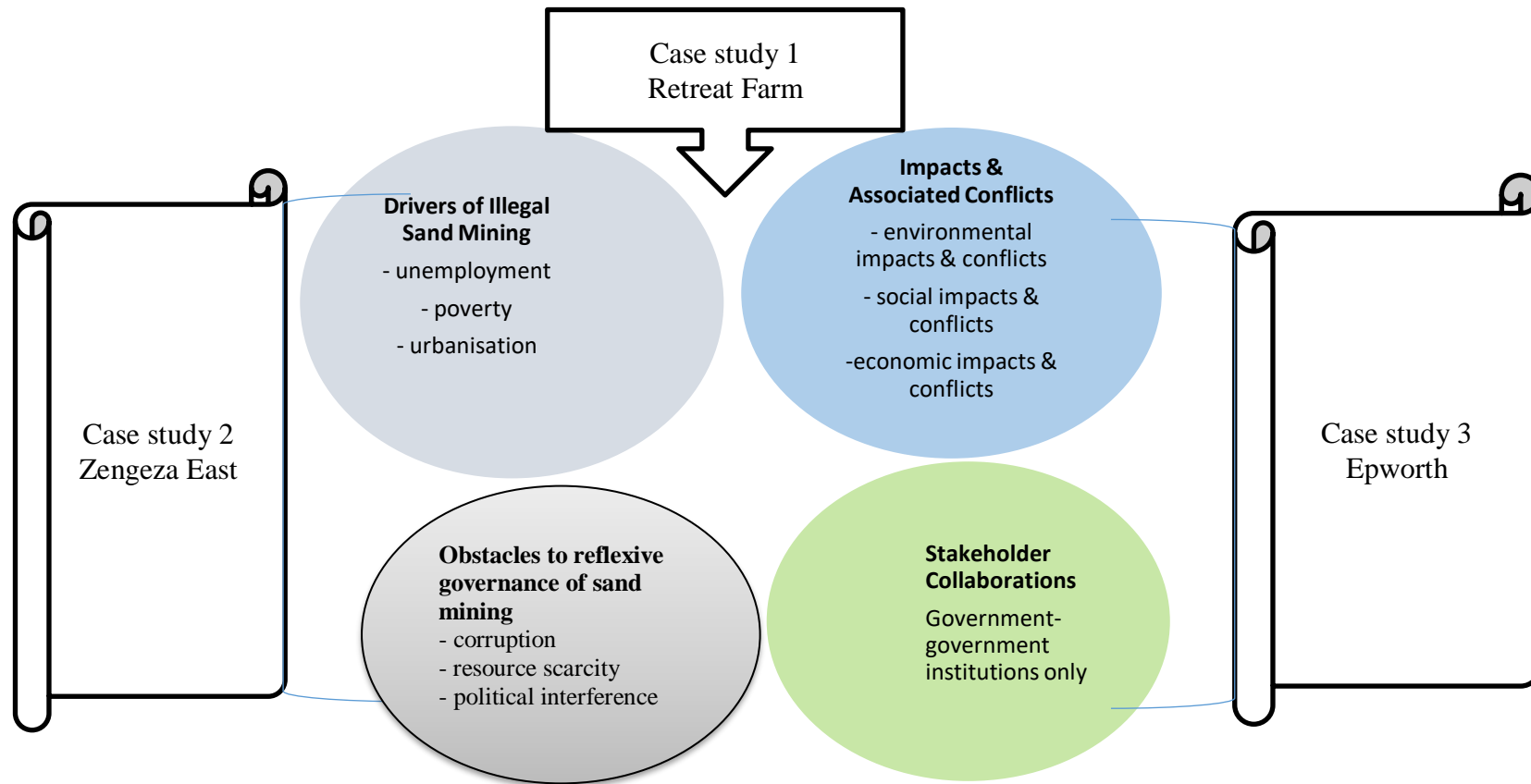


Figure 5.2: Overlapping themes and sub-themes Source: Researcher’s compilation, (2023).

5.2 Drivers of illegal sand mining

This section presents results on the social, economic, and political drivers of illegal sand mining at all three case sites - Retreat farm, Zengeza East and Epworth. Key drivers emerged in this study include high unemployment, proliferation of informal settlements, urbanization, urban expansion and increase in demand for sand, government's land reform policy and economic meltdown. The first part of this section presents and interprets qualitative data per case site followed by comparative analysis of all case sites upon which general conclusions are derived. This chapter briefly discusses the results as a more detailed discussion is presented in the Chapter 6.

5.2.1 Case Study 1: Retreat Farm

5.2.1.1 Social drivers of illegal sand mining

Social drivers of illegal sand mining that emerged from Retreat Farm included unemployment, proliferation of informal settlements and urbanisation. The first section of results presents how unemployment has contributed to illegal sand mining. The second part explains how informal settlements have contributed to illegal sand mining while the contribution of urbanisation is discussed as the last part of the current section.

5.2.1.1.1 Unemployment

Unemployment emerged as one of the social drivers of illegal sand mining in Retreat Farm. With closure of industries in the recent past and limited employment opportunities, most youths have turned to informal jobs including illegal sand mining. Most illegal miners were previously employed in the formal sector but have had their contracts terminated indefinitely. It emerged that in the past year when industry was relatively more functional, the rate of illegal sand mining was very low. As noted by study participant IL 5, a resident at Retreat Farm, (Personal Communication, 10 August 2020):

“...In order to feed my family, I do sand mining and sell the sand to get some money. I used to work at Lytton industry but it's now 4 years since I got retrenched. No other job came my way. This is my new job my friend”

This was also supported by study participant IL 6, an illegal sand miner and resident of Retreat Farm (Personal Communication, 10 August 2020) who indicated that,

“...I used to drive a kombi, pirating to and from town but I did not have a driver’s license. Police arrested many times until I chose to leave the job for security reasons. I could not get any other job and I ended up doing this sand business”.

Similar sentiments were raised by study participant CR 4, a resident of Retreat Farm (Personal Communication, 3 August 2020) who identified unemployment as the main driver of the current high rate of illegal sand mining as she indicated that,

“Sand mining started long back around 2005. My neighbours told me that the magnitude of illegal sand mining was not more pronounced before. However, all those you see doing sand mining are not interested as such but are driven by lack of alternative jobs. There are no jobs to sustain communities and corona has even worsened illegal sand mining. Most people were deprived of their jobs in town and are now flooding here. The change money boys you see at Mutamba area there and all the rank marshals were operating at the designated points prior to this pandemic but are now all here”.

The above narratives show that unemployment is indeed a driver of illegal sand mining in Zimbabwe. Government officials also acknowledged that much of the illicit and indiscriminate sand mining activities across the country is an outcome of high unemployment. However, most government officials indicated that illegal sand mining is more rampant in urban areas where there is high unemployment. Study participant GE 3, a government official from EMA (Personal Communication, 14 August 2020) highlighted that,

“...Yes, it is true that there has been a rise in illegal sand mining activities in the past two years. This is due to urbanisation and high unemployment rate in the country. However, there could be need for more research on the latter as illegal sand mining may even persist despite jobs if there is housing demand. Perhaps if more industries were operational, some youths could be employed there, and illegal sand activities could be minimal”.

The NGO community also pointed out that unemployment is the root cause of illegal sand mining among other forms of illegality, particularly by youths. Earlier views by residents and government officials were supported by sentiments by study participant NG 1 from an NGO, Go Green Zimbabwe (GGZ) (Personal Communication, 20 August 2020) who pointed at unemployment as a key driver of illegal sand mining by expressing that,

“I think unemployment is the main source of this environmental catastrophe. Why so- because long ago, illegal sand mining activities were not as prevalent as they are today. However, this is fuelled by urbanisation. More and more people are residing in urban areas as opposed to the old era when women and families stay in rural areas while men work in urban areas. So, yeah unemployment due to urbanisation has had a major effect on the emergence and rise in illegal sand mining in Harare and countryside”.

Supporting these views, illegal sand miners themselves confirmed that unemployment due to a dwindling job market forced them to engage in illegal sand mining. However, the study further established that the COVID-19 pandemic exacerbated the situation by further shrinking the job market due to government’s restrictions on movements, gatherings, and selected activities. One of the study participants IL 3, an illegal sand miner and resident of Retreat Farm (Personal Communication, 10 August 2020) reported that,

“I was doing my personal business near Waterfalls shopping centre over the past years. When COVID-19 came, we were chased away by the police. I could no longer pursue my vending business. It was now difficult for me to take care of my families and provide for their basic needs. The standards of living suddenly deteriorated. That is when I started dig sand and sell near my homestead where the police could rarely come”.

Undoubtedly, unemployment worsened by the COVID-19 pandemic compromised the standards of living for impoverished communities who saw no other alternative income-generating activity except illegal sand mining in their vicinity. According to Trading Economics (2018), the unemployment rate in Zimbabwe stood at 5.18% in 2016 and 5.16% in 2017. Similarly, the 2011 Labour Force Survey revealed that at least 3.7 million Zimbabweans are involved in informal sector activities with a significant number engaged in illegal sand mining for a living. Plecher (2020) similarly noted that the general unemployment rate was 4.99% in Zimbabwe. This suggests that unemployment is one of the major socio-economic problems over the past years in the country. Undoubtedly, this is one of the leading contributors of illegal sand mining in Zimbabwe.

5.2.1.1.2 Proliferation of informal settlements

Besides unemployment, the study also noted that growth of informal settlements contributed to illegal sand mining in the area. The rising costs of living in nearby residential areas such as Waterfalls has driven families out of relatively expensive residential areas into cheaper,

informal settlements in Retreat Farm. Most residents rely on illegal activities to survive, including illegal sand mining. The study established that prior to this influx, the rate of illegal sand mining was generally low. Evidence suggests that unemployment and poverty within informal settlements resulted in rampant illegal sand mining by local communities for a living. Open spaces and idle land owned by the state and local authorities are utilised for those activities. This emerged from government officials interviewed from different government departments. One of the study participants, GE 4 from EMA (Telephone Interview, 14 August 2020) explained that urbanisation is one of the main drivers of illegal sand mining. He expressed that,

“Harare is the most affected city by sand mining due to urbanisation. The rise in urban population has resulted in the emergence of informal settlements in and around Harare, and this has magnified the problem of illegal sand mining. Sand poachers mainly operate in these informal settlements such as Retreat, Hopley and Mabvuku”.

This sentiment was also supported by study participant GL 1 from HCC (personal communication, 25 August 2020) who related urbanisation to informality of settlements as compounding drivers of illegal sand mining by highlighting that,

“...It is true that we have had problems with illegal settlements emerging in peripheral parts of the city such as Epworth, Mt Hampden, Hopley and Retreat. We discovered that these areas have become hotspots for illegal sand mining due to increase in illegal settlements there. We have other parts of Harare that are endowed with rich river sand that is on demand for construction but have relatively low scale illegal sand abstractions. Clearly, it is a culture of illegalities in those areas, unwanted activities are indeed rampant, illegal residents doing illegal activities- it's sad. This is why we tend to bulldoze those settlements as they have nothing to offer but eroding city's outlook”.

The above narratives clearly reveal the contribution of informal settlements to illegal sand mining. Indeed, illegal sand abstraction is a microcosm illegality of the macrocosm informal settlements in Retreat Farm and other parts of the Harare Municipal Province. These findings are supported by past research that established extensive illegality within informal settlements. Chitsike (2003) noted that unplanned settlements are often associated with various social malpractices, conflicts and environmental damage. Expansion of informal settlements in Retreat Farm has resulted in a proliferation of illegal sand mining in the area. However,

findings by Marais et al. (2018) showed that illegal sand mining is rather an outcome of informal settlements suggesting that illegal settlements is not necessarily a push factor for illegal mining. Similarly, Gómez-Betancur et al. (2022) noted that natural resource endowment often leads to illegal settlements and activities within the area. In contrast, in Zimbabwe, most unemployed youths residing in informal settlements have left with no option except venturing into illegal sand mining business. Research reports confirm that informal settlements are often associated with various forms of social, economic and environmental malpractices (Madyise, 2013; Saunyama, 2017; Kafe, 2017). In this study, it was clear that the concentration of unemployed and poverty-stricken people in informal settlements has contributed to illegal sand mining and various forms of conflicts.

5.2.1.1.3 *Urbanisation and rise in demand of sand for construction purposes*

Results from Retreat Farm showed that urbanisation is the leading social driver of illegal sand mining. Urbanisation increased the demand for sand as a raw material for construction purposes. Various forms of infrastructure such as houses, shops and other informal structures were established in and around Retreat Farm to cater for accommodation and other services. There is growing market for sand within Retreat Farm and from neighbouring areas such as Waterfalls and Hopley. Even external private companies and individuals conduct sand mining in Retreat Farm to supply sand and generate income. Interviews held with various key study participants from government and non-governmental organisations confirm that indeed urbanisation is the leading cause of illegal sand mining in such areas. Study participant GE 3 from EMA (telephone interview, 14 August 2020) highlighted that,

“We are experiencing high urbanisation rate in Zimbabwe particularly here in Harare. As a result, the demand for housing has also increased. With this demand, sand as one of the building materials has also experienced voracious demand. Now, most youths have taken advantage of this demand to mine sand illegally in Harare urban and per-urban areas such as Retreat farm and Hopley. This is mainly caused by high demand for clay and sand by developers and builders. Sadly, In Harare alone, more than 700 hectares of land is damaged in Harare to date. The prices on the informal market is very low, and this attracts buyers, that’s why with urbanisation, sand has made a good business for unemployed people”.

Results indicated that the rate of illegal sand mining rose gradually with an increase in the urbanisation rate in the country. Most officials from local authorities supported these earlier

sentiments. Study participant GL 1 from HCC (personal communication, 25 August 2020) reiterated that,

“Yes, it’s true that illegal sand mining activities have been on the rise in the past few years. This is due to rural-urban migration that has subsequently led to the rise in urban population. This has also resulted in the increase in demand for accommodation that subsequently created a lucrative market for sand, hence the influx of youths in illegal sand miners”.

The views that urbanisation is linked to a rise in illegal sand mining also emerged in interviews with NGO officials. Unfortunately, the job market is unable to absorb large job-seeking population in urban areas. Study participant NG 2, from GGZ (Personal Communication, 21 August 2020) noted that,

“In my understanding, most environmental problems taking place in Harare as a whole are somehow accelerated by high population. Urbanisation has been high, and environment is under threat. Think of waste disposal- everywhere its waste. I think this the same with sand abstraction where resources including jobs are not enough to meet the demands of the population due to high urbanisation. Now, the expansion of the city to meet such demands especially housing has seen the proliferation of illegal activities- sand being one of the resources needed in construction industry. Those unemployed youths have gone there now, look at Harare south in Retreat for example; illegal sand mining has been lately rampant”.

The above narratives confirm that indeed urbanisation is a leading factor in the rise in illegal sand mining activities in the province. The community itself, including the residents and illegal sand miners, acknowledged that the population in Retreat Farm has been gradually rising leading to overpopulation and a scramble for resources. Varied population age groups are actively involved in at least one process of illegal sand mining such as land preparation, mining, extraction, transport and selling. Study participant CR 5, a local resident of Retreat Farm (Personal Communication, 3 August 2020) highlighted that,

“When I started residing here in Retreat, there were very few isolated houses around year 2000. Today, as you can see yourself, houses are crowded. People are increasingly residing in this area. There is no control as to who stays where yet there seems a growing population. This explains why we are now experiencing massive illegal mining activities as people strive to earn a living”.

This view concurred with sentiments that emerged from the illegal sand miners themselves. Study participant IL 5, a resident and senior illegal sand miner from Retreat Farm (personal communication, 10 August 2020) expressed that,

“In Retreat, most of us are bringing our families in urban areas hoping to find jobs. Unfortunately, that is not the case. As a result, we do mine and sell sand informally in order to feed our families”.

Clearly, evidence from this case site indicates that urbanisation is a leading cause of illegal sand mining. Increase in demand for accommodation coupled with limited means of living due to urbanisation have resulted in communities engaged in illegal sand mining. Urbanisation in Zimbabwe sharply increased since 1980 when the country gained independence and Harare municipal province is one of the most populated provinces, supporting a high rate of urbanisation rate. According to Brinkhoff (2017), the Zimbabwe National Statistics Agency Census Provincial 2012 report shows that Harare had a population of 1 485 231, Epworth 167 462 and Harare Metropolitan Province 2 013 048 million. The latest census report shows an increase in population to 2 427 209 in 2022 with urban population increasing by 33% since 2012 (Zimstat, 2022).

Lempriere (2017) noted that urbanisation is often associated with a myriad of social, economic and environmental problems. The scholar identified environmental degradation, pollution and conflicts as some of the socio-environmental ramifications in developing countries. Similarly, Dawson (2020) noted that urbanisation is a threat to environment as utilisation of land often involves illegal acquisition. Although these studies did not focus on sand mining issues, their findings highlight on the connection between urbanisation, illegal utilisation of natural resources and socio-environmental problems. This particularly emerged in this study where urbanisation has forced poverty stricken and jobless youths into illegal sand mining for living. These findings augers well with the political ecology framework that views environmental problems as a connected hub of various social, economic and political factors (Miller, 2022; Dawson, 2021; Kervankiran *et al.*, 2016). Indeed, urbanisation emerged as a threat to community welfare and well being, and socio-economic driver of illegal sand mining in Retreat Farm. Previous studies support these findings on urbanisation as a driver of illegal sand mining for example in China, Singapore and India (Lempriere, 2017; Peduzzi, 2014).

5.2.1.2 Economic drivers of illegal sand mining

5.2.1.2.1 Poor national economic performance

Regarding economic drivers, the study established that the general economic meltdown facing the country has contributed to increasing illegal sand mining activities. In Retreat Farm, the majority of the participants cited poor national economic performance as a driver of various forms of illegal activities including illegal sand mining. Most participants stated that poverty, unemployment, poor living standards and many other social problems are outcomes of a bad economy and subsequent economic hardships. Study participant IL 6, an illegal sand miner from Retreat Farm (Personal Communication, 10 August 2020) expressed that,

“As you know Zimbabwe’s economy is very poor. The government has failed our country, it has failed us. Industries have closed and there are no jobs. Surely, how would you expect me to survive? This needs to be fixed first so that we desist from illegal sand mining”.

This sentiment was supported by another study participant IL 1, an illegal sand miner from Retreat Farm (Personal Communication, 10 August 2020) who similarly indicated that, “...there is no money, and the economy is absolutely dead. Leave us doing what we are doing. Do not ask more questions my bro”.

The majority of local residents interviewed also indicated that economic hardships push communities into various sorts of illegal activities that generate some money. Illegal sand mining was identified one of the activities that help to absorb the economic shocks in Zimbabwe. Study participant CR 8, a local resident of Retreat Farm (Personal Communication, 5 August 2020) highlighted that, “...my neighbours wake up as early as 5am to prepare heaps of sand ready for market. Surely besides that, how would we take care of our families under these economic hardships?”

The above narratives by the furious impoverished community members indicate that indeed the general poor national economic performance has significantly contributed to illegal sand mining activities in Retreat Farm. Similar findings emerged in previous studies on sand mining as they also revealed that illegal sand mining is an alternative means of living in the face of national economic challenges faced by most developing countries (Lange, 2011; Mushonga, 2022; Davey, 2001; Greens, 2012; Chevallier, 2014). According to Akinyemi et al. (2019), the economic performance index for most third world countries is relatively low. Alexander (2007) relates this to subsequent social malpractices, misconduct and illegality, as national economies

do not adequately supply the socio-economic needs of societies. Indeed, this study revealed that illegal sand mining is driven by harsh economic experiences faced by communities. In a study by Dalu et al. (2017), it emerged that illegal mining sites are dominated by youths who have either been retrenched or never been absorbed into formal employment due to limited job opportunities. This clearly suggests that environmental sustainability relates to economic status of the country as highlighted by the political ecology. In this study, it was evident that poor national economic performance significantly contributed to illegal sand mining in Zimbabwe.

5.2.1.3 Political drivers of illegal sand mining

5.2.1.3.1 Government's land reform policy

Evidence from Retreat Farm indicates that the land reform policy in the form of the Fast-Track Land Reform Program (FTLRP) to revoke land from white owners to black Zimbabweans has contributed to illegal sand mining. The study established that there was a sudden shift in land use patterns as new landowners did not have the technical and financial capacity to maintain agriculture standards. As a result, some land was left idle attracting illegal sand miners to operate there. Furthermore, other landowners used their political muscle to acquire and lease out some claims for the purpose of illegal sand mining operations and settlements. The industry pointed out on the unregulated land acquisition processes used by war veterans under the purview of empowerment in terms of land reform program as a key driver to illegal sand mining in the area. Pointing at the government's policy as a driver of illegal sand mining, study participant IN 1, a mine manager from the Derbyshire Quarry (Personal Communication, 28 August 2020) noted that,

"...This area (Retreat) is dominated by war veterans who own most of this land. Since then, we began to witness rampant illegal sand mining activities. We have serious problems with these miners as they sometimes encroach our company territory. Before the land reform, the farm was highly secured and such activities were close to non-existent".

The above narrative clearly indicates that politics played a greater role in facilitating illegal sand mining. This assertion also emerged from the local residents and further highlights on the regulation challenges for land acquired under the fast track land reform program. Study participant CR 5, a local resident from Retreat Farm (Personal Communication, 3 August 2020) cited that,

“These areas nowadays are not privately owned as they used to be. Before the land reform, Whites owned most of these farms. It was difficult to do any activity in these farms because they were highly secured but now everyone does what he likes. Even EMA and local authorities are no longer able to effectively protect the exposed land because it’s for the state”.

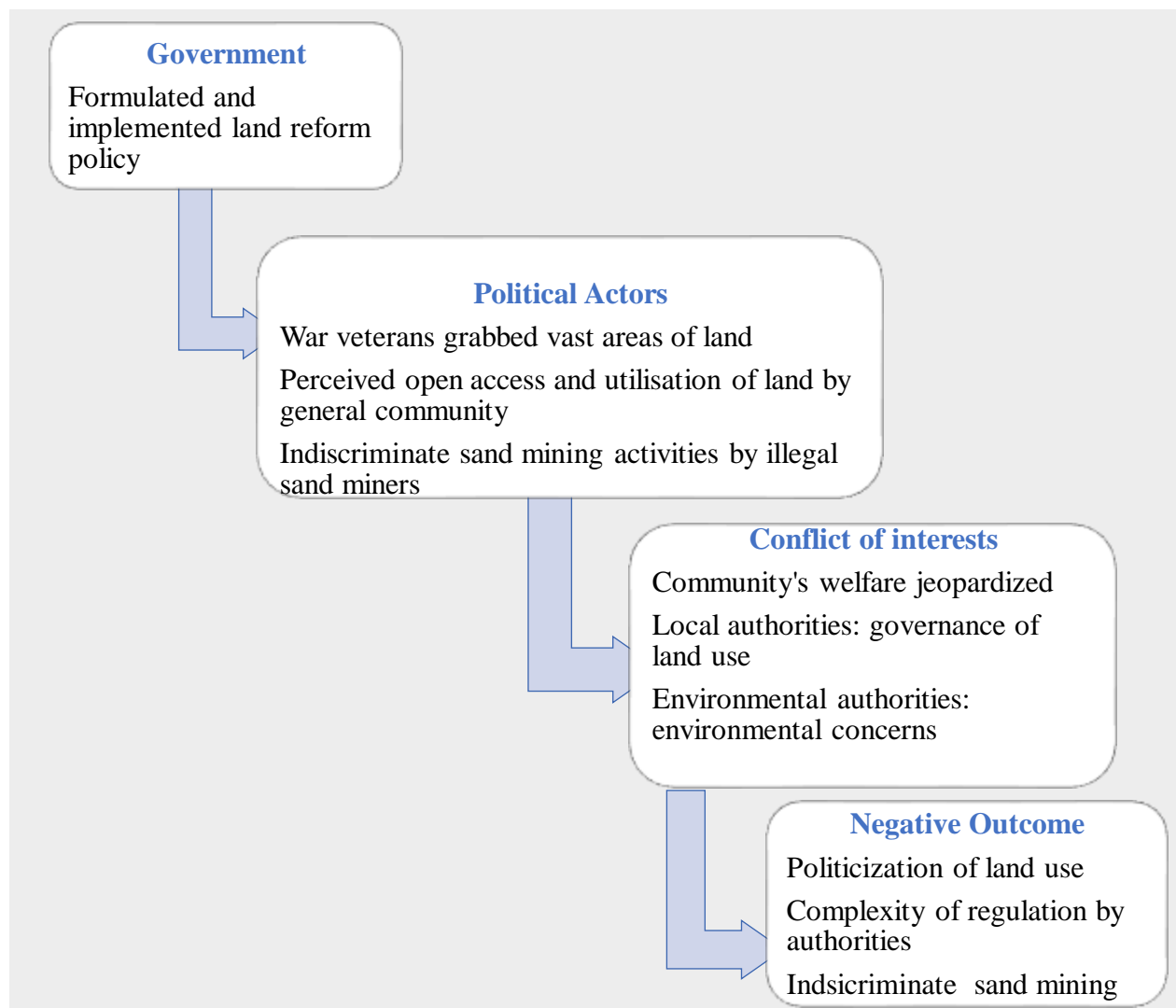
It is evident from these findings that the land reform program was a politically driven initiative that was silent on environmental sustainability issues within resettlements. The environmental authorities also explained that state land is more of an open resource that is difficult to regulate. Study participant GE 4, an official from EMA (Telephone Interview, 14 August 2020) similarly noted that, “Retreat Farm is a state land, and this is why it is difficult to regulate illegal sand mining there. No one specifically owns it hence rampant illegal sand extraction taking place there”.

Indeed, the land reform policy contributed to indiscriminate illegal sand mining activities in Retreat Farm. Even the local community viewed this program as an empowerment tool over land acquisition and utilisation. Sand mining activities became widespread including interfering with other private spaces. Industrialists registered to mine quarry and sand were some of the victims of illegal sand mining in Retreat Farm. Study participant IN 3, a Mining Manager from Eyecourt Quarry (Personal Communication, 28 August 2020) expressed that,

“We always fight with illegal sand miners here in Harare south as they encroach into our territories without hesitation. At one point, some threatened us saying we are war vets and even attempted to continue mining into our territory until we sued them. They claim that they are the empowered indigenous owners of this land, that way they also use political gimmick to interfere with our activities”.

Clearly, the above narrations show the land reform policy generated inflated expectations over land use by indigenous Zimbabweans. This created much conflict within the indigenous populace itself particularly over legitimacy and human rights violations. According to Cliffe et al. (2011), the land acquisition process began in 1980 through a *willing buyer willing seller* approach and took a sudden government shift to compulsory land grabbing from the whites to black Zimbabweans. This initiative marked the departure of White settlers from their land and the inception of black Zimbabwean land ownership. The chaotic nature of the process resulted in the grabbing of vast resettlement land by political stakeholders especially the War Veterans

(Mando et al., 2019). Figure 5.3 below illustrates land reform implementation process and the subsequent consequences.



Source: Researcher, (2023).

Figure 5.3: Government policy, illegal sand mining and conflicts

Previous studies on the land reform program in Zimbabwe suggested that the initiative was associated with a lot of social and environmental malpractices (Mkodzongi & Lawrence, 2021; Scoones et al., 2021; Cliffe et al., 2017). Although there are few academic studies on land reform and illegal sand mining activities, results indicate that the land reform program resulted in the proliferation of illegal activities within resettlement areas. This supports findings of this study that revealed a direct connection between the land reform policy and illegal sand mining. Marongwe (2003) noted that there was misinterpretation among indigenous people on the rationale of the policy. The author indicated that the chaotic nature of policy implementation

compromised policy awareness. Most indigenous communities viewed the initiative as an open door program aimed at benefiting any Zimbabwean in every way possible. Shoko et al. (2020) challenged policy makers to engage citizens and raise awareness before implementation. In contrast, the fast track land reform program was politically driven and implemented in a manner that did not allow for environmental and social impact assessments. Findings of the study clearly reveal that ill-planned implemented government policy pave way for malpractice, non-compliance and conflict. Indeed, the land reform policy emerged a political driver of illegal sand mining in Retreat Farm, Zimbabwe.

5.2.2 Case Study 2: Zengeza East in Chitungwiza town

5.2.2.1 Social drivers of illegal sand mining

5.2.2.1.1 Unemployment

Similar to findings from Retreat Farm, unemployment also emerged as one of the key drivers of illegal sand mining in Zengeza. The majority of participants were of the view that if the job market was stable, there would not be as much illegal sand mining activities. In fact, illegal sand mining is now a form of self-employment upon which impoverished and jobless communities depend for a living. This emerged in interviews held with illegal sand miners themselves, with study participant IL 14, a resident of Zengeza East (Personal Communication, 13 August 2020) expressing that,

“We are aware that when we mine sand, we cause soil erosion and the water that we use to clean the sand flows back into the rivers systems killing fish. We know it’s illegal and violation of environmental rights, but we have no option. The country is in bad economic state and there are no jobs so there is nothing we can also do. Personally, my contract was ceased long back by the employer so if I can’t do this, I will starve”

The above sentiment is a clear indication that illegal sand miners are aware of the impacts of their activities and the legal implications. The deliberate violation of laws is a push factor of the underlying harsh economic conditions they experience. The view above is supported by another study participant IL 15, an illegal sand miner from Zengeza east (Personal Communication, 13 August 2020) who emphasized that,

“We are aware that we should protect the environment. We also know that we should protect our river systems. However, you then evaluate and see that you can’t protect the environment while I’m not protecting myself and see my family starving. There are no jobs and as we speak, we are three brothers, the two of us lost their jobs in 2012 while another one in 2015 because industries had closed hence, and we are here mining sand”.

Clearly, this narrative points at the link between illegal sand mining and unemployment and poor standards of living by the local residents. The majority of the participants also felt that the closure of industries in Harare has driven people into illegal sand mining. Similar to findings from Retreat Farm (case site 1), unemployment emerged as one of the key drivers of illegal

sand mining in Zengeza. One of the study participants CR 8, a resident of Zengeza east (Personal Communication, 5 August 2020) informed that,

“...There are no jobs as you know in Zimbabwe. Everyone is hustling to earn a living. This is how most residents are hustling to feed their families. These miners supply sand in all areas in Chitungwiza and even get customers from as far as Borrowdale and its working for them”.

Similar sentiments supported the foregoing by quantitatively justifying the financial sustainability of the illegal sand mining operations in the face of dwindling job market in Zimbabwe. Study participant IL 15, a senior illegal sand miner and resident of Zengeza (Personal Communication, 14 August 2020) has this to say,

“I charge about US\$6 to US\$8 per cubic metre if the customer uses own transport. If I use own sourced transport service, the cost increases depending on distance to be covered. I do not take local currency, it’s strictly foreign currency”.

Another participant described sand mining as both a business and employment opportunity citing the immense contribution of the sector towards infrastructure development in Harare. Study participant ISM (18), a resident and illegal sand miner of Zengeza (Personal Communication, 13 August 2020) highlighted that,

“If we don’t mine sand, how do we survive when existing resources cannot meet the demands of the population? Many new houses and structures that side suggests an influx of more people in Zengeza. With no jobs, no food and you expect me to stay at home, no! In fact, we are also supplying quality raw material for construction, and that’s part of the development we want in Zimbabwe”.

The is concrete evidence from the interview excerpts provided by local residents and illegal sand miners that indeed unemployment, poverty and deteriorated living standards compounded to increasing illicit sand mining in Zengeza, Harare Province.

5.2.2.1.2 Urbanisation

It also emerged that urbanisation has attributed to illegal sand mining in Zengeza East. Officials from local authorities viewed the rise in population as contributed immensely towards rampant illegal sand mining activities in the area. These participants from Chitungwiza Municipality expressed concern over the rise in illegal activities from a rapidly urbanised area including sand

mining. Study participant GL 4, a CM official (Personal Communication, 28 August 2020) noted that,

“We are deeply concerned about illegal sand mining operations we are experiencing in this area. Over the past years, the rate was relatively low but currently the rate is alarming. I believe, available resources cannot meet the living demands for the ever-growing urban population hence rampant informal and illegal activities by families”.

Another government official supported the above views by highlighting the rise in both formal and illegal sand mining to meet the construction demands due to urbanisation. Study participant GL 3, a CM official (Personal Communication, 26 August 2020) explained that,

“Sand is on demand as more and more people are coming into urban and peri-urban areas. There are many construction works here, unfortunately including informal settlements. This is fuelling this illegal sand mining as every unemployed youth is involved in this activity in one way or the other. Residents and even companies are in involved in this business as sand is mined without any tax payments and also sold at relatively cheaper cost”.

Despite this common assertion by government officials, there were contrasting views by some residents and illegal sand miners who felt that urbanisation is not of significance to illegal sand mining as participants pointed at unemployment and poverty as key drivers. Study participant IL 12, an illegal sand miner from Zengeza (Personal Communication 13 August 2020) strongly disagreed that urbanisation is the leading driver of their activities as he expressed that, “...over the years Harare was known for large population but the rate of illegality was generally low. Poverty is the root cause boss”.

Although urbanisation emerged one of the drivers of illegal sand mining, unemployment was the leading factor in Zengeza. Study participant CL 3, a community leader from Zengeza (Personal Communication, 7 August 2020) emphasized that unemployment is the main driver of illegal sand mining,

“The main problem is that our young generations have no other things to do- there are no jobs, that’s why they flock in mining sites where they take alcoholics and fight more often during mining operations”.

Although there were some contrasting views, it is evident that urbanisation influences illegal sand mining through construction and sand demand. Furthermore, findings show that illegal sand mining is associated with a myriad other social problems such as alcohol abuse, conflicts and violence. This suggests that illegal sand mining sites are havens of misconduct and law defiance. Even previous studies noted that highly urbanised cities are often associated with social problems including resource scarcity, social malpractices and indiscriminate natural resource consumption (Dawson, 2020; Milton, 2010; Muchadenyika & Williams, 2016; Lempriere, 2017). In developing countries, urbanisation has been on the rise in the recent years, yet resources cannot meet population needs. A study by Lempriere (2017) revealed that big cities generally experience a high rate of illegal sand mining due to the high demand for sand, concrete, stones and other building materials. Although unemployment remains one of the socio-economic issues in developing countries, for example in Africa (Muchadenyika & Williams, 2016), in this study urbanisation emerged one of the leading drivers of illegal sand mining in the country.

5.2.2.2 Economic drivers of illegal sand mining

5.2.2.2.1 Economic hardships

Similar to Retreat Farm, findings from Zengeza show that economic hardships have contributed to illegal sand mining in the area. Although the community mainly pointed at unemployment as the main issue, government officials interviewed acknowledged that the general economic hardships faced by citizens explains why there is a rapid increase in illegal sand mining in most parts of the country. Unemployment emerged as a microcosm of the national economic meltdown. Officials linked this issue to complexity of their regulatory functions and execution. Study participant GE 3, EMA official (14 August 2020) expressed that,

“Economic hardships and unemployment remain the key drivers. Driving illegal sand miners away from the site permanently under such circumstances is very difficult. We make raids more often but once you leave the place, they come back on site. In fact, what pushes them is because there are no more formal jobs out there, industries continue to close, so our efforts are outweighed by the poverty and jobless induced illegal sand mining operations”.

This highlights that indeed, the poor national economic performance has created social and economic conditions that compromise living standards and push communities to engage in alternative but illegal income generating activities such as sand mining. This view was also

evident in the narratives by study participants from NGOs who cited that economy influences illegality in the extractive sector. Study participant NG 2, a LDRAT official (Personal Communication, 21 August 2020) cited that,

“Our present economy is not really good. The industry is not meeting employment demands. As a result, everyone is hustling. Zimbabwe has literally turned into an entrepreneurship community where everyone is selling something. It’s a sad reality that this is culminating into high rate of illegality including illegal sand mining to sustain lives. Honestly, if our economy is better performing like some of our neighbours, South Africa being a good example- we wouldn’t see much of this illegal sand mining in our country. This is why South Africa has so many immigrants from our country, and the trend of international out-migration is even rising”.

These findings explain why driving illegal sand miners away from their sites has become a mammoth task for authorities. Sand mining sites have become hunting grounds for living thus create conflicts with law enforcers, industry and local community. This confirms the tenet of political ecology framework that views environmental changes or issues from a broader perspective. Indeed, this study exposed that illegal sand mining is an outcome of interconnected social, economic, political and environmental issues. Even other previous studies conducted on sand mining that clearly exposed an economically driven illegality of mining by indigenous local communities to earn a living. For example, in Botswana, a study by Madyise (2013) revealed that the extractive sector has become a war zone between authorities and illegal sand miners with the latter defying regulation by any means possible. Clearly, illegal sand mining is a result of push rather than pull factors as most studies point at a high rate of unemployment and poverty levels due to economic performance (Upadhyay, 2019; Plecher, 2020; Madyise, 2013). In this study, an economically active but an unemployed population dominated illegal sand mining. More so, the activities were associated with social, economic and environmental conflicts. These findings validate the land-resource-conflict theory that views land use as a source of conflict among various interested stakeholders.

5.2.3 Case Study 3: Epworth in the city of Harare

5.2.3.1 Social drivers of illegal sand mining

5.2.3.1.1 Unemployment

Like Zengeza and Retreat Farm, unemployment also emerged as one of the main social drivers of illegal sand mining. Limited employment opportunities in both the formal and informal sector has forced most families to resort to illegal sand mining activities that include digging, selling and transporting sand. Results indicated that employment was more of self-employment ranging from mining and trading of sand, vending, transport and other basic services provision. Study participant CR 11, a resident from Epworth (Personal Communication, 7 August 2020) noted that, "...sand has provided us with jobs. My husband spends his entire daytime mining and selling sand. I sell my foodstuffs around the mining sites while my children also help in my vending during their holiday".

This suggests that sand mining opens up various forms of businesses and employment opportunities for local communities. The same views emerged from the illegal sand miners' themselves who emphasized that sand mining is their alternative form of employment. Supporting earlier findings from local residents, study participant IL 14, an illegal sand miner from Zengeza, Chitungwiza (Personal Communication, 14 August 2020) furiously expressed that, "...my brother how could you ask these questions as if you are not a Zimbabwean. Who doesn't know that we have unemployment crisis in Zimbabwe?"

These responses clearly reveal the magnitude of unemployment and its impact on local communities. Unemployment has left communities with no other alternatives except self-employing themselves in the sand mining sector. Previous studies show that precedence is given to income generation at the expense of environmental sustainability, safety and health in informal mining sectors (Stewart et al., 2020; Smith et al., 2016). Due to limited formal jobs, the informal sector has substantially consumed most youths in developing countries (Wireko-Gyebi et al., 2020; Asabonga et al., 2017). Artisanal and small-scale mining operations including illegal sand mining is widespread as families earn a living through a range of activities. Previous academic studies indicate that besides sand extraction, harvesting and selling, illegal sand mining sites have attracted vendors of wear, foodstuff and many other goods and support services (Ali, 2020; Kadoe, 2018; Arwa, 2013; Madyise, 2013). This supports the strong connection between unemployment and illegal sand mining. Indeed,

unemployment emerged one of the key drivers of illegal sand mining in Epworth as the community generally live from hand-to-mouth.

5.2.3.1.2 *Proliferation of informal settlements*

Evidence from Epworth also suggests that the rapid growth of informal settlements has contributed to rampant and indiscriminate sand mining by local communities. Together with rising costs of living in most residential areas due to urbanisation, informal settlements have become an alternative means of accommodation. Sadly, the jobless and impoverished residents have raided all sandy open spaces to extract sand for selling. Sandy areas have also attracted new informal settlements around them for closer proximity to the mining sites. Illegal sand mining is regarded as an economic opportunity and a cost-effective industry that is tax-free and relatively attracts low transport costs. One of the participants, study participant CR 11, a resident of Epworth (Personal Communication, 7 August 2020) had this to say,

“I resided in Kambuzuma with my family for over 10 years without any problem. Back then, housing was not a problem; the demand was relatively low that you could stay as tenant for more than 5 years at one house. With time, many people began to migrate from rural areas to urban areas especially after colonization and this triggered a rise in costs of rentals. Consequently, I failed to sustain those costs that I moved and stayed here in Epworth. Of course, we are illegal residents but it’s cheap staying here as you can do some farming, sand mining and generate some income. Indeed, this is helping us a lot”.

The above sentiment suggests that illegal sand mining mainly occurs in and around informal settlements. These sentiments concurred with views given by officials from CSO and local authorities. Confirming how informal settlements facilitate illegal sand mining and plans to address these issues, study participant GL 1, an official from HCC (Personal Interview, 25 August 2020) explained that,

“...Epworth is generally an informal settlement. Plans are at advance stage to regularise it. However, regularisation of these settlements may help to address illegal sand mining. Most of these illegal sand miners are generally residents of the informal settlement so once regularised, there is room to regulate the activities more easily”.

The assertion above suggests that Epworth is one of the informal settlements with inherent social and environmental issues. Undoubtedly, illegal sand mining is one of the emerging

issues. The regulation of such illegal activities within informal settlements is problematic as noted by study participant CS 1, an official from ZDA (Personal Communication, 21 August 2020),

“...illegal sand mining is mainly driven by these informal settlements who activities are very difficult to control for now. We just hope that once developments have been fully set including regularisation, it will be a thing of the past. We believe that a regularised area can reduce illegality. All systems and activities will be monitored to check compliance, and we will continue to engage authorities on this”.

Evidence from the three groups of participants clearly shows that indeed the proliferation and expansion of informal settlements have contributed to illegal sand mining. Asare et al. (2021) noted that resource-endowed areas often attract population and result in establishment of informal settlements that are associated with volatile social conflicts. Previous studies also highlight the high prevalence of crimes and other forms of illegality in resource-endowed areas due to high population concentration (Kwangwama et al., 2022; Marais et al., 2018; Bucher, 1993). Although these studies focused mainly on the mining of minerals while this study focused on sand, the findings concur that indeed informal settlements accelerate illegality.

5.2.3.1.3 Urbanisation

Findings from Epworth similarly revealed that urbanisation is a driver of illegal sand mining. Urbanisation has led to a rise in sand demand for construction purposes. Communities have harnessed that demand by resorting to illegal sand mining in order to meet sand demand. Most participants interviewed indicated that there has been a rise in population in Epworth in the recent years causing indiscriminate illegal sand mining. The following narrations by study participant CL, a resident of Epworth (Personal Communication, 12 August 2020) responded that,

“Epworth used to be a small area that you could hardly see much illegal sand mining activities. Today, we are crowded and there is a high rate of informality and illegality. Everyone is doing all sorts of things to earn a living. Population has grown at the expense of resources. As a result local community members utilise any open space for a living including agriculture, brick moulding and sand mining- unfortunately all being illegal”.

Similar sentiments emerged from study participant CR 12, a local resident of Epworth (Personal Communication, 7 August 2020) who cited that,

“We are overcrowded here. Everyone is bringing his or her family in towns but cannot afford to stay in other better residential areas such as Waterfalls, Kuwadzana and Msasa. Now, to earn a living most families are now engaged in sand business for a living. We do mine and sell sand, and we get customers from as far as Chitungiza because our sand is cheaper. This illegal sand mining helps us to get some money to sustain our family needs feed families”.

Findings from government officials supported the above sentiments as most participants also attributed illegal sand mining to high population concentration within Epworth community. One of the officials, study participant GL 3, from ELB (Personal Communication, 26 August 2020) highlighted the following,

“We are experiencing population growth in Epworth. We may not have the figures but demand for resources comparing with past years has drastically increased. Same services and facilities cannot adequately sustain the current population. For that reason, we are witnessing an increase in illegal activities from the community including illegal sand mining. Sand endowed areas are full of openings, which was not been the case over the past years. Unfortunately, they mine in undesignated areas, which is cause for concern”.

It is clear from the above narratives by different groups of participants that urbanisation is one of the leading drivers of illegal sand mining in Zimbabwe. This is due to rise in demand for sand for construction purposes (Mark, 2021). In order to meet that demand for sand, illegal sand mining has become common phenomenon especially in developing countries. Arabi (2021) noted that sand is relatively cheap in the informal market despite questions over its quality, and therefore provides a good business for local communities. As noted by Lange (2021), washed river costs around US\$ 7 per cubic meter in the informal market while the figure almost doubles in the formal market in Zimbabwe. With rise in urbanisation and low standards of living in most developing countries, this suggests that any infrastructure developments involves the use of cheap sand from the illegal sand miners. Thus, urbanisation and construction are key variables in illegal sand mining in Harare.

5.2.3.2 Economic drivers of illegal sand mining

5.2.3.2.1 Economic hardships

Results from Epworth also suggest that economic hardships experienced by citizens has contributed to illegal sand. The majority of the participants indicated that poor national economic performance has subsequently lowered the standards of living in the area. Against this backdrop, communities turned into illegal sand mining to feed their families. Study participant IL 7, a resident and illegal sand miner from Epworth (Personal Communication, 11 August 2020) narrated that,

“Life is hard in Zimbabwe. Here in Epworth, its hand to mouth. The economy is not sustainable. We do all sorts of things in order to feed. I survive through illegal sand mining. I am sure you also know the state of our country. Things are not good out there. That’s our daily hustle in order to feed families”.

The above evidence shows that indeed urbanisation plays a critical role in worsening illegal sand mining. Sand mining emerged an economic shock absorber of economic meltdown and the resultant harsh standards of living for local communities. Even the community leadership acknowledged that the poor national economy is contributing to rampant illegal sand mining activities in Epworth. Study participant CL 2, a resident and community leader from Epworth (Personal Communication, 5 August 2020) noted that,

“Illegal sand mining which is now problematic in our community is an indication of how bad things are, our economy is not so good currently. I remember around year 2010, the rate of illegal sand mining was very low and we could see some mining here and there. It is because there was better economic performance; most youths were flourishing well with their businesses while industry absorbed a substantial number. Today, industry is down, doing business involves all sorts of illegality as long as these boys see a source of money”.

Together, these narratives expose how poor national economic performance is a driving force to increasing illegal sand mining in Epworth and Zimbabwe at large. As explained by the political ecology theory, these findings showed that illegal sand mining is driven by multiple intertwining factors including economic and social problems. In a study by Arwa (2013), illegal sand mining served as an economic shock absorber in the face of shrinking job market and rising costs of living. The income generated from illegal sand mining is used to meet local community needs in the face of economic hardships. Mushonga (2022) argued that the income

is insignificant but can sustain lives for most local communities. Reports show that illegal sand mining is attributed to economic performance of the country (Chevallier, 2014; Green, 2012; Lawal, 2011). The wide range of livelihood activities often emerge as alternative means to earn a living including illegal trading of sand and vending (Masalu, 2002). Therefore, poor economic performance significantly contributes to illegal sand mining as established by this study. This explains why, as explained by the political ecology framework, environmental changes or issues such as illegal sand mining are indeed an outcome of interconnected issues that are broadly a cause for concern to the societies.

5.2.3.3 Political drivers of illegal sand mining

5.2.3.3.1 Government's indigenization policy and community's perceived outcomes

Results from Epworth indicate that the indigenization policy has contributed to the rise of illegal sand mining activities in the area as communities felt more empowered to own, utilise land and benefit from it. According to Marazanye (2016), the Indigenization and Empowerment Act, signed in March 2008 provided for indigenous black Zimbabweans to benefit from mining foreign investments made in their communities. Findings suggest that the local communities misinterpreted the government policy as meant to empower them through uncontrolled and open access to natural indigenous resources such as land and minerals. This has resulted in widespread sand mining activities by the community.

On the other hand, communities viewed the government's indigenization policy as have failed to bring local socio-economic developments in their communities as highlighted by the policy. Communities who anticipated significant socio-economic developments from private sand miners operating in their localities in terms of the policy felt betrayed and resorted to illegal sand mining practices to benefit themselves. Most participants expressed concern over the futility of the government's indigenization policy towards local development. Study participant IL 10, a resident of Epworth (Personal Communication, 11 August 2020) indicated that,

“We were told by the government that we will benefit with mining investments in our district. Personally, I expected that we would see developments such as good roads, clinics, and other facilities. To my surprise, I have seen nothing like that. Companies simply mine and we, communities continue to suffer. This is why we finally rose up to find ourselves pieces of land to mine sand for a living. I personally feel betrayed”.

The above excerpt clearly shows community discontentment over the development outcomes of the policy. Below is a similar assertion that was shared by study participant CR1, a local resident of Epworth (Personal Communication, 6 August 2020) expressed that,

“There were a lot of white investments in these areas, but the community could not see any community benefit for years. This culminated in hostile relations between the registered miners and the community at times resulting in legal actions filed against one another. However, this did not fully avert the problem as the vicious illegal sand miners continued to mine in private land. Even ourselves, we ended being part of the mining activities”.

These results confirm that indeed Indigenization and Empowerment Act has facilitated the rise in illegal sand mining in Epworth and Zimbabwe at large. A study by Mazaranye (2016) shows that most government policies are central to sustainable mining. Poorly formulated and implemented policies can rather promote indiscriminate mining practices. In this study, the government’s policy rather created a smooth ground for illegal sand business. Thus, Arabi (2019) suggested that policy implementation should involve intensive public education and awareness. This serves to inform citizens on the rationale of any policy, and counteract misinterpretations as emerged in this study. Bhatasara (2020) asserted that effective policy formulation and implementation requires adoption of a participatory approach along the course. The scholar highlighted that stakeholder engagement helps the policy to achieve its intended goals. Thus, the failure or success of any policy would be easily understood and promote further cooperation towards intended outcomes. Findings of this study clearly shows that the indigenisation and Empowerment Act was prematurely implemented in terms of public awareness hence conflict over public anticipated outcomes. Table 5.4 below provides a comparative analysis of cases on the drivers of illegal sand mining in Harare Metropolitan Province.

5.2.4 Comparative case analysis on the drivers of illegal sand mining

Table 5.4: Summary: Drivers of illegal sand mining

	<i>Case Sites</i>		
	<i>Retreat farm</i>	<i>Zengeza East</i>	<i>Epworth</i>
<i>Social drivers</i>	<ul style="list-style-type: none"> - Unemployment and poverty as the main drivers of illegal sand mining - Illegal settlements facilitating illegal sand mining activities. Mining takes place within residential houses and away on open spaces - Urbanisation 	<ul style="list-style-type: none"> - Unemployment leading driver of illegal sand mining. Poverty and declining standards of living strongly linked to the foregoing - No link with settlements. Area is highly regularized under the jurisdiction of Chitungwiza municipality as the local authority. - Urbanisation 	<ul style="list-style-type: none"> - Unemployment identified as the driver of illegal sand mining - Settlements highly informal and unregularized. Emerged as the source of illegal sand miners - Urbanisation
<i>Economic drivers</i>	<ul style="list-style-type: none"> - Poor national economic performance 	<ul style="list-style-type: none"> - Economic meltdown as linked to limited jobs 	<ul style="list-style-type: none"> - Poor economic performance
<i>Political drivers</i>	<ul style="list-style-type: none"> - Government's land reform program: - Area highly politicized following the government's land reform program. - Area is mainly <i>state land</i> hence too much freelance activity and complexity of regulation - Politics used as a weapon of uncontrolled land use 	<ul style="list-style-type: none"> - No political driver emerged. 	<ul style="list-style-type: none"> - Government's indigenisation policy emerged the main driver of illegal sand mining. - Strong community belief system on land reform program, indigenisation, and empowerment policies

This section presented results on the social, economic, and political drivers of illegal sand mining at all three case sites - Retreat farm, Zengeza East and Epworth. Key drivers emerged in this study include high unemployment, proliferation of informal settlements, urbanization, urban expansion and increase in demand for sand, government's land reform policy and economic meltdown. The first part of this section presented and interpreted qualitative data per case site followed by comparative analysis of all case sites upon which general conclusions are derived. The next chapter presents findings on the impacts of illegal sand mining and relationship with socio-environmental conflicts in Zimbabwe.

5.3 Impacts of illegal sand mining and subsequent socio-environmental conflicts

Results from the three case sites indicate that the social, economic and environmental impacts of illegal sand mining have triggered conflicts among the different stakeholders including the community, government and industry. Environmental impacts include land degradation, environmental pollution. Social impacts include displacement of communities, an increase in the rate of criminal behaviours and loss of lives. Economic impacts include loss of sand market by the formal sector. This section makes a case site results analysis followed by a comparative results analysis.

5.3.1 Case Study 1: Retreat Farm in Harare

5.3.1.1 Environmental impacts and conflicts

Land degradation

Illegal sand mining has resulted in serious land degradation in Retreat Farm. The rudimentary methods of sand extraction create deep pits left open after resource depletion. An observation made by the researcher shows that illegal sand mining does not observe territorial jurisdictions causing serious environmental degradation and stakeholder conflicts. Private spaces including land for industry, residents and local authorities is illegally mined creating hostile relations among these actors. Figure 5.4 below shows environmental degradation caused by illegal sand mining near a homestead in Retreat Farm:



Source: Researcher, (2020).

Figure 5.4: Land degradation caused by illegal sand mining in Retreat Farm

Field observations further revealed that open tracks created by illegal sand mining have facilitated soil erosion and altered river systems in some areas. More so, open pits have also become breeding grounds for mosquitoes as rainwater collects during rainy season putting public health under threat. Interviews held with industrialists and government officials confirmed the above impacts. Study participant GE 5, EMA official (Telephone Interview, 15 August 2020) cited that,

“These illegal sand miners leave open gullies everywhere. Once they exhaust the sand, they leave the pits unrehabilitated and mine elsewhere. At the end, we have numerous gullies in the mining sites, some of them very large and a danger to lives. Right now, if you visit various parts across the country where these activities are rampant, surely, the rate of environmental degradation is alarming”.

This view was supported by another participant, study participant GE1, an EMA official (Personal Communication, 14 August 2020) quantified the environmental impacts by citing that, “...in our latest raids (2021), we discovered that more than 220 hectares of land was severely degraded. Illegal sand miners have created about 300 open pits”.

The above sentiments concurred with responses from another government official, study participant GE 2 (Personal Communication, 18 August 2020) who pointed at massive land degradation cause by illegal sand mining with reference to the previous year as she said,

“...about 214 hectares of land has been as of 2019 in Waterfalls district due to illegal sand mining. The district covers Retreat, Eyestone and Derbyshire. The most affected area is Retreat farm that has about 162 hectares of land already affected. That’s massive degradation as you can see”.

These excerpts clearly show that illegal sand mining has resulted in massive environmental degradation in Zimbabwe. Land clearance for transport purposes, and bad mining methodologies degrade the land owned by local community and private companies. This has created hostile relations with both local community, environmental authorities and landowners. Industrialists expressed concern over interference of private land and subsequent land degradation for the purposes of sand mining by illegal miners. Study participant IN 3, a Manager at Eyecourt Quarry (Personal Communication, 28 August 2020) expressed the following concern,

“...As you can see there are numerous minor road networks in this area. These are not official roads so all narrow dust roads you see around were created by transporters to carry sand from the mining sites. The boys (illegal sand miners) destroyed trees and grass to pave way for unlicensed transport service providers”.

These assertions complement field observations that revealed indiscriminate illegal sand mining processes including transport systems. Deep gullies were observed everywhere on mining sites including sites which have been exhausted of sand. No reclamation was done after mining at some point as depicted by figure 5.5 below.



Figure 5.5: Illegal sand mining activities (mining and transport) in Retreat Farm

Source: Researcher, (2020).

Document analysis of EMA reports support the above results as it emerged that illegal sand mining affected more than 200 hectares of land in Waterfalls district. Retreat Farm emerged as one of the most affected areas within that district.

Putting together evidence from document analysis and the semi-structured interviews above, illegal sand mining has indeed resulted in serious environmental degradation in Retreat Farm resulting in socio-environmental conflicts among different actors. These findings concur with findings from previous studies that noted that illegal sand mining processes and methodologies degrade the environment (Nalule, 2020; Farahani & Bayazidi, 2017; Asabonga et al., 2017; Gavriletea, 2017). The studies also noted that conflicts are inherent in illegal sand mining sites due to the haphazard nature of mining systems. Extant literature indicates that illegal sand mining involves indiscriminate land clearance, extraction of sand and rudimentary methodologies that leave environment highly degraded. For example, a study by Nalule (2020) revealed that sand mining mainly occurred along streams and riverbeds resulting in downstream siltation. Although the researcher reported less siltation, land degradation such as open gullies, unreclaimed after sand mining was common in the three case sites. Similar to this study, Shaji and Anilkuar (2014) also noted that illegal sand mining created deep tunnels and

altered river systems. The scholar highlighted on the subsequent conflicts that emanated from such environmental ramifications, for example, his study revealed that community leadership, local residents and the government condemned such detrimental practices by illegal sand miners. However, regulating illegal sand miners is often hindered by defiance (Arwa, 2013), suggesting that governance of illegal sand mining is associated with conflicts. The following section presents findings on the nexus between land degradation and conflicts in Retreat Farm.

Land degradation and socio-environmental conflicts

Land degradation has become a major cause for concern various stakeholders that include the government, community, and sand miners themselves. The restriction of illegal sand mining by local authorities and environmental authorities was associated with serious resentment and open defiance by the illegal sand miners. This has created a volatile environment in the sector. With land barons claiming to own some land, illegal sand mining has seen eruptions of conflict between the two parties. Illegal sand miners continue to mine in these claims. More so, illegal sand miners destroy agriculture land or fields owned by some residents as they extract sand creating hostile relations between the two parties. This emerged in the following excerpt by one of the study participants CR 2, a local resident of Retreat Farm (Personal Communication, 3 August 2020) who expressed that,

“My entire agriculture field has been mined by illegal sand miners. I used to produce vegetables and tomatoes but now there are open pits all over. The boys are dangerous and they do fight you that I had to just ignore. We have no control of these boys, and we are no secure because cases of robbery have since been on rise, while those who defy their requests particularly to mine close to backyards receive attack threats”.

As the narrative above indicates, illegal sand mining has been associated with conflicts with different stakeholders such as the residents/community and local authorities. This was mainly due to lack of respect of the rule of law, societal norms and legitimacy of land. Unfortunately, the vicious nature of illegal sand miners has forced communities to concede loss of property and agriculture land and to be deprived of their traditional sources of living. Bezolla et al. (2022) noted that illegal mining often results in alteration of biodiversity including natural resources upon which local community relies on. This suggests that the victims of such circumstances are bound to respond to such adverse practices to retain their traditional lives. Church and Crawford (2018) noted that some illegal sand miners plunder agriculture fields and

destroy vegetation in a bid to extract sand, and this often leads to serious conflicts with affected communities. As espoused by the land-resource-conflict theory, land is subject to conflict of land use due to a wide range of activities that it can be offer. Previous studies, similar to findings made in this study concur that landowners, private sector and local community tend to lose their land due to illegal sand mining activities. The indiscriminate and rudimentary nature of mining is a threat to society and the environment. Illegal mining sidelined other land users as illegal sand miners force their operations anywhere with sand endowments. Indeed, environmental degradation caused by illegal sand miners raises conflicts with various stakeholders. Governance, public health and legitimacy are central to illegal sand mining induced conflicts (Kemp *et al.*, 2011). This is a clear indication that weak governance system can trigger conflicts with victims of illegal sand mining.

Environmental pollution

Illegal sand mining has resulted in both air and water pollution in Retreat Farm. Illegal sand mining processes such as digging, extraction, segregation and purification of sand have polluted nearby water sources. This researcher observed that the purification process involves mixing raw sand with water in order to remove residual material in suspension. Wastewater and materials directed to nearby dams polluted water. Furthermore, illegal sand miners extract sand on the upstream of Irvine Dam where it is rich with sand and a source of water for sand processing. In an interview with illegal sand miners, study participant IL 2, a resident of Retreat Farm (Personal Communication, 10 August 2020) explained that,

“...we extract sand from approximately 200 meters from here and bring it here for processing. Once processed, it relatively gains better monetary value. Therefore, the processing involves using water from that dam owned by Irvines (Pvt Ltd) company. It is unfortunate that the miners do not care of the pollution they cause through this process. I have no idea what company management are doing over this as I believe they are aware”.

Indeed, the purification process is detrimental to water quality and biodiversity as similar sentiments emerged from other illegal sand miners. Another study participant, IL 6, a resident and senior illegal sand miner from Retreat Farm (Personal Communication, 10 August 2020) similarly explained that,

“When I prepare my heap of sand, I apply some water to grade the sand into better quality one. Wastewater infiltrates but in cases where we are a large number operating at one point,

more water is lost at the same so it may flow into that nearby dam. I will be trying to prepare good grade of sand and subsequently better monetary value”.

Responses such as those above show that indeed, the processing of sand by illegal sand miners has led to the pollution of groundwater. The study also established that illegal sand mining mainly occurred in informal settlements where sources of water include streams, wells and some wetlands. Activities of the illegal sand miners on and off mining sites polluted these water sources as shown by Figure 5.6 below.



Source: Researcher, (2020).

Figure 5.6: A well that was polluted by illegal sand mining processes in Retreat Farm.

The researcher also observed that illegal sand mining contributed to air pollution. Direct burning of shrubs and grass during land clearance for the purpose of mining caused air pollution. Indirectly, illegal sand mining caused air pollution through burning of granite rock to weaken it for easy breaking as the communities made small concrete stones out of it. A walk-through observation in most mining sites by the researcher showed a couple of economically active and aged men and women breaking large stones into concrete stones. Off-cuts from rubber collected from waste disposal sites in industry and wood were fuel for burning granite. This produced hazardous gases into the atmosphere. These findings also emerged in interviews conducted with industrialists who were deeply concerned about their conflicting interests with illegal sand miners. Industrialists confirmed these observations as issues of atmospheric pollution due to land clearance was of greater concern to them based on proximity of their

operations. Study participant IN 2, an official from the Derbyshire Quarry in Retreat Farm (Personal Communication, 28 August 2020) reported that,

“The same illegal sand miners also prepare concrete stones and sell. Because they do not have adequate and suitable machinery to do the process, they burn the concrete using off cuts from tyres and other plastic waste so that the rock would be easily break the rocks. If you walk past the mining sites, you see burning points and even the gas emissions. Obviously we are affected by these emissions because look, we operate close each other daily”.

These issues also emerged in field observations made by the researcher during site visits and interviews. The researcher observed some black patches on notable points in the sand mining sites that suggests earlier burning. Interviews held with residents supported these observations as study participant CR 3, a resident of Retreat Farm (Personal Communication, 3 August 2020) cited that,

“...our noses are now used to these bad smells from burning of rubber and grasses by these illegal sand miners. As you can see, I stay very close to the mining sites. I cannot get rid of them but live with the situation. They burn rubber especially those offcuts from light industries and Mbare and place on the rocks they intend to break. Granite is strong so burning is to make it weak and easy to break”.

Another study participant, CR 4, a local resident of Retreat Farm (Personal Communication, 3 August 2020) further highlighted that,

“...these illegal sand miners burn everywhere. Last week they burnt my agriculture field and began mining sand there. To worsen the situation, they used my dry maize stalks to burn their stones, and break and sell together with sand. We are especially worried about our health as they constantly do the burning”.

All the foregoing narratives clearly show that illegal sand mining is associated with environmental pollution and this creates a physically marred landscape but an equally insidiously damaged population psyche marred by defiance of the law, respect for others, human rights violation and welfare distortion which are sources of socio-environmental conflicts Other studies confirm that indeed illegal mining causes environmental pollution (Duncan, 2020; Chevallier, 2014; Adedeji, 2014; Asabonga et al., 2017). Duncan (2020) noted small scale and illegal miners often use mercury for gold processing and discharge the chemical

into river systems to contaminate the river water. According to UNEP (2020), approximately 34% of mercury emissions from illegal mining sector emanate from mercury discharge into the environment. Although the focus was gold mining, the findings support findings from the present study that revealed the environmental pollution impacts of sand processing by the illegal sand miners. Reports further indicate that illegal mining sites are associated with various sources of pollution such as open defaecation, poor waste disposal and littering (Abdus-Saleque, 2008; Jacob, 2010; Kamis, 2011). In this study, environmental pollution emanated from poor wastewater disposal, solid waste disposal and burning processes during land clearance. Indeed, illegal sand mining contributes to widespread environmental pollution, and this emerged as a serious concern to various stakeholders such as the local community, government and industry. The following section presents findings on the relationship between environmental pollution and socio-environmental conflicts in Retreat Farm.

Environmental pollution and socio-environmental conflicts

Environmental pollution has created socio-environmental conflicts between illegal sand miners on the one hand and other stakeholders such as the residents, government and industry as highlighted earlier. Results of the present study indicated that pollution of public water sources and the government's failure to control the situation were the local communities' main concerns. Some local communities have resorted to self-defense systems to combat illegal sand mining and adverse environmental impacts such as fencing some water points. Thus, in the process, resulted in conflicts with illegal sand miners over common water resources. Similarly, emerging conflicts with industry revolved around land use, as well as market and environmental pollution. Field observations also indicated that wastewater after sand purification is discharged into a nearby dam owned by Irvine Company which is a public health concern and land right concern for the industry. Such complex conflicts emerged in interviews conducted with government officials and industrialists for example, study participant GL 3; an ELB official (Personal Communication, 26 August 2020) highlighted that,

“The miners use water to purify or process their sand. They often do so near water sources, so the water used naturally flows to the river systems polluting water. Local community and private companies use the same water. That is clearly public health concern”.

Another key study participant GE 2, an EMA official (Personal Communication, 18 August 2020) similarly highlighted on the environmental concern of illegal sand mining as he expressed that,

“...illegal sand mining is a cause for concern on our environment. When the illegal sand miners process their sand, they pollute our water sources. They discharge that wastewater in nearby water points such as the case with Irvine Dam in Waterfalls. This company (Irvines) breeds and sell chickens, so the water is used for both commercial and domestic processes within its site. Therefore, that pollution obviously becomes a public health concern and a corporate concern as well. Unfortunately, these illegal sand miners are always on the spot despite our collaborative efforts with the private sector. Efforts to combat this problem is still on going, hopefully we will address it soon”.

Clearly, the above excerpts show that pollution is one of the serious environmental impacts of illegal sand mining, and is associated with complex socio-environmental conflicts among various stakeholders including industry, local authorities, environmental management authority and the local community. Conflicts mainly revolve around land use, health concerns and resource use. Communities view environmental pollution as a direct violation of their health and safety while authorities are concerned with environmental law violations. A study by Bezzola et al. (2022) revealed complex socio-environmental conflicts due to illegal mining induced pollution of land, air and water sources. Similarly, Duncan (2020) noted that environmental pollution, land degradation and alteration of landscapes affected local communities who castigated the government authorities for failing to address these issues. Madyise (2013) also reported that dust, smoke and noise from trucks ferrying sand raised a public outcry. Musah (2009) similarly noted that communities in East Gonja district complained of illegal sand mining induced water pollution in their localities. This empirical evidence concurs with findings made by the current study suggesting that illegal sand mining causes environmental pollution that in turn lead to various forms of socio-environmental conflicts.

5.3.1.2 Social Impacts and conflicts

Results of the present study indicate that illegal sand mining resulted in a number of social problems in Retreat Farm that include displacement of communities, crimes and health and safety violations and loss of lives. These ramifications created hostile relations between illegal sand miners and other stakeholders such as government and the local community.

Displacement of communities

Results from the study indicated that illegal sand mining has led to the displacement of some homesteads in Retreat Farm. Illegal sand miners dig any area endowed with alluvial sand and river sand. Consequently, illegal sand mining takes places near some homesteads and gradually encroaches backyards despite residents making reports over such unjust practice. It emerged that in most informal settlements, illegal sand miners are not afraid of mining in and around homesteads due to the illegal nature of settlements themselves. This has resulted in the forced migration or resettlement of some affected families.

In an interview with one of the illegal miners operating near homesteads, study participant IL 2, an illegal sand miner and resident of Retreat Farm (Personal Communication, (10 August 2020), he expressed that,

“...these houses are illegal as well. That family offered itself that land, so it cannot stop my operations as well. We are doing it the illegal way. I will just continue to mine towards their house until they vacate it. I don't mind”.

Field observations also confirm that illegal sand miners forcibly extract sand around homesteads putting the lives of people at risk of landslides and in some cases displacing populations, as shown by Figure 5.7 below.



Source: Researcher, (2020).

Figure 5.7: Illegal sand mining around homesteads in Retreat Farm

Community displacement, environmental degradation and pollution are some of the underlying issues contributing towards socio-environmental conflicts among various actors. Reports indicate that the discovery of valuable minerals often leads to the displacement of communities, change of land use and loss of traditional land by local communities (Adedeji, 2014, Mwangi, 2007, Madyise 2013. Shaji and Anilkuar (2014) further noted that government initiated mineral and sand mining displaced large communities in mineral endowed areas. Conflicts emerged as victims were not content with compensation. Previous studies on illegal and legal mining studies confirm that compensation is usually inadequate and does not match the losses incurred by the victims of displacement (Bosco & Sumani, 2019; Ali, 2020). Thus, breakdown of social and traditional structures due to illegal sand mining is often associated with resentment and conflict.

Displacement and socio-environmental conflicts

The displacement of families from their homesteads, agricultural spaces and traditional sites due to illegal sand mining caused serious social conflicts. Conflicting land use for the purpose of residence and sand mining emerged the key driver of conflict as illegal sand miners made sure they access sand even within backyards. The illegal nature of both informal settlements and illegal sand mining worsened relations between the two parties - residents and sand miners. Illegal sand miners respected no residential jurisdictions as they viewed residents as equally illegal. Unfortunately, the residents were on the losing side as illegal sand miners were insensitive as to the socio-environmental demands of both community and authorities. As such, illegal sand miners were not much bothered about the risk of landslides on families. Residents expressed deep concern over their fears of illegal sand mining activities within their territories. One study participant CR 2, a local resident of Retreat Farm (Personal Communication, 3 August 2020) explained the risk and conflicts they have with illegal sand miners as she said:

“We are afraid of staying here because of sand mining occurring around our yard as you can see there. We tried to stop them but they resisted and rather fought back saying we are also illegally settled here. We tried to sue them, but it all ended in vain for no apparent reason”.

Similarly, study participant IL 15, an illegal sand miner from Retreat Farm (Personal Communication, 12 August 2020) clearly exposed the nature and magnitude of conflict between the community and illegal sand miners as he narrated that,

“My brother, this place is all state land, so we do all sorts of things here. Therefore, when you construct your house and we have interest with sand around your homestead; we do so because we are all illegal. That is why we can even mine by the house”.

The above narratives expose the existing conflicts occurring between the community and the illegal sand miners due to their differing interests and priorities. This stakeholder conflict has a ripple effect on relations between the community and law enforcement authorities. The majority of participants from the community blamed the government authorities for failing to protect them from the vicious miners that respect no boundary. The study observed that illegal sand mining activities forced some residents off their agriculture fields. In a study by Arwa (2002), conflicts emanated between sand miners, truck drivers and landowners such as farmers as the latter were faced with indiscriminate land use interference. Similarly, Martinez-Alier et al. (2016) examined environmental conflicts in India and South America and revealed that both

environmental impacts and displacement of communities due to sand mining operations triggered stakeholder conflicts. Illegal sand mining deprived communities of their agrarian livelihoods, and traditional and customary land use practices (Bogcha, 2010). Clearly, illegal sand mining induced social impacts trigger socio-environmental conflicts as emerged in this study.

Increase in social and criminal malpractices

Results of the study also showed that illegal sand mining increased the rate of crime such as theft and robberies in Retreat Farm. Results indicated that COVID-19-induced lockdown deprived people of their traditional means of living such as vending and trading worsened criminality and illegality in and around sand endowed areas. The situation has created panic and social unrest among local communities who feared of their security threat due to rise in illegal sand mining activities in their localities. One study participant CR 1, a resident of Retreat Farm (Personal Communication, 3 August 2020) expressed that,

“We are now living in fear because of these illegal miners whose numbers are increasing. There are so many thieves now, last week one man was robbed off his cell phone at Mutamba. Because of increasing activities and movements due to sand mining, both day and night robbery cases have been on rise. It is not surprising some of these illegal sand miners are the same that rob people at night”.

Even the community leaders pointed out the loss of security by the community for fear of victimization and loss of lives and property due to an increase in criminal acts particularly because of expanding illegal sand mining activities. Key study participant CL 1, a community leader of Retreat Farm (Personal Communication, 3 August 2020) reported that,

“I have received many cases of people killed especially during the evening in my community. This is unlike around year 2000 when you could rarely hear that such and such person has been robbed or killed but when these illegal sand mining activities proliferated; it is now a common phenomenon. The problem is the same illegal sand miners engage in other illegal practises during the night. I remember, one thief who was caught at Mutamba, and apparently, he was a senior illegal sand miner. So indeed, we have a lot of social malpractices now, even young girls are now attracted by these illegal sand miners and engage in prostitution to get some little money. I have been working with other stakeholders, and hopefully we will win the battle”.

The above narrations show that illegal sand mining has indeed led to a rise in social problems within communities endowed with sand resource. There emerged concern over the rising number of cases of robberies and theft perpetrated by illegal sand miners. Even previous studies established that illegal sand mining sites and surrounding residential areas have become havens of social misconduct (Simeipiri & Brown, 2017). The concentration of population in sand endowed areas has resulted in a high incidence of crime (Farahani & Bayazidi, 2017). In such cases, conflict is highly volatile and imminent (Isung, 2021). The next sub-section presents findings on how such criminal tendencies have resulted in conflicts among various stakeholders.

Criminal tendencies and socio-environmental conflicts

The insecurity among local communities has worsened relations between the residents and the illegal sand miners. Local communities view illegal sand miners as robbers and thieves who torment the community through both daylight mining and other nocturnal criminal acts. On the other hand, the community feels that community leadership has not prioritized their concerns. Local residents view their community leaders as focal persons that should play a leading role in addressing social, economic, political and environmental issues, yet their presence in addressing illegal sand mining and the socio-environmental is insignificant. These emerged as a source of conflicts in this study. Study participant CR 1, a resident of Retreat Farm (Personal Communication, 3 August 2020) castigated community and political leaders over poor governance as she said,

“We have political leaders at ward and constituency level here in Retreat. I cannot mention their names but honestly, I am furious of their sluggish roles they play in their areas of jurisdictions. They only appear towards elections and go blind once we vote them in. I am not happy at all. No initiatives neither any controls to curb this illegal sand mining”.

The above response shows prevailing conflicts taking place between community leadership and residents over gaps in the governance of illegal sand mining. Local community members were concerned at the sluggish commitment of leadership to address illegal sand mining-induced social problems they experience. Another study participant CR 4, a resident of Retreat Farm (Personal Communication, 3 August 2020) similarly pointed on the same issue,

“Our ward councillors pretend they do not know that there is a community outcry over the increasing rate of thievery, robbery and prostitution around sand mining hotspots. Some families are losing their land, but the leadership is quiet”.

Another study participant CR 1, a resident of Retreat Farm (Personal Communication, 6 August 2020) castigated local authorities and EMA for failing to perform their duties to ensure that proper land use and environmental protection respectively is ensured. He said: “...EMA is failing to control these activities, same with Council on land use planning. They are slept in offices. ZRP is also not doing its duty. They seem bribed. Retreat is no more a secure area”.

Assessing these comments, it is evident that illegal sand mining has resulted in various social problems including conflict between the community and government authorities, the latter described as irresponsible in addressing these issues. Literature shows that illegal mining is associated with conflicts, violence, prostitution, theft and environmental disturbance (Ali, 2020; Robinson & Green, 2002). Illegal sand mining promotes prostitution as more and more population move to and concentrate around mining sites (Ibid). A study by Ali (2020) supports the views that illegal sand miners perpetrate social problems as they also engage in theft and human rights violations. Deprivation of land and forced displacements trigger conflicts between the miners, authorities and the local community. For example, in India, studies show that there was serious resistance by communities to comply with government directives for displacement, despite compensation. However, weak governance systems are also stimuli for conflicts (Asare et al., 2021; Arwa, 2013). Indeed, social problems caused by illegal sand mining lead to various forms of stakeholder conflicts.

Loss of lives

The present study also noted that illegal sand mining has resulted in loss of lives. The deep trenches resulting from sand mining are potential death traps for both people and livestock from surrounding communities. The study revealed that during the rainy season, these become open pits that become invisible as they fill up with rainwater. Children emerged the most vulnerable group as they get trapped whilst playing around some open spaces, most of which were once sand mining points. The majority of the participants highlighted that they had heard at least one report of a fatality due to drowning in those unrehabilitated pits. Study participant GE 2, EMA official (Telephone Interview, 18 August 2020) confirmed these findings as he said,

“Open pits created through illegal sand mining puts public safety and health at risk. We have had cases of children drowning into these pits across the country in the recent past. At the same, the pits have become breeding grounds for mosquitoes putting the public at risk of malaria infections”.

The above excerpt concurs with findings from the local community, as study participant CR 2, a resident of Retreat Farm (Personal Communication, 3 August 2020) also revealed that, “...last year (2019), there is a child who drowned in Mabanana area. Unfortunately, there was no one close to rescue the child. The child died”.

This evidence suggests that illegal sand mining has been associated with loss of lives mainly among children who drown in the open pits created by illegal sand miners. Findings by Asori et al. (2022) also revealed that loss of lives emanate from the violent acts associated with illegal mining. This suggests that illegal sand mining is equally a threat to safety, health and welfare. In this study, however, loss of life was a result of environmental degradation and not social misconduct. Other studies on small artisanal mining shows that illegal mining activities have direct and indirect effects on health and lives through direct attacks and traps, and long-term pollution-induced deaths (Isung, 2021; Simeipiri & Brown, 2017). All these ramifications trigger conflicts among different stakeholders.

Loss of lives and social conflicts

The study revealed that there were social conflicts that emanated from safety, health and lives concerns. A range of activities in and around illegal sand mining sites emerged as safety and security threats to local communities. Thus, in addition to open pits left after sand mining activities posing a threat to the lives of children, robbery and violent attacks were reported. These sparked conflicts with local community who felt that their safety and security was at risk, in spite of there being responsible authorities who should combat illegal sand mining and resulting insecurity. It further emerged that due to loss of lives, there were cases of confrontation between local residents and some illegal sand miners as the latter invaded spaces belonging to certain families. The conflict of interest in some cases resulted in fierce attacks and losses of lives. Study participant CL 1, a community leader of Retreat Farm (Personal Communication, 3 August 2020) acknowledged that illegal activities and other subsequent acts by illegal sand miners created a tense environment in his community as residents try to protect their families. He said,

“...it’s a war zone we have in our community. Some residents are also dangerous and can really fight back. Like I said earlier, some have lost their children from these deep pits left by illegal sand miners, and such a parent is not a happy person at all. There is also a feeling, as we get through some reports, that we as leaders are not doing enough to bring sanity. So, the community is equally disappointed with both leadership and illegal sand miners. Fighting and violent acts are therefore common. I have been engaging the police to try to help out, but community does not appreciate”.

Such sentiments emerged from the local residents who highlighted their conflict with sand miners and the government. Study participant CR 1, a resident of Retreat Farm expressed that,

“I am personally disappointed in the manner illegal sand miners operate in our community. They have no respect; some of our neighbours have lost a child after she drowned in pits sometime about 2 years ago during the rainy season. No one took the responsibility neither accountability for such loss of precious life. Efforts to caution illegal sand miners when they encroach our territories is even risky as they can attack you. So, we have actually teamed up with my colleagues to face them and stand our rights to stop them from free invasion of private territories or spaces. The police is just but a fake watchdog because they do not take any significant actions towards that. We will fight ourselves for the safety of our families”.

The above sentiments from local residents and their leadership clearly link illegal sand mining and social conflicts. The community appears forced to defend themselves against the illegal sand miners. Thus, conflicts emerged between the two stakeholders in Retreat Farm. Previous studies indicated that illegal mining activities is often associated with violence, loss of lives and conflicts (Church & Crawford, 2018; Masterson, 2018). Similar studies also show that illegal sand mining has directly led to the loss of lives for both animals and humans as a result of unrehabilitated pits (Nguru, 2008; Madyise, 2013; Shaji & Anilkumar, 2014; Katisya-Njoroge, 2021, Zhu, 2020; Zhu, 2022). It is such ramifications that have created conflicts among various stakeholders, for example in China where communities in Qinghai province clashed with the poor governmental regulatory efforts against water pollution caused by illegal sand miners and which claimed many lives (Environmental Justice Atlas, 2018, in Church and Crawford, 2018; Huang & Xu, 2020). Clearly, illegal sand mining, loss of lives and conflicts are inseparable and a major source of conflict for communities.

5.3.1.3 Economic impacts and conflicts

Loss of sand market from registered mining companies

Economically, illegal sand mining has resulted in losses by the formal sector regarding the sand market. These include registered sand mining companies operating in Harare South such as the Derbyshire Quarry and registered transporters due to the stiff competition for market between the illegal sand miners and the industry for service delivery. Results indicated that sand supplied by illegal sand miners is relatively cheap hence the formal sector loses the market despite being taxed by the government. Some companies have since downsized their operations and retrenched workers in the face of declining markets. As a result, government institutions such as National Social Security Authority (NSSA) requires every employer to make monthly pension contributions based on prevailing number of employees, and that means loss of income for the government. This emerged in interviews held with industrialists who are deeply disturbed by the competitive sand environment. One of the industrialists, study participant IN 3, an Eyecourt Quarry official (Personal Communication, 28 August 2020) noted that,

“...obviously the loss of income on our side is a loss of income on the government. We make monthly contributions to the government through its institutions such as ZIMRA and NSSA, so if we are not operating well and close some of operations that suggests that the government cannot fully generate income from taxes etc. It’s really an economic issue to industry, government and the public. The latter relies on some government support to regulate these mining activities for example local authorities get government’s financial support. So, it’s an economic blow for everyone if illegal sand mining continues unabated”.

Similar sentiments emerged from other officials in the private sector on the financial blow they experience in sand market due to illegal sand miners. One study participant IN 1, a Derbyshire Quarry official (Personal Communication, 28 August 2020) explained that,

“Illegal sand miners operate at our door steps hijacking our clients by the main gate. For sure, some clients concede and we lose them. If we lose three clients for example, that will be a minimum of US\$300 lost basing on our minimum order quantities. We also have a provision for transport service for sand/quarry we supply but because as clients are lured by the main gate, they get the service outside. It’s a loss to us.

These responses clearly show that illegal sand mining has economic costs to the industry with a ripple effect on government and Zimbabwean citizens. Competition from illegal sand miners emerged as the major concern from industry. In contrast, other studies conducted in developed countries show that the regularization of any emerging mining operations ensures that there remains very low rate of illegal mining (Giljum et al., 2011; Lenschow, 2002). Both small and large-scale illegal sand mining are quickly regularised to maintain a typically formalised system of sand mining (Ibid). In the present study, due to prevailing harsh economic conditions, illegal sand mining has become an employment opportunity that attracts a large youthful population. This significantly affects mining operations of registered sand miners by providing stiff competition. However, findings from studies conducted in developing countries concur that there is market conflict between the formal sector and informal sector in the mining sector (Marschke & Rousseau, 2022; Andrews, 2015; Davey, 2001). These studies reveal the price disparities that exist between registered miners and illegal miners with the latter selling sand at cheaper prices. That suggests an attractive supply as compared to the formal market, and this has an adverse impact on the economic performance of registered mining entities.

Loss of market and socio-environmental conflicts

Results showed that stiff market competition and loss of income by the industry due to illegal sand mining has resulted in a series of conflicts between the two stakeholders. Illegal sand miners have not only raided mining territories owned by the private mining companies but also raided premises competing for customers. In all cases, there was no consent between the two parties resulting in bad relations between the two parties. Illegal sand miners continue to operate within private territories despite various actions taken by companies to get rid of them. Explaining the nature of conflicts, study participant IN 1, a Derbyshire Quarry official (Personal Communication, 28 August 2020) noted,

“During the first days, the illegal sand miners could operate from a distance as they fear of our actions if they come closer. With time, and as you can see, they are no longer afraid to operate by our gate. Even our security is now afraid to confront them as they can even attack you. Last year, one of our security personnel was attacked but surprisingly no satisfactory actions were taken by the police after our report of the matter”.

Governance of illegal sand mining emerged as an issue by the industrialists. The industry blames government authorities such as EMA, local authorities, police and community

leadership for failing to address rampant illegal sand mining within Harare south. Study participant IN 2, a Derbyshire Quarry official (Personal Communication, 28 August 2020) pointed out that,

“We used to work with EMA more often but nowadays they rarely come here to chase away these illegal sand miners. In the past, EMA could visit these mining sites and conduct patrols even on weekly basis. Today, they no longer do so even to come and check on our environmental compliances. The illegal sand miners aware of this limited on-site inspections and monitoring are fully engaged in mining operations day and night without much fear”.

These findings indicate that the main conflict is between the legal and illegal sand miners over territory for mining and market. The weak governance of illegal sand mining by state institutions such as the EMA and local authorities was a source of conflict between industry and government. This suggests that there is a reflexive governance gap in Zimbabwe’s sand mining sector. The reflexive governance entails application of modern and valid controls to address existing socio-environmental problems such as depletion of natural resource and environmental destruction (Dryzek & Pickering, 2017). Based on this framework, the foregoing findings clearly show that failure to apply reflexive governance towards the sector contributed to socio-environmental conflicts. The private sector is suffering due to relative pricing system of sand by illegal sand mining that ultimately affect profit maximisation. According to Clement (2005), the ultimate goal for most private entities is profit-making. The influx of illegal sand market means a blow to the formal market. Previous studies on sand mining also indicate that illegal miners constitute inherent operative, environmental problems faced by the private sector through competition for markets (Isung, 2021; Sumani, 2019). This creates private-community relations marred with conflicts and arbitration. Clearly, illegal sand mining has created poor stakeholder relations over market in Retreat Farm.

5.3.2 Case Study 2: Zengeza East in Chitungwiza

5.3.2.1 Environmental impacts and conflicts

As with the case of Retreat Farm, illegal sand mining has resulted in environmental impacts that include land degradation, environmental pollution particularly land, and loss of biodiversity. It emerged that illegal sand miners extract sand indiscriminately and do not exercise sustainable and environmentally friendly practices.

Land degradation

The study noted massive land degradation in Zengeza East. Sandy land had gullies and open pits created by illegal sand mining. Observations and interviews with residents revealed that illegal sand mining negatively altered the physical and geological landscape. Study participant CR 6, a resident of Zengeza East (Personal Communication, 5 August 2020) cited,

“This area used to be so even about 3 to 4 years ago. It is only after this rapid illegal sand mining that you cannot find an even space for other land uses such as farming. Illegal sand miners burnt many trees and gases leaving the area unsuitable for gardening. Some streams have since dried up while a lot of open pits characterise this area”.

This response from a local resident reflects the magnitude of land degradation caused by illegal sand mining in Zengeza. The community leadership acknowledged that environmental impacts attracted the attention of environmental authorities. Study participant CL 3, a resident and community leader of Zengeza east (Personal Communication, 7 August 2020) noted that,

“We are deeply concerned about the rate of environmental degradation taking place in our community. There are now pits everywhere, and the boys do not reclaim after mining. There are new emerging streams due to widespread sand mining. EMA is trying its best but there is too much resilience from illegal sand miners. Lot of soil is eroded every year. I just hope local authorities will regularize these endowed areas so that regulation becomes easy”.

This supports earlier sentiments by local residents, and observation made by the researcher clearly indicated massive plundering of sand and gravel by youthful miners as shown by Figure 5.8 below.



Source: Researcher, (2020).

Figure 5.8 Land Degradation by Illegal Sand Mining near Residential Houses

This figure clearly shows the state of land degradation caused by illegal sand mining. This also suggests that in the rainy season, there will be massive soil erosion further deepening open pits. Literature indicates that extraction rates of sand and gravel are often higher than renewal rates through erosive processes (UNEP 2014, Chevallier, 2014). Land degradation mainly emanates from rudimentary methodologies in the excavation, transportation and consumption of sand (Ashraf *et al.*; 2011; Frohlich, 2017; Propescu, 2018). Therefore, illegal sand mining is undoubtedly a major driver of environmental degradation.

Land pollution

Results indicated that illegal sand mining is responsible for land pollution in Zengeza and other hotspot areas in Chitungwiza. This emerged through field observations and interviews conducted with EMA and illegal sand miners. The researcher observed that the main sources of pollution included open defaecation and dumping of waste materials such as paper. Mining sites do not have hygiene facilities such as public toilets, waste disposal sites and water since they are illegal sites not approved by local authorities. This observation concurred with evidence from the interviews held with EMA officials and the illegal sand miners themselves

as they provided similar responses on pollution. Study participant IL 15, an illegal sand miner from Zengeza (Personal Communication, 13 August 2020) stated that, "...this place is typically a bush; you cannot expect to find toilets or bins for waste disposal. We just throw everywhere. We use bush toilets".

The above sentiment was supported by other illegal sand miners and government officials as study participant IL 15, an illegal sand miner, Zengeza east (Personal Communication, 13 August 2020) highlighted that, "...can we have toilet problems when we have all these bushes my brother? These are our toilets. I cannot go back home for a mere toilet and come back here".

Another government official, study participant GE 6, an EMA official (Personal Interview, 18 August 2020) similarly expressed that,

"I think you have seen that illegal sand miners dig sand in open spaces in areas without any social amenities such as dumb sites, water and toilets. It means they use bush for toilets. They dump waste everywhere. Almost every activity is undesignated and illegal. It is worrisome and it is a health scare".

The above narratives clearly show that illegal sand mining directly and indirectly cause land pollution. Lack of hygiene facilities at most illegal mining sites is a major problem resulting in environmental pollution. Deforestation, land degradation, pollution and destruction of infrastructures are some of the adverse consequences of illegal sand mining (Sayami & Tamrakar, 2008; Padmalal & Maya, 2014; Bagchi, 2010; Ratnayake, 2013). This suggests that environmental pollution is one among other environmental problems caused by illegal sand mining. Mushonga (2022) noted that the sand processing also causes water pollution.

Loss of biodiversity

The study also revealed that illegal sand mining threatened biodiversity in Harare's urban and peri-urban spaces. It emerged that most illegal sand miners clear land prior to mining sand or gravel on cleared ground. The deforestation and burning significantly destroyed fauna and flora including artificial ecosystems such as gardens and maize fields. Study participant CR 7, a resident of Zengeza east (Personal Communication, 5 August 2020) noted that, "...illegal sand miners destroy all the vegetation wherever they intend to mine. They can either burn or cut down shrubs. Once the area is clear, they beginning to abstract sand".

The study further noted that numerous road networks created by illegal sand miners and transporters also threatened biodiversity. Study participant IN 2, a Derbyshire Quarry official (Personal Communication, 28 August 2020) highlighted that,

“As you can see there are numerous minor road networks in this area. These are not official roads but illegal ones that are used by transporters to carry sand from the mining sites. The boys (illegal sand miners) destroyed trees and grass to pave way for unlicensed transport service providers”.

It emerged that land clearance had destroyed emerging or new plants as explained by most participants. Study participant CR 8, a local resident of Zengeza (Personal Communication, 5 August 2020) similarly expressed that,

“The illegal sand miners destroy everything, plants, fields and gardens as long as they discover sand there. Its all clear grounds now. You cannot believe that this area was once bushy. We can't even see certain types of plants that were dominant because there is no more reproduction of the same”.

Putting together this empirical evidence, illegal sand mining clearly disturbs the ecosystem balance. Reports show that both legal and illegal sand mining cause vegetation destruction subsequently disturbing natural habitats of various species (Davey, 2001; Nguru, 2008; Greens, 2012; Karikari, 2013; Arwa, 2013; Chevallier, 2014; Adedeji, 2014; Jonah et al., 2015).

5.3.2.2 Social impacts and conflicts

Displacement of communities

In Zengeza East, illegal sand miners dig sand in residential stands, reserved and private land. With land barons claiming to own some land, illegal sand mining has prompted conflict between the two parties. Illegal sand miners continue to mine in these claims. More so, illegal sand miners destroy vegetable gardens and crop fields owned by other residents in order to mine sand. Study participant CR 9, a resident of Zengeza (Personal Communication, 5 August 2020) reported that,

“My entire agriculture field has been mined by illegal sand miners. I used to produce vegetables and tomatoes but now there are open pits all over. The boys are dangerous, they do

fight you, so I had to just ignore. Honestly, we have serious problems with these miners- how it will end, I do not know. Maybe we will not be here the next time you visit us”.

Similar to the above sentiments, another study participant CR 3, a resident of Retreat Farm (Personal Communication, 3 August 2020) stated,

“...some families have since relocated to other areas due to influx of illegal sand miners. The miners surely do not give us peace; they are rude and can mine within your backyard. I think this is why some families have relocated. It is really sad! I don't know why government let such forced migration happens in their eyes”.

As the narrative above indicates, illegal sand mining has displaced communities from their land and sources of income. The ferocious nature of illegal sand miners has forced communities to concede loss of agriculture land and livelihoods. The study also noted that illegal sand miners mined sand in reserved land owned by local authorities such as graveyards. Chen (2017) noted that illegal sand mining is associated with displacement and environmental degradation. Invasion and displacement of communities directly and indirectly burden governments in addressing the adverse impacts of illegal sand mining (Lempriere, 2017). This suggests the need for adoption of reflexive governance to combat these problems. Without reflexive governance and stakeholder engagement, there remains conflicts between local communities, governments and illegal sand miners as explained in the following section.

Displacement and socio-environmental conflicts

Results indicate that displacement of local communities was also a source of conflicts among the miners, local community and environmental authorities. Several local communities lost their land used for settlement, agriculture and religious purposes. This has intensified conflicts between illegal sand miners and local communities who felt that the government is not fully enforcing laws. One of the affected community members, study participant CR 9, a resident of Zengeza (Personal Communication, 5 August 2020) had this to say’

“My entire field is now a mining site for illegal sand miners. Illegal sand miners have destroyed most open urban spaces here in Zengeza in search of sand and gravel. Over there, it was once a worship centre for Apostle church of the red gametes, but the boys took over by force. Church leaders engaged the police, but it did not work because the miners would even mine during the night. We are in crisis; we have no peace”.

Most local residents concurred with the above sentiment by highlighting the magnitude of conflicts and response systems adopted by the victims. Study participant CR 10, a local resident of Zengeza (Personal Communication, 5 August 2020) indicated that,

“I personally launched a report when one illegal sand miner threatened me of death after I confronted him for destroying my garden. You know I had a very good and evergreen garden with vegetables and tomatoes but the miners destroyed it. They starved me of my source of income because I could sell my produce everyday. So, I was really disappointed, and confronted him at first before reporting the matter to the police. My colleagues had their nearby gardens destroyed too as the invasion expanded, and they (my neighbours) relocated their gardens elsewhere”.

The above comments clearly reveal the magnitude of conflicts between the community and the illegal sand miners over land use. There is also discontent by local community over poor and inept governance of illegal sand miners. Indeed, mining induced displacements have often been characterised by resentment and conflicts (Andrews *et al.* 2017). Indeed, land ownership and varied land use create conflicts among stakeholders. According to Bezzola *et al.* (2022), poor stakeholder relations, particularly between the community and miners, revolve around legitimacy, land use and forced displacements. This clearly suggests a strong connection between illegal sand mining, displacement and conflicts.

Increase in criminal acts

The study also established that illegal sand mining has increased the rate of criminal acts in Zengeza East. These include robbery, prostitution, and violent attacks. Most illegal sand miners take alcohol and drugs that alter their behaviour on and off mining sites. The majority of participants highlighted that illegal sand mining is dominated by men whose families stay elsewhere resulting in extra-marital sexual relations and prostitution. At the same time, the same miners are involved in violent fights against each other and anyone who interfere with their activities. Similarly, the sudden rise in armed robbery cases caused panic among local residents of Chitungwiza. This emerged in interviews conducted with local community as one study participant CR 10; a resident of Zengeza (Personal Communication, 5 August 2020) noted that, “It is rare to go for a week before we witness a fight erupting among these illegal sand miners. Maybe it’s because they are often under the influence of drugs. Last week, one

illegal sand miner was hit on his head by his colleague at their site, and reports say the victim is hospitalised up to now”.

The above narrative indicates that illegal sand mining was associated with various forms of misbehaviour, malpractice and unethical conduct. The above view concurs with responses given by other participants. Study participant CR 6, a resident of Zengeza (Personal Communication, 5 August 2020) who also highlighted that,

“...illegal sand miners have opened up businesses here but not all are good business. At night, most of these miners hook up with commercial sex workers at the beerhalls. We are worried about these behaviours on our children who also witness such bad acts. As as 6pm, there will be already on the streets almost naked”.

These results clearly show that illegal sand mining has promoted criminal acts in and around sand-endowed areas in Harare. Although high population concentrations in an area boost business through increased market share, research report that business operations around illegal mining sites often lead to high rate of prostitution, violent acts, human rights violations and robbery (Komnitsas, 2020; Shaji & Anilkuar, 2014). This suggests that illegal sand mining sites equally attract various forms of criminal tendencies within communities. Andrews et al. (2017) also noted that illegal sand mining is associated with various socio-environmental conflicts. In such cases, adopting of multistakeholder and reflexive governance is key to sustainable mining. Thus, this study appreciates the utility of stakeholder theory and reflexive governance in addressing the socio-environmental issues associated with illegal sand mining in Zimbabwe.

Loss of lives

The study also established that illegal sand mining has resulted in the loss of lives among local communities. Most participants indicated that deep open pits created during sand mining trapped and injured children while others lost lives after falling into them. Study participant CR 6, a resident of Zengeza east (Personal Communication, 5 August 2020) shared the following narrative,

“...they (illegal sand miners) mine and once they exhaust sand, they just leave the pits open. These pits that trap people especially during the rainy season when they fill up with rainwater. Some children have lost lives in the recent years because of these pits”.

Similar to findings from Retreat Farm, the above sentiment shows that illegal sand mining has resulted in the loss of lives. It also emerged from the study that conflicts that occur among the illegal sand miners themselves and the community are usually associated with loss of lives. A significant number of participants concurred that illegal sand miners often attack each other and use any form of weapon during fighting. Study participant IL 13, an illegal sand miner from Zengeza (Personal Communication, 13 August 2020) noted that, "...in 2017, one miner was attacked by two other illegal sand miners after a misunderstanding erupted over access to sand rich areas".

The above comments show that illegal sand mining is associated with various social and physical hazards. These social ramifications together with environmental concerns concern researchers (Aquaknow 2014; Bardi, 2013). In some countries such as India, unreclaimed open pits have trapped people, some of whom lost their lives. Similar studies also confirm that both humans and animals died due to trapping in the pits (Bagchi, 2010). Indeed, loss of life, human rights violations and displacement are some of the common outcomes of illegal sand mining and stakeholder conflicts.

5.3.2.3 Economic impacts and conflicts

Interference with other formal commercial sectors

Economically, study results revealed that illegal sand mining has interfered with other commercial sectors such as mining and transport. Registered companies faced stiff competition from illegal sand miners in service provision, including both transport and mining itself. Illegal sand miners tend to sell their sand at very low prices resulting in loss of clients by registered sand miners. Similarly, illegal transport service providers have dominated the area such that registered transporters have lost customers thereby constraining the income levels. This has a subsequent impact on government revenues as highlighted by some key study participants. Study participant IN 3, a resident of Zengeza (Personal Communication, 21 August 2020) noted that,

"We have serious problems with illegal sand miners as registered transport service providers. Our vehicles are certified fit by Vehicle Inspection Department (VID) and we have all the necessary documents but those actually doing the transport service are mainly illegal sand miners yet they deprive us of our businesses. So, it's actually a network of illegality in Zengeza".

Another participant IN 2, a Derbyshire Quarry official (Personal Communication, 7 August 2020) similarly highlighted that, "...illegal sand mining is competing with the formal sector, not only in terms of sand market but even with other key sectors such as transport and construction".

These views suggest that illegal sand mining has affected the formal sector at various levels - production, operative efficiency and profit. Illegal sand business involves a wide range of activities such as mining, selling and transport (Rogerson, 2011). Over the years, such services were provided by private entities that now face stiff competition from the informal sector particularly the illegal sand dealers. This clearly shows that illegal sand mining has literally become a business threat for the formal sector that experiences the ripple effect of competition, loss of market share and income, and persistent government taxation. Thus, illegal mining poses a financial burden to mining companies through emerging costs of repair of damaged properties, replacement and improving security (Isung, 2021; Farahani & Bayazidi, 2017). This suggests additional expenditure of the side of the private sector. As noted by Isung (2021), illegal sand mining is a cost to both state and mining companies that carry the burden of restoring environment damaged by illegal sand miners. These views concur with findings made in this study where some mining companies secured their private spaces by plantations to deprive illegal sand miners of space for sand extraction.

5.3.3 Case Study 3: Epworth in Harare

5.3.3.1 Environmental Impacts and Conflicts

Land degradation

Similar to Retreat Farm and Zengeza, results from Epworth also revealed that illegal sand mining is causing untold environmental degradation. The researcher observed plundering of the environment including deforestation, slash and burning, and formation of gullies. These observations also emerged in interviews conducted with government officials who confirmed this disturbing situation. Participant GE 6, an EMA official (Personal Communication, 17 August 2020) noted that, "...the growing devastation of sand poaching, illegal quarrying and brick moulding in and around Harare Province has now resulted in a total of 228 hectares of land being degraded, with 310 open pits being dug".

Local community leadership also confirmed that illegal sand mining is causing widespread land degradation that might result in shortage of space for future land use. Participant LC 1, a resident and community leader of Epworth (Personal Communication, 12 August 2020) noted,

"We are really worried about the way land is being abused here in Epworth. Groups and groups of youths spend day and night digging and extracting sand everywhere despite our efforts to stop them. If we walk around, you will find that everywhere there are gullies, there is much soil erosion, and few swampy areas we had over the years are now slowly disappearing. At the same, gravel mining is leaving few spaces available for other land uses. I wonder if we will be able to find spaces for cemetery with such rate of illegal sand mining. It's really worrisome!"

The above findings indicate that there is serious environmental degradation caused by illegal sand mining in Epworth. The indiscriminate activities are causing alteration of ecosystems through gullying, progressive siltation, and destruction of hydrological systems. This is in line with literature reporting various adverse environmental impacts such as land degradation, alteration of geomorphological systems, deforestation and pollution because of illegal sand mining (Bosco & Sumani, 2019). In Africa, illegal sand mining is widespread and rapidly becoming an ecological problem (Lawal 2011, Chevallier 2014, Adedeji, Adebayo & Sotayo, 2014). This suggests that illegal sand mining has become a common environmental problem and concern for most countries. Conflicts is a consequence of these environmental

ramifications of illegal sand mining. The following section presents findings on the link between environmental degradation and socio-environmental conflicts in Epworth.

Environmental degradation and conflicts

Study results indicated that environmental degradation caused by illegal sand mining has culminated in various socio-environmental stakeholder conflicts. Environmental destruction, for example, has created a tense landscape between the government authorities and illegal sand miners. The EMA and local authorities require approved extraction of sand, yet illegal sand miners neither want to register themselves nor desist from illegal acts. As such, there exists a cat and rat relationship between the two stakeholders as authorities enforce laws against illegal sand mining. Participant GL 3, an ELB official (Personal Communication, 28/08/2020) noted that,

“...illegal sand miners are very stubborn. They have since devised their own strategies to avoid us during the day. Because of that, we have embarked on both day and night raids on hotspots in order to catch them on-site. We actually engage the police who have the authority to hunt them with their dogs. We also intend to be conducting more of such operations. We are really saddened by the resilience and defiance exercised by illegal sand miners, and so we shall forcibly implement every hardest controls possible to combat the problem”.

Clearly, concern over environmental sustainability is a key source of conflict in Epworth. At the same time, local community members castigate government’s efforts towards illegal sand mining, and view the government as clueless. Participant CR 13, a resident of Epworth (Personal Communication, 5 August 2020) noted that,

“...in this country, everyone has freelance of activity. The government is weak. We are same with a society that has no law. EMA rarely comes here, local authorities are just quiet, and you wonder if we have law and law enforcers. Obvious our environment cannot survive. Everyday, new gullies are created, shrubs are cleared off and many more. I am really disappointed by the government for failing to play its part”.

The above narratives confirm that environmental disturbances caused by illegal sand mining do raise various forms of socio-environmental conflicts. There are conflicts over governance, environmental sustainability and resource utilisation among local community, government and illegal sand miners. Community views government as a weak entity in addressing socio-

environmental conflicts within their community. This is despite the same government adopting various pieces of legislations such as the Constitution (Chirisa & Muzenda, 2013; Chigudu & Chirisa, 2020); Mines and Minerals Act (Dhliwayo, 2016); Environmental Management Act (Muringaniza *et al.*, 2022) and Local Authorities' by-laws (Muchadenyika & Williams, 2016) to protect the environment from such unsustainable natural resource practices. However, most studies attest that environmental disturbances by illegal sand mining is not only a local community concern but a governmental, private sector and civil society concern suggesting that all these stakeholders are inherent elements of conflicts (Pereira, 2012; Singh et al., 2014, Mark, 2021). Therefore, there is a close connection between illegal sand mining, environmental degradation and conflicts.

5.3.3.2 Social impacts and conflicts

The two main social impacts that emerged from Epworth include destruction of traditional and heritage sites and the increase in criminal acts due to illegal sand miners. These issues emerged from interviews conducted with government officials and local community.

Destruction of traditional and heritage sites

It emerged that illegal sand mining causes destruction of traditional and heritage sites in Epworth, including cemeteries, community rendezvous points and church sites. The majority of participants from local communities particularly highlighted that the miners are ethically careless and do not hesitate to mine any area with sand and gravel endowments. Local authority expressed concern over such acts, as participant GL 3, an ELB official (Personal Communication, 28 August 2020) noted that,

“We are very worried about the rate at which illegal sand mining is occurring in Harare. These illegal sand miners dig everywhere including the cemeteries. We have seen this in areas such as Epworth and Hopley”. They are not even afraid to dig sand at the cemeteries”.

Even local community noted that illegal sand miners exhume several graveyards for sand in various areas in Harare. Results indicated that despite being a taboo, illegal sand miners continue to exercise such unethical acts without hesitation. Participant CR 13, a resident of Epworth (Personal Communication, 5 August 2020) had this to say,

“Graves are being exhumed extracting sand in areas such as Zengeza, Kuwadzana and Waterfalls. It’s also happening here in Epworth. People are starved, they don’t mind as long as they find sand there”.

The above views concur with findings from civil society organisations where illegal sand mining emerged as an activity that violates traditional laws and ethical conduct in Zimbabwe. There was concern over the rate of graveyard destruction by illegal sand mining in the recent past. Participant CS 1, a ZDA official (Personal Communication, 21 August 2020) noted that,

“Last year alone, more than 30 graves have been destroyed by the illegal sand miners as they search for sand at Zinyengere graveyard. Illegal sand miners throw some remains into nearby dam that provides water for domestic use to the local community”.

Local community members similarly pointed at the rapid graveyard destruction by illegal sand mining in Epworth. Participant CR 13, a resident of Epworth (Personal Communication, 5 August 2020) expressed that, “...we have an area called KwaRueben where you can see a beehive of mining and transport of sand from a cemetery. Heaps and heaps of sand were seen near the cemetery”.

The researcher also observed large patches of mined land within a cemetery in Epworth. Figure 5.9 clearly shows that illegal sand mining is indeed a socio-environmental issue that has damaged both the environment and heritage sites.



Figure 5.9: Illegal sand mining at a cemetery in Epworth

Source: Researcher, (2023).

A literature search indicates that most mining activities have ethical implications on local communities, especially foreign mining investments (Stacey et al., 2010). However, this was mainly due to ignorance and racial traditional orientations (Ibid). In the present study, illegal sand miners were non-observant of the traditional values of cemetery and other reserved spaces. Previous studies also confirmed that illegal miners often violate human rights, traditional values and principles as well as sustainable development (Atejiroye & Odeyemi, 2018; Arwa, 2013; Amankwah & Anim-Sackey, 2003). This suggests that illegal sand mining is associated with many unethical practices. This results in conflicts with community and various other stakeholders who live within the confines of local traditional values, principles and acts.

Increase in criminal behaviour

It also emerged that illegal sand mining has resulted in an increase in criminal acts and human rights violations. Environmental degradation and criminal behaviour of illegal sand miners emerged as key issues that threaten safety and social security among the local communities.

Participant CR 11, a local resident of Epworth (Personal Communication, 7 August 2020) expressed that,

“We are living in fear now. Our kids fall into these deep pits when they play outside backyards. Some pits are even more than 3 meters deep. We are worried, and worse they can victimize anyone. Illegal sand miners are ferocious. We really need rescue from such living environment my brother”.

Another participant CR 13, a resident of Epworth (Personal Communication, 5 August 2020) similarly noted that, “...there are too many thieves here. Obviously, it is these sand poachers. One thief was caught last year, and we knew him as an illegal sand miner”.

These sentiments clearly show that illegal sand mining resulted in the proliferation of unethical and criminal behaviours in sandy areas. Families lived in fear of the ferocious illegal sand miners who are capable of conducting any criminal acts to protect their activities and supplement their incomes. Studies indicate that illegal mining is associated with a high crime rate, misconduct, non-compliance, and violence (Lucrezi et al., 2009; Singh et al., 2015; Adedeji, 2014). Nguru (2017) noted that the poor regulation of illegal sand mining worsens criminality in resource-endowed areas.

Human rights violations

The study also noted that illegal sand mining cause numerous human violations on communities. These include the right to education, security and safety and fair labour practice.

Right to education

Results indicate that young boys and girls are engaged in various activities such as sand extraction, transport or selling for themselves and on behalf of landowners but are poorly remunerated. School-going children are engaged in illegal sand mining even during school days suggesting absenteeism and school dropout. Participant CR 12, a resident of Epworth (Personal Communication, 7 August 2020) narrated that,

“I am 18 years old and supposed to be doing form 6 but I could not continue because my parents couldn't afford the fees, so I am here because at least I get some money to buy what I want. It's better to work and get money than spending more time in school when I can't attend more often because of fees issue”.

The above view indicates that even school going children have turned to illegal sand mining violating their right to education. Another participant CR 12, a resident of Epworth (Personal Communication, 7 August 2020) also highlighted that, “I come here during the weekends and holidays for some part time work here. We sell various staff at the mining sites such as bananas, buns and dried nuts. I only study during the night, and when I am not tired”.

The above comments indicate that illegal sand mining violates children’s right to education. Children view self-employment as a better option than education. Most youthful and school-going participants viewed the education system in Zimbabwe as a failure given that very few people will be absorbed in the job market. These findings concur with previous studies that show that illegal mining employs almost all age groups and both genders although males are more dominant (Ghosh, 2012; Madyise, 2013; Mahadevan, 2019). This is indeed a disturbing trend given that most education systems, particularly in Africa absorb children upto 20 years of age in secondary schools, which (UNESCO, 2020). Clearly, illegal sand mining has serious implications on education.

Health and safety issues

The study also noted serious health and safety violations due to illegal sand mining. Observed issues include lack of personal protective equipment (PPE), consumption of contaminated water, and poor waste disposal practices. Illegal sand miners extracted sand without safety clothes such as overalls, gumboots and facemasks suggesting a high risk to dust hazards and injuries. Rudimentary methods of mining such as the use of hammer tools to blast rocks and picks to dig sand emerged as some of the safety threats. Participant IL 11, an illegal sand miner from Epworth (Personal Communication, 11 August 2020) noted that, “This is the way we work and it’s not an issue. We are used to it. Of course, here and there we record some injuries but that should not stop our mining as such”.

Sadly, most illegal sand miners viewed protective clothing as a minor issue that cannot detract from their sand business. This suggests negligence and ignorance as to the hazards and dangers of mining without appropriate PPE. Participant IL 8, a resident and senior illegal sand miner from Epworth (Personal Communication, 11 August 2020) expressed that, “Haa that is minor issue. Our focus is on money; we have substantial experience doing this without witnessing anyone who was injured or died. Probably, those pits could be worrisome for children”.

The local community confirmed unsafe acts and conditions practised by illegal sand miners in Epworth. Furthermore, most participants acknowledged that they had witnessed some occupational accidents caused by negligence of the illegal sand miners. Participant CR 12, a resident of Epworth (Personal Communication, 7 August 2020) noted that,

“PPE is never their priority. It is rare to see them putting on protective clothes. We have witnessed several injuries though minor for our children engage in illegal sand mining. Injured by equipment and in some cases injured due to violent confrontations. Last year, we even heard of a child that drowned in the open pits left by these sand miners”.

It is evident from the above responses that there is serious negligence and ignorance over safety and health by illegal sand miners despite the inherent hazards within their operations. There is no prioritisation of safety, thus violating the right to health and safety. Reports show that the rudimentary methods of sand mining expose illegal sand miners to risk of infection and injuries among other occupational hazards (Masalu, 2010). Furthermore, illegal sand mining is associated with both surface and underground water pollution (Chevallier, 2014; Adedeji, 2014) that subsequently affect public health (Quinn et al., 2018).

Study results indicated that conflicts mainly emanate from safety and health issues. Local community members, particularly the local residents, and illegal sand miners themselves emerged the most vulnerable part of society. Most residents use water from the small streams and wells for domestic uses, as such, they view illegal sand miners as a threat to their health. Most participants indicated that they have confronted illegal sand miners in an attempt to stop them from contaminating water sources used by the residents. However, because illegal sand miners often use water during sand processing, they have defied any restrictive actions by the residents resulting in conflicts. Participant CR 11, a resident of Epworth (Personal Communication, 7 August 2020) noted that, “Last year there are two boys who were beaten up after found contaminating water during sand processing. The water is used by community for domestic purposes”.

This sentiment shows that there was indeed a conflict between residents and illegal sand miners. Similar findings emerge from other local residents who were interviewed and who noted that the illegal sand miners need a careful approach in dealing with them over public health issues. Results indicated that the poor waste disposal systems at illegal sand mining sites is a safety, health and environmental threat. Efforts to confront illegal sand miners over these

public health issues is often associated with conflicts. Participant CR 13, a resident of Epworth (Personal Communication, 5 August 2020) confirmed that,

“...as local community we try to confront illegal sand miners when their activities endanger our safety and health. It is not an easy task though. If you are not careful, they can attack you whether you are right or not. We really need the help of central government and all authorities to intervene before the situation gets worse”.

It is evident from these narratives that illegal sand mining is not only a safety and health threat to illegal sand miners only but to the general public, hence a source of socio-environmental conflict. Similarly, Perira (2012) noted that vibration caused by mining and blasting processes is a safety and health concern for local communities. Previous research showed that India recorded approximately 30 illegal mining related fatal accidents annually (Bagchi, 2010; Shaji & Anilkumar, 2014). Despite drawing the attention of various authorities, local community and other stakeholders, there remains governance problems, and particularly law defiance by illegal sand miners (Alfvin, 2009; Padmalal et al., 2008; Bagchi, 2010). Indeed, similar findings from this study confirm that illegal sand mining is mainly associated with brutality, violence, law defiance and human rights. Furthermore, illegal sand mining has safety and health implication that often trigger conflicts among the various stakeholders.

5.3.3.3 Economic impacts and conflicts

Destruction of land set for other commercial land uses

In Epworth, results showed that there is rampant land destruction due to illegal sand mining. Unfortunately, some illegal sand mining activities are done in privately owned spaces including land set by the local authorities for other economic land uses. Illegal sand miners destroy reserved spaces for commercial and public activities such as schools, parks and shops. The local authorities expressed concern over the economic costs caused by illegal sand mining on reserved spaces. It emerged that local authorities incur extra expenses for land reclamation as illegal sand miners mine and leave open patches of land. Participant CS 1, an ELB official (Personal Communication, 21 August 2020) noted that,

“These deep pits created are left just like that when the boys exhaust the rich sand. Unfortunately, because we had already set aside such places or spaces for some land uses such as for establishment of shopping centre, it means the institution should rehabilitate the space first., This demands a lot of money which probably have never been part of our long-term

budgets of plans. Surely yeah, we have an economic cost. However, we intend to set aside designated spaces for sand mining and encourage them to register at a flexible fee so that they do not mine everywhere. Hope this will work to our expectations”.

The above sentiments concur with views from the civil society who pointed at restricted economic and social development due to illegal sand mining. Participant NG 5, a ZDA official (Personal Communication, 10 August 2020) noted that,

“We are making stringent efforts to promote development in Epworth but illegal sand mining is so discouraging. Despite our good partnership with local authorities and the government to implement these developments in Epworth, illegal sand miners themselves seem to work against that agenda as they are just destructive. Illegal sand miners destroy fences, foundations, pegged stands and other community facilities just to extract sand for personal use”.

The foregoing comments clearly show that illegal sand mining has not only become a socio-environmental cost but an economic cost. Responsible authorities incur additional expenditure from efforts to protect and rehabilitate degraded land due to illegal sand mining. This presents a conflict between illegal sand miners, local authorities and the civil society. Illegal sand mining emerged an economic liability and deterrent to local development. Rochayati and Herianto (2020) asserted that illegal sand mining interferes with community and government activities such as agriculture and residence, respectively. Most academic studies also show that illegal sand mining activities often encroach private mining spaces (Msalu, 2002; Dean & Dolan, 2004; Adu-Gyamfi, 2016; Elavenil et al., 2017). This evidence suggests that illegal sand mining negatively interferes with other economic and social activities resulting in conflict with various stakeholders such as the government, civil society and local community. Table 5.5 below gives a summary on the impacts of illegal sand mining and subsequent conflicts.

Table 5.5. Summary on illegal sand mining impacts and associated conflicts

	<i>Case Sites</i>		
	<i>Retreat Farm</i>	<i>Zengeza East</i>	<i>Epworth</i>
1.Environmental issues	- rudimentary methods used leave open pits, degrade the environment - water pollution	- land pollution - loss of biodiversity	-land degradation
Associated conflicts	- environmental authorities concern over environmental degradation (EMA, local authorities: HCC) - Community's concern over their health and safety from open pits and pollution.	- conflict between local authorities: ELB, EMA and illegal sand miners over environmental degradation - community's concern over poor governance by authorities (ELB and EMA)	- conflict between local authorities (ELB) and CSO (ZDA) and illegal sand miners over environmental degradation
2. Social issues	- displacement of communities - Increase in criminal behaviours (prostitution, robbery cases, violence) - Loss of lives: children trapped by open pits	- displacement of communities - Increase in criminal behaviours (prostitution, robbery cases, violence) - Loss of lives	-destruction of traditional and heritage sites (graveyards and open church sites) - Increase in criminal behaviours - Human rights violations
Associated conflicts	- land use conflict: residential vs. sand mining between residents and illegal sand miners - conflict among illegal sand miners over access to sand endowed sites	- land use conflict: residential vs. sand mining (residents vs. illegal sand miners) - land use conflict (local authorities vs. illegal sand miners): council land exploited without permit	- land use conflict (church vs. illegal sand miners), local authorities (Chitungwiza municipality) vs. illegal sand miners - law enforcement vs. criminality (police vs. illegal sand mining induced criminals)
3. Economic issues	- loss of sand market on the formal sector/ registered miners	- interference with other formal commercial sectors (mining, transport etc)	- destruction of land set for other commercial land uses
Associated conflicts	- conflict over market (industry vs. illegal sand miners)	- conflict of business (formal vs. informal sector)	- conflict over land use (local authorities vs. illegal sand miners)

Figure 5.10 presents a summary of findings on the nexus between illegal sand mining impacts and various forms of conflicts



Figure 5.10: Summary of nexus between impacts of illegal sand mining and conflicts. Source: Researcher, (2023).

The depiction above clearly shows that illegal sand mining is associated with various social, economic and environmental impacts. Environmental impacts include land degradation, environmental pollution. Social impacts include displacement of communities, an increase in the rate of criminal behaviours and loss of lives. Economic impacts include loss of sand market by the formal sector. These conflicts have resulted in conflicts among the different stakeholders including the community, government and industry. The next chapter presents findings on the roles played by stakeholders (government, civil society, local community and industry) in

addressing illegal sand mining. A special focus is made to how and to what extent do these stakeholders collaborate in mitigating illegal sand mining in Zimbabwe.

5.4 Stakeholder collaborations in addressing illegal sand mining

Findings indicate that various stakeholders including the government, non-profit organisations, industry and local community play important roles in mitigating illegal sand mining. Although collaboration is weak, activities undertaken include environmental education and awareness, enforcement, environmental protection and restoration, ecosystem management and restoration and reporting of malpractices. This section critical analyses these roles including answering the key question; how adequate is the stakeholder collaboration in addressing illegal sand mining problem in Zimbabwe?

5.4.1 Roles of various stakeholders addressing illegal sand mining

The study noted the various stakeholders involved in the management of sand mining including the regulation of illegal sand mining in Zimbabwe. These include Environmental Management Agency (EMA), the local authorities and in this case Harare City Council, Epworth Local Board and Chitungwiza municipality, the Zimbabwe Republic Police (ZRP), the industry, non-governmental organisations (NGOs), Civil Society Organisation (CSOs) and community. This concurs with the Stakeholder theory that emphasizes the importance of collaboration between stakeholders in attaining social sustainability (Tiffen et al., 1994; Barnett 2007; Hagmann 2005). Indeed, each stakeholder has a role to play in addressing illegal sand mining and the socio-environmental issues. This section discusses the general functions played by various stakeholders in addressing illegal sand mining in all three case studies in Harare Metropolitan Province as shown by Table 5.6 below.

Table 5.6: Stakeholder participation in addressing illegal sand mining

Case Site	Active Stakeholders	Roles
Retreat Farm	1. Government institutions EMA	<ul style="list-style-type: none"> - stakeholder engagement exercises - education and awareness - blitz monitoring operations - law enforcement - penalize offenders
	ZRP	<ul style="list-style-type: none"> - law enforcement - participating in blitz operations
	Local authorities (HCC)	<ul style="list-style-type: none"> - participates in blitz exercises - land use governance
	Media (ZBC)	<ul style="list-style-type: none"> - documentaries and broadcasting
	2. Community	<ul style="list-style-type: none"> - residents reporting malpractices
	3. Industry (EyeCourt & Derbyshire Quarry)	<ul style="list-style-type: none"> - reporting malpractices - compliance to sand mining regulations - restriction of sand mining through alternative land use
Zengeza east	1. Government institutions EMA	<ul style="list-style-type: none"> - on-site regulation of illegal sand mining - organising blitz exercises - law enforcement
	Local authorities (Chitungwiza Municipality)	<ul style="list-style-type: none"> - land use governance
Epworth	1. Government institutions (ELB) Local authorities	<ul style="list-style-type: none"> - land use governance - participates in blitz exercises
	EMA	<ul style="list-style-type: none"> - stakeholder engagement exercises - education and awareness - blitz monitoring operations - law enforcement
	Police (ZRP)	<ul style="list-style-type: none"> - law enforcement
	Media (ZBC)	<ul style="list-style-type: none"> - documentaries and broadcasting
	2. CSO (ZDA)	<ul style="list-style-type: none"> - participates in education and awareness

5.4.2 Stakeholder collaboration in addressing illegal sand mining

5.4.2.1 Collaboration among government institutions

Participation in decision-making

Results indicated that there is notable engagement in decision-making regarding environmental programs between government institutions such as the EMA, local authorities and ZRP. These institutions participate in the formulation of policies and programs for addressing the impacts of illegal sand mining. Most government officials confirm the existing stakeholder engagement in program and policy formulations. Participant GE 5, an EMA official (Personal Communication, 18 August 2020) noted that,

“We normally work other government institutions and departments such as the office of the District Administrator (D.A) in addressing illegal sand mining. They participate in consultative programs as part of program formulation. Right now, we plan to review our Act, they will part of it”.

There was confirmation from another government official from EMA, participant GE 1 (Personal Communication, 14 August 2020) who noted that,

“...depending on the nature of program or thematic focus, we often work with the police, DA’s office and the council in planning activities for environmental management. However, for illegal sand mining in particular, so far, we have not had any specific consultative programs. We also hope work hand in hand with other government institutions such as Civil Protection Unit (CPU) in designing the programs”.

Another participant GL 2, an HCC official (Personal Communication, 28 August 2020) supported these earlier views, “We normally work with EMA and ZRP in patrols as part of efforts to curb illegal sand mining. We plan these exercises together and design schedules for our officers to raid illegal sand mining sites”.

Similarly, results from the local community also indicated that the EMA mainly works with the ZRP in conducting illegal mining sites monitoring. Participant CL 1, a resident and community leader of Retreat Farm (Personal Communication, 3 August 2020) highlighted that, “ZRP and EMA sometimes visit our area targeting illegal sand mining sites. They raid all those places. Last week, police apprehended three men for digging sand illegally here”.

Despite evidence of infrequent visits, most participants noted that police sometimes raid and apprehend illegal sand miners in Retreat Farm. Participant CR 1, a resident of Retreat Farm (Personal Communication, 3 August 2020) expressed that, “Police sometimes visit this Retreat area. In January last year, they were here and caught some illegal sand miners. Sometimes the police come together with EMA officers, and once apprehended EMA issues tickets”.

These comments confirm that indeed there is some collaboration between some government institutions in addressing illegal sand mining through blitz operations and these have significantly reduced the rate of illegal sand mining in most parts of Harare Municipal Province. Findings from government departments further indicate that a significant number of fines were issued to illegal sand miners in the previous year through blitz exercises. Participant GE 3, an EMA official (Personal Communication, 14 August 2020) noted that,

“We have offered more than 200 tickets to illegal sand miners last year alone in Harare through our site operations and blitz operations. ZRP has been so supportive. We conducted successful engagements together. Without police, it may be even dangerous for our officers to face the offenders on their own”.

These positive findings also emerged from other government officials. Participant GE 1, EMA official (Telephone Interview, 14 August 2020) also highlighted that, “In our latest blitz with local authorities and ZRP, we managed to fine 12 offenders within three (3) days accounting for close to \$430 000”.

These comments suggest a positive collaboration between government departments in addressing illegal sand mining. This is in line with the stakeholder theory that calls for such positive engagements towards achieving social sustainability. According to Freeman et al. (2010), the stakeholder theory suggests that analysing the relationship between any business and its stakeholders presents a better chance of addressing common problems. According to Chazal (2010), the stakeholder theory calls for the mobilisation of various stakeholders in order to establish a socially sustainable organisation. Previous studies show that most governments adopt stakeholder collaborations such as combined blitz operations to address environmental problems such as illegal sand mining (Abraham et al., 2021; Leal Filho et al., 2021; Liu et al., 2021). Indeed, with such collaborations, this significantly reduced the rate of illegal sand mining and the socio-environmental conflicts in the country.

Education and awareness

The study further noted some positive stakeholder engagements among government departments in addressing illegal sand mining. It emerged that the EMA collaborates with the ZRP and the media in conducting education and awareness campaigns on environmental issues including illegal sand mining. The EMA takes advantage of regular roadblocks conducted by ZRP to create awareness of such issues to the public. The agency also educates the public on sustainable sand mining and other environmental matters through media institutions that include Zimpapers and the Zimbabwe Broadcasting Services (ZBC) in educating the public and in raising awareness on topical environmental issues such as illegal sand mining. Participant GE 4, an EMA official (Personal Communication, 18 August 2020) noted that,

“We engage various stakeholders to combat illegal sand mining in Zimbabwe. We work with ZRP and local authorities in regulating environmental unfriendly activities in areas of jurisdiction for example we conduct blitz operations on mining sites with ZRP officials. So, yes we indeed work together on various key result areas”.

Similar sentiments emerged from other participants as study participant GE 2, an EMA official (Personal Communication, 14 August 2020) highlighted that “We are also engaging ZBC through radio and television, and Zimpapers in disseminating messages of warning to illegal sand miners and deliver virtual education and awareness messages”.

These comments clearly show that the EMA engages the media to publicize and raise awareness of sustainable environmental management through national television and newspapers while police offer security during some live activities such as road shows and by providing roadblocks. This suggests that education and awareness is important in addressing socio-environmental issues. Gosh (2012) noted that the lack of such programs result in activities that are not environmentally friendly. Limited knowledge on the environmental issues hinder effective management of illegal sand mining (Green, 2012; Chevallier, 2014). This suggests that stakeholder collaboration, as noted by the stakeholder theory, in education and awareness is key to achieving sustainable sand mining and implementing reflexive governance.

Law enforcement

The study also observed that government institutions such as the EMA and local authorities also collaborate in enforcing environmental management law on illegal sand miners. The two government institutions conduct spontaneous blitz operations on illegal sand mining hotspots.

The EMA also works with all local authorities and ensures that they address environmental issues in their particular areas of jurisdictions. This emerged in interviews held with government officials. Study participant GE 1, an EMA official noted that, "...the Agency works with local authorities to include issues of sand mining in their master plans. EMA engages local authorities to designate sites for sand mining in order to control indiscriminate sand mining activities here".

Similarly, study participant GE 4, an EMA official (Personal Communication, 18 August 2020) affirmed that, "We also conduct multi stakeholder law enforcement blitz to curb sand mining as well as education and awareness campaigns to both community and the sand miners. We normally work with ZRP and Council officers in conducting the exercises."

The above evidence indicates that there exists some positive engagement among government departments in education, awareness and law enforcement in Zimbabwe. Indeed, these key result areas can significantly combat illegal sand mining and the socio-environmental conflicts. Limited stakeholder engagement perpetrates conflict, non-compliance and environmental degradation in the mining sector (Andrews et al., 2017; Singh et al., 2014). As such, some governments have implemented stakeholder engagement programs that promote sustainable mining, for instance blitz inspections and awareness (Arwa, 2013). Undoubtedly, stakeholder collaboration is key to sustainable sand mining in Zimbabwe.

Mitigating impacts on the effects of illegal sand mining

The study noted very limited stakeholder engagements in mitigating the impacts of illegal sand mining. There are no integrated efforts, rather, individual institutions set their own programs for land reclamation, and the local authorities bear the responsibility. Study participant GL 2, an HCC official (Personal Communication, 25 August 2020) noted that, "...you see some of these areas being mined as set aside for other land uses. So, we as local authorities normally rehabilitate them first in order to pursue with our land use plans such as residential. We do this in our institutional capacity".

This response exposes the inadequacy of key stakeholder engagements that could more effectively address illegal sand mining issues.

However, results indicated that local authorities get the support of the government in order to execute those responsibilities. The central government support institutional programs through

resource supply and funding. Study participant GL 1, an HCC official (Personal Communication, 28 August 2020) highlighted that,

“The government assists us financially. Some of our programs depends on resource support from the ministry. As you may be aware, ministries also get some funding from the central government. We partly rely on such funds as individual institutions of the government. However, to say we have a specifically allocated funding for sand mining is a misrepresentation of truth. We simply receive funds based on availability from the government, and at times when need arise”.

Although the above findings show some form of engagement, there exists inadequate engagement towards reclamation and environmental restoration programs. Yet, much of emerging conflicts revolve around impacts of sand mining (*see section 5.2*). The Stakeholder theory challenges this phenomenon where stakeholders work in isolation. In fact, the theory views stakeholders such as business, community, government and individuals as assets for driving socio-environmental performance (Clement, 2005; Garvare & Johansson, 2010). Integrated efforts are key to curbing illegal mining and associated socio-environmental issues (Abraham et al., 2021; Leal Filho et al., 2021; Liu et al., 2022). Indeed, there is need for improved stakeholder collaboration in combating illegal sand mining in Zimbabwe.

5.4.2.2 Collaboration of government institutions with the community

Participation in decision-making

This study established that there is no adequate community participation in decision-making processes involving illegal sand matters. Environmental authorities continue to marginalize local communities who experience the worsts impact of illegal sand mining. These issues explain the persistent conflicts in Harare Metropolitan Province as communities feel rejected and ill represented in matters that affect their day-to-day lives. Evidence from this study suggests that the few collaborations that local authorities conduct often exclude grassroots communities. Study participant GE 5, an EMA official (Telephone Interview, 18 August 2020) noted that,

“In terms of illegal sand mining, so far, we have worked with police and office of the DA. We have not worked with any community except just raising awareness to the public. We work with local authorities on several programs, but we have not implemented sand mining program together yet. The feedback from local authorities is not positive”.

The lack of community involvement as highlighted above suggests that perceived solutions are non-inclusive and not comprehensive. With communities faced with a myriad of socio-economic and environmental problems caused by illegal sand miners, not engaging them in building sustainable strategies emerged as an instrument of conflict. The community also confirmed such engagement gaps regarding decision-making processes in addressing illegal sand mining. Similar to the above view, the local community noted that they are not fully engaged in decision-making processes. Study participant CR 1, a resident of Retreat Farm (Personal Communication, 12 August 2020) cited that, "...we only know that EMA and Council officers come here chasing the illegal sand miners. I do not remember any program when these authorities engage our communities or conducting any public consultations".

The findings above expose the inadequacy of local community participation in decision process on sand mining issues. The consultation of grassroots communities is fundamental in understanding key issues affecting them and in formulating appropriate measures in line with reflexive governance. As noted by Leonard and Lidskog (2021), reflexive governance framework calls for adoption of appropriate institutional and legislative measures to address existing problems. However, Ingwe et al. (2017) noted that the lack of technical knowledge, resources and non-conformity by local communities hinder effective collaboration. Thus, it is key to involve community members in program planning, implementation and evaluation and this may be facilitated by publishing the results of the present study and reporting these to communities affected by illegal sand mining.

Education and awareness

The study noted some positive government-community engagement aimed at combating illegal sand mining and the socio-environmental conflicts. It emerged that the government engages the community in education and awareness campaigns using various forms of media and methodologies. However, the engagement only takes place between the EMA and communities. The study noted the practical absence of collaborative programs with other key government institutions such as the Ministry of Mines, local authorities, and the police. Most local residents indicated that they do work with the EMA in education and awareness. Study participant CR 4, a resident of Retreat Farm (Personal Communication, 3 August 2020) noted that, "...only EMA is the one that usually engages us in education and awareness. I remember before COVID-19, they used to talk about sand mining issues on the television".

This view highlights the positive government-community engagements on education and awareness on illegal sand mining. However, it is clear that other government institutions are silent on community engagement. Furthermore, results indicated that even the EMA does not often conduct such community engagement programs. Study participant CR 6, a resident of Retreat Farm (Personal Communication, 5 August 2020) highlighted that,

“Yeah, EMA sometimes do awareness campaigns for communities. I can’t remember the last time they conducted road shows in Waterfalls but yeah, they do. However, they will be talking about various issues, and illegal sand mining is just one of the areas. I remember, at some point they were doing fire awareness campaigns. However, the truth is it is long back”.

While these findings show some positive engagement with community, clearly, they are not adequate and involve very few government departments. In Senegal, government collaborated with local community in establishing surveillance systems for monitoring illegal sand mining activities (Toupane et al., 2021). However, studies confirm that local community may be generally marginalized in socio-environmental programs (Takeuchi & Aginam, 2011; Akinyemi et al., 2019; Juju et al., 2020). In Africa, local community engagement is low due to limited resources and ignorance (Juju et al., 2020). This confirms findings of this study that noted inadequacy of local community collaboration in education and awareness, thus illegal sand mining and socio-environmental conflicts remain pending issues in Zimbabwe.

Law enforcement

Results indicated that government-community engagement in law enforcement involves an informal process of reporting non-compliances and unsafe acts to the ZRP. However, this engagement is crucial in triggering authorities to take due actions against illegal sand miners. It emerged that the community members supply information to EMA on various socio-environmental destruction by illegal sand miners. The community, in most cases the victims of illegal sand mining, reporting such matters to the police or EMA. It emerged that local community kept authorities informed of illegal sand mining issues affecting them. Study participant CR 1, a resident of Retreat Farm (Personal Communication, 6 August 2020) highlighted that,

“...my homestead was dug by these illegal sand miners sometimes last year. This affected other residents as well. There was an outcry, and local residents submitted several reports to EMA and the police. With time, we saw officers from EMA and ZRP visiting these areas more often”.

This sentiment suggests that the local community is instrumental in information dissemination to authorities who, in turn, utilise that information to implement appropriate measures against offenders. Most participants reiterated that authorities do accept anonymous reports on illegal sand mining practices. Study participant CR 7, a resident of Zengeza (Personal Communication, 5 August 2020) noted that,

“We work with EMA more often. We give them information on illegal sand mining operations in Retreat. However, we do so anonymously because once they know you reported them to EMA officers or the police, you may be in trouble with the dreadful miners. I remember a case when illegal sand miners threatened one family for reporting them to police about 2 years ago”.

The government also confirmed the existence of positive collaboration with communities in their law enforcement work. Study participant GE 1, an EMA official (Personal Communication, 14 August 2020) noted that,

“Yes, the community is important to us. We work with them as grassroot and custodians of their own environments. As such, we often get some useful information pertaining to illegal sand mining and we harness it to improve our interventions”.

The above sentiments also emerged from Epworth where results indicated that reporting cases was a trend within the three case sites. Study participant CL 2, a resident and community leader of Epworth (Personal Communication, 5 August 2020) highlighted that,

“These illegal sand miners dig everywhere, and they won’t listen if you advise them to stop. They rather tell you that you are equally an illegal resident. So, when we have issues with them, we report to police. I have received several reports from my community of conflicts with illegal sand miners. Some even dig sand within people’s backyards. So I often cascade the reports to the responsible authorities who in turn take appropriate actions”.

The above sentiments from local leadership pinpoints engagement with police against illegal sand miners. Study participant CR 9, a resident of Zengeza (Personal Communication, 5 August 2020) noted that, “Last year I reported a case when one illegal sand miner invaded my backyard. The police came and warned the person and since then he never came back”.

This suggests that reporting cases was the main form of informal engagement that exist between local communities and government in law enforcement. The police conduct their

investigations and apprehend illegal sand miners using information supplied by the community. Lund-Thomsen (2005) noted that communities are key stakeholders in curbing illegal sand mining through reporting malpractices and environmental restoration. Bradshaw and McElroy (2014) also noted that the local community are the custodians of their own social and physical environments and provide first-hand experiences and information on environmental offenses. Despite the government-community engagement being more informal, studies show that authorities utilise baseline information from local communities to intensify their on-site monitoring operations (Asori et al., 2022; Arwa, 2013). Clearly, there exists some positive government-community engagement towards law enforcement in Harare Metropolitan Province.

Mitigating socio-environmental impacts of illegal sand mining

The study noted that the local community play an important role in addressing the impacts of illegal sand mining. The local community reclaims degraded spaces in their areas to prevent further degradation and loss of their productive land. Thus, this is an important supplement of government responsibility on environmental protection and management. Study participant CR 12, a resident of Epworth (Personal Communication, 7 August 2020) noted that,

“These illegal sand miners dig everywhere, and they won’t listen if you advise them to stop. They rather tell you that you are equally an illegal resident. At the end of the day, we tend to fill in the pits on our own to protect our own children. Last month, I reclaimed five pits created by these boys after several warnings without listening to me”.

Local residents from Retreat Farm similarly explained that they do land reclamation as illegal sand miners leave deep open pits within their vicinities. Study participant CR 5, a resident of Retreat Farm (Personal Communication, 3 August 2020) also confirmed that, “...the challenge is that if you attempt to confront them on your own, they can attack you, so I usually close these pits around my homestead on my own. That way, I avoid conflict with them”.

This indicate that local community members supplement government roles on land reclamation. State institutions are often responsible for law enforcement that work with local community, civil society and NGOs to execute this mandate (Jänicke & Jacob, 2006). Zelli and Van Asselt (2013), however, noted that collaborations with community is weak due to limited institutional integrity, support and formal structures towards illegal mining regulations. This suggests that a local community attributes illegal sand mining to weak governance systems,

thus conflicts arise when a community is affected by illegal sand mining in a state with weak laws and law enforcers.

5.4.2.3 Collaboration of government institutions with industry

Participation in decision-making

Results indicated that there was little government-industry collaboration in addressing illegal sand mining issues. Despite government authorities routinely visiting mining premises, the study noted that the industry is not very involved in decision-making regarding illegal sand mining issues. This is despite the industry attempting to find assistance from responsible authorities on illegal sand mining issues affecting their operations. Study participant IN 3, an Eyecourt Quarry official (Personal Communication, 28 August 2020) noted that,

“...when they (local authorities) come here, they visit our premises asking a few questions about our experiences with illegal sand miners but as for planning and consultations through workshops, I can’t remember the last time we were consulted. It’s a couple of years ago”.

This comment highlights the inadequacy of consulting industry, particularly mining companies, affected by illegal sand mining. There is marginalization of industry in the decision-making process. This also emerged in other interviews held with other key participants from the industry. Study participant IN 1, a Derbyshire Quarry official (Personal Communication, 28 August 2020) explained that,

“We are actually surprised that local authorities such as community leadership, EMA and local authorities mandated to deal with such illegal sand mining issues are silent. We thought they would involve us in planning on how best can address these issues since we are equally the victims. EMA last came here last year but as part of their general environmental inspections. In some cases, authorities are only visible when they receive reports from community. To me, we are neglected; we are marginalized yet being serious affected by territorial abuse, environmental destruction and competition”.

Together, these findings show that, in addressing illegal sand mining issues, there are no specifically designed government engagement programs with industry. This conflicts with the stakeholder theory that encourages adoption of integrated efforts in addressing such environmental issues (Freeman et al., 2010; Clement, 2005). Public-private partnership is key in addressing environmental issues affecting the community and industry (Burgess & Clark,

2017). In this study, such collaboration is deficient suggesting that industry remains a victim of illegal sand miners through environmental degradation and market loss. Other academic studies show that beach illegal sand mining destroyed the tourism industry in the Caribbean islands (Schoof, 2014; Propescu, 2018). These authors relate this to lack of integrated efforts by the government, industry and community. Previous studies also show that illegal sand mining's interference with private sector operations has resulted in public-private conflict (Hilson & Yakovleva, 2007; Özkaynak et al., 2012; Pranzini et al., 2015; Akintola & Fakoya, 2016; Alfvén, 2019, Qurbani, 2020). Similarly, this study revealed poor relations between the community, industry and the government over governance of sand mining in Harare Metropolitan Province.

Education and awareness

The study also noted limited public-private engagements concerning education and awareness. All the participants from the mining companies reiterated that government only engages them when it requires information on the trends and industry experiences with illegal sand miners. Study participant IN 2, a Derbyshire Quarry official (Personal Communication, 28 August 2020) was discontented with limited engagement as he expressed the following views, "...ummm in terms of education and awareness, we have not yet worked together. I see EMA mainly working with government institutions such as local authorities and media institutions".

His sentiments suggest that there is very limited, if any, government-industry engagement on education and awareness programs involving illegal sand mining. Even the government officials themselves confirmed this, citing that much of such engagement occurs with local communities. Study participant GE 4, an EMA official (Telephone Interview, 14 August 2020) noted that,

"...we mainly engaged local community in our awareness programs because they are perpetrators and victims of illegal sand mining. The media helps us to disseminate our campaigns". Local authorities have not been so cooperative so far".

These findings expose the government-industry engagement gap in education and awareness programs against illegal sand mining. Yet, Valéro (2015) confirms that private-public partnership is key in addressing a myriad of socio-environmental issues. Illegal mining has often been characterised by conflict of interests between the formal sector and informal sector (Bagcha, 2010). Based on this assertion, the collaboration of government authorities, industry

and community becomes essential in achieving sustainable mining. The stakeholder theory clearly points out to stakeholder engagement as a fundamental element of social sustainability (Burgess & Clark, 2017). These findings therefore conflict with this theory. In contrast, in Australia, a study by Deppeler et al. (2021) showed that public-private partnership resulted in socio-economic and environmental sustainability. Studies also confirmed that stakeholder collaboration in education and awareness achieve social sustainability (Sobrino, 2015; Valéro, 2015; Franco & Ali, 2017). This poses a challenges to institutions to adopt reflexive governance systems so that all key stakeholders may address illegal sand mining in Zimbabwe.

Law enforcement

Results of the study indicate that industry is not adequately engaged in law enforcement. Although government is responsible for law enforcement, the role of other key stakeholders such as industry was invisible in this study. Industrialists noted that if engaged, they indirectly complement government's role in law enforcement through information, ideas and resource support. Unfortunately, results indicated that much of the engagements take place between the government institutions themselves particularly EMA, local authorities and the police. Study participant IN 1, an Eyecourt official (Personal Communication, 28 August 2020) noted that,

“We are a bit marginalised by the government in terms of law enforcement work. We are aware that for government, it is a mandate but industry remain key actors in augmenting government roles. That stakeholder collaboration is lacking. I think, we should have programs that brings us together, share ideas on best ways to achieve good governance”.

Another study participant IN 3, a Derbyshire Quarry official (Personal Communication, 28 August 2020) affirmed that the government should engage industry to help design and enforce more effective programs and policies. He said that,

“...there is limited space for us as industry as government departments work in isolation in program and policy implementation on illegal sand mining. They just want us and often knock our offices when they want us to comply with fiscal policies because it's all about money. Yet, our income is compromised with influx of illegal sand mining activities”.

These findings show that there are no tailor-made programs designed to integrate industry and law enforcement. Such collaboration appears limited to government authorities despite the industry being both victims of illegal sand mining and taxpayers of the government. Although

the industry reports and updates responsible authorities about their issues with illegal sand miners, this is just an informal system. There are no specific engagement programs with industry to address illegal sand mining issues. Studies support the view that collaborations are limited (Mensah & Okyere, 2014; Valéro, 2015; Miller, 2022). Cheshire et al. (2014) noted meaningful collaboration between the mining sector and the policy makers was essential for sustainable development within the small-scale mining sector. This suggests that engagement of all key stakeholders in the mining sector makes illegal sand mining regulation more effective and efficient, thus achieving the demands of reflexive governance and stakeholder frameworks.

Mitigating socio-environmental impacts

Monitoring and reporting of malpractices

It also emerged from the study that some mining companies collaborate with other stakeholders in addressing illegal sand mining in the province. Mining companies help expose the culprits of illegal sand mining by reporting cases and incidences of malpractices to the responsible authorities such as the ZRP, local Councils and the EMA. Study participant IN 1, an Eyecourt Quarry official (Personal Communication, 28 August 2020) noted that,

“We report cases of illegal sand mining to ZRP. Sometimes they engage us as they try to control these rampant activities, they come here and document issues we report to them. We have tried to warn some of these illegal miners, but they do resist and can even attack you, so engaging the police make it more effective to control these culprits”.

The above view also emerged from other government officials. Study participant IN 2, an official from Derbyshire Quarry (Personal Communication, 28 August 2020) expressed that,

“We work with EMA in trying to control illegal sand mining activities here. They come here to check with us, and we report on the state of our environment in the view of these illegal sand miners. However, their feedback is no longer pleasing. EMA used to come here more often but they have since gone quiet for some time now even to check on our compliance”.

Such engagement obviously stimulates authorities to take appropriate actions towards illegal sand mining activities. For instance, the police utilise information gathered from the industry to conduct its investigations and apprehending illegal sand miners. This is a positive engagement between the industry and government in curbing illegal sand mining in Zimbabwe. Government-industry engagement programs are key to dealing with looming illegal sand

mining (Cheshire et al., 2014). In Ghana, an integrated mining governance framework in 2014 significantly combated illegal sand mining and conflicts (Basu et al., 2015). This is because the framework engaged all key stakeholders, as highlighted in the stakeholder theory.

Land use management

It also emerged that some companies have leased their idle land to other neighbouring companies for other land uses in order to deprive any illegal mining activities in those areas. This engagement can significantly reduce the size of idle land that can attract illegal sand miners. Study participant IN 1, an Eyecourt Quarry official (Personal Communication, 28 August 2020) noted that,

“We have bought some claims from our neighbouring company as a way of preventing the migration of illegal sand mining in our current territory where we are blasting. So, those mining claims are more of buffers. If we hadn’t done so, maybe we would be at a stage of 50-50 mining with illegal sand miners in our current premises. In other words, these are efforts to deprive them off mining spaces”.

This view augers well with sentiments by local community leadership that commented on sustainable corporate solutions implemented against illegal sand mining. CL 1, a resident and community leader of ward 1, Retreat in Harare South constituency (Personal Communication, 3 August 2020) highlighted that,

“A certain company in this constituency actually planted the whole of eastern wing with fruit trees as a way to block advancement of illegal sand miners in their territory. Today, the whole area is a plantation, there is no more space for sand extraction. After 3 to 4 years the whole area will not have space for sand extraction at all, and that is remarkable work”.

This clearly suggests concerted efforts by the industry in addressing illegal sand mining. However, there remains limited programs specifically designed to engage industry. In fact, findings indicate that industry implement sustainable programs as a defence against illegal sand mining, and not as part of a pre-designed government-industry programs

Figure 5.11 below shows a plantation established around the premises of one sand mining company following a series of conflicts with illegal sand miners on that sand rich area.



Source: Researcher, (2020).

Figure 5.11: Plantation buffer by a sand mining company in Retreat Farm

While such roles played by industry is important, studies suggest that there are engagement gaps in addressing illegal sand mining and conflicts (Hussain et al., 2017). The authors noted that private-public engagement is often ill-coordinated resulting in persistent illegal coastal sand mining in Bangladesh. Chevallier (2014) stated that when private sector associations and industrialists' upscale engagement efforts, this significantly reduces the socio-environmental costs of illegal sand mining. Thus, industry should be engaged in illegal sand mining issues.

5.4.2.4 Collaboration of government institutions with CSOs and NGOs

Participation in decision-making

Study results indicated that the EMA and local authorities often engage civil society organisations and some NGOs in the formulation of programs and policies for addressing illegal sand mining in Epworth. Local authorities such as ELB work with civil society organisations such as ZDA on development matters including illegal sand mining that impede local development projects. This emerged in interviews held with local authority officials, as study participant GL 4, an ELB official (Personal Communication, 26 August 2020) noted that,

“We usually invite ZDA, our local community-based development organisation in our workshops especially when we plan activities for our local developments. Obviously, we address all these issues of illegal sand mining since it is an obstacle to our local development activities. Illegal sand miners are destroying land or spaces reserved for other developments and landuses. Thus, we are working with such key local stakeholders to try to avert these illegal activities”.

Civil society also confirmed existing engagement with government in decision-making towards local development issues. Study participant NG 3, a ZDA official (Personal Communication, 21 August 2020) explained that,

“Our role in to promote local development within Epworth. As such, we work with various stakeholders such as community leadership and government authorities especially ELB, local authorities of Epworth. We often meet to formulate ways of enhancing development, and so any issues affecting such development is obviously part of our deliberations”.

The community leadership also indicated that local authorities often engage community and civil society in all socio-economic and environmental issues affecting local community development. Study participant CL 2, a resident and community leader of Epworth (Personal Communication, 5 August 2020) highlighted that, “...we sit with ELB management, ZDA and other stakeholders to discuss issues affecting our community. We even plan programs together, including programs for addressing illegal sand mining and socio-environmental conflicts”.

Together, these comments reveal that there is some positive engagement of CSOs including in program formulation and implementation on illegal sand mining. Indeed, civil society and NGOs constitute important stakeholders in combating environmental issues (Dashwood & Pupilampu, 2015). Other studies show that these stakeholders have made significant engagement programs towards climate change, environmental protection and local community development (Lee, 2021; Lim et al., 2021; Lawal, 2011). In Africa, program engagements involving the mining sector were reported (Arwa, 2013; Singh, 2014). This shows that the civil society and NGO sectors are important stakeholders in all stages of mining project management.

Education and awareness

Results from Epworth indicate that there is some collaborative work between civil society and the community in education and awareness campaigns involving illegal sand mining. A local civil society organisation called Zinyengere Development Association (ZDA) works together with persons in the community to raise awareness on the dangers of illegal sand mining on the environment and society. However, illegal sand miners do not embrace such programs, which they view as a waste of their time. This compromises the efficacy of education and awareness programs against illegal sand mining in Zimbabwe. Study participant NG 2, a LDRAT official (Personal Communication, 21 August 2020) noted that,

“Sometimes we conduct awareness campaigns in our community in a bid to fight sand poaching. We usually visit the hotspot areas in the company of local community leadership to teach the illegal sand miners on the dangers of their activities. However, it’s not always an easy exercise as you risk attack. Illegal sand miners openly defy the education as they feel its time wasted to them”.

Similar views emerged from the interviews conducted with local community members as most participants emphasized the dangers associated with site-based education and awareness campaigns. Participant CR 11, an Epworth resident (Personal Communication, 7 August 2020) expressed that,

“Few years ago, I almost lost my life when illegal sand miners charged at us with machettes after we visited their sites attempting to do awareness campaign. I had accompanied the ZDA officials in their awareness exercise. We had to flee from the site to save lives”.

This indicates some collaborative efforts at the same time exposing some obstacles to effective implementation of said initiatives. Illegal sand miners do not wish to accommodate newcomers in their mining sites as they feel interfered with. Most participants noted that illegal sand miners are a dreadful and defiant cohort of local community that requires a careful approach. Participant IL 9 illegal sand miner, an Epworth (Personal Communication, 11 August 2020) expressed that, “...I think you have asked enough questions. It’s enough! Please leave us now”.

This confirms that illegal sand miners are dangerous, intolerant and capable of engaging criminal acts. This compromises efforts to engage them in programs to address illegal sand mining and conflicts. Literature shows that despite most governments implementing education

and awareness programs in the mining sector, engaging illegal sand miners themselves remain a challenge (Abraham et al., 2021; Leal Filho et al., 2021; Liu et al., 2021). These authors also noted that illegal sand miners resist formalisation and view illegality as economically viable option to them. This suggests that illegal sand miners are not easy to engage in dealing with their illegal sand mining activities.

Mitigating impacts

Although NGOs and civil society organisations also play an important role in environmental issues, the study observed a limited participation in the impacts of illegal sand mining in Harare Metropolitan Province. It emerged that most NGOs are involved in programs such as climate change, waste management, water sanitation and hygiene (WASH) among others. In implementing and evaluating existing programs, including community-based programs, most NGOs partner with the government, the private sector and other NGOs. However, the study revealed that there no engagement programs that focus on sand mining and associated socio-environmental issues. Illegal sand mining has not received adequate attention of the NGOs compared with other environmental issues such as climate change. The government's engagement with NGOs in addressing this problem is also low despite most NGOs showing interest in engagement. Findings from NGO officials expose the engagement gaps between government and non-governmental organisations. Study participant GL 3, an ELB official (Personal Communication, 28 August 2020) noted that,

“We are aware of illegal sand mining problems in Zimbabwe especially in urban areas. However, we currently do not engagement programs on illegal sand mining particularly. Maybe, we equally need to work together with government departments such as EMA and local authorities, and even the community to address illegal sand mining. There are a lot of issues here, community is affected, the government is affected as well- we are all affected in one way or the other”.

The above sentiments were supported by other key study participants from the NGO sector as participant NG 1 from GGZ; a local environmental NGO (Personal Communication, 21 August 2020) highlighted that,

“So far, we haven't implemented any program focusing on sand mining issues. We have been focusing on small-scale mining and its relationship with community hence we work with

community and other government departments in our programs. However so far, we have not yet been into sand mining, but we know it is on rising trend”.

While the above shows that NGOs are also engaged in environmental issues including mining, illegal sand mining has not had adequate program support. The stakeholder engagement between NGOs, government, community and other stakeholders in illegal sand mining is minimal. This engagement gap has left that sector relatively more marginalised in terms of program intervention and collaboration. Furthermore, lack of coordination and collaboration among the key stakeholders such as NGOs, community leadership and the private sectors emerged a major cause for concern. Study participant NG 2, a LDRAT official (Personal Communication, 21 August 2020) noted that,

“Yes, in some instances we work with government departments in addressing environmental issues. We understand, illegal sand mining has become on the topical environmental issues in Zimbabwe, but we have not received a call in that regard yet but yes, we are ready to partner. The government has not approached us yet to see how we can possibly work together in addressing sand mining issues”.

This comment reflects limited collaboration between the government and the NGO sector in addressing illegal sand mining, despite the latter being actively engaged in various other environmental programs in Zimbabwe. In contrast, previous studies showed that government-NGO engagement significantly curtailed illegal sand mining issues in other countries (Arwa, 2013; Singh, 2014). This challenges the current engagement system in Zimbabwe to adopt a program focused engagement interventions with NGO sectors.

5.4.3 Comparative case analysis on stakeholder collaborations in addressing illegal sand mining

Table 5.7: Summary on stakeholder collaborations in combating illegal sand mining issues

Case Site	Stakeholder Collaborations					
	<i>Government Institutions</i>	<i>Government with NGOs</i>	<i>Government with Industry/Private Sector</i>	<i>Government with Community</i>	<i>Government with CSOs</i>	<i>Other Collaborations (Specified)</i>
Retreat Farm	√	X	√	√	X	√
	(EMA, HCC, ZBC and ZRP).		(EMA, Eye Court, and Derbyshire Quarry).	(EMA, and Local Residents).		(Private-private partnerships on land use: Eye Court vs. Derbyshire Quarry).
Zengeza East	√	X	X	x	X	x
	(EMA, CM, ZBC and ZRP).			(EMA and Local Residents).		
Epworth	√	X	X	x	√	x
	(EMA, ELB, ZBC and ZRP).			(EMA and Local Residents).	(ELB and ZDA).	

It is clear that significant efforts are made by various stakeholders including the government, civil society, local community and industry in addressing illegal sand mining in Zimbabwe. However, there is lack of collaborative system of governance as most of the work is done independently especially by state institutions with government mandate over socio-environmental regulation. The next chapter critically analyses the adequacy of existing legal framework in Zimbabwe in addressing illegal sand mining and conflicts in terms of penalty system, standards of sand extraction, provision of institutional framework, stakeholder engagement and accountability. The chapter further examines reflexivity of governance in Zimbabwe.

5.5 Analysis of legislative framework and reflexive governance of illegal sand mining

This section analyses various legislation governing sand mining in Zimbabwe with a special focus on their adequacy in addressing illegal sand mining. These include the Environmental Management Act (Chapter 20:25), the 2013 Constitution of Zimbabwe, the Mines and Minerals Act (Chapter 21:05) and the Urban Councils Act (Chapter 29:15 of 2002). The following aspects were analysed: institutional functionality, legislative direction, accountability, responsibility and inclusivity as well as coherence with other legislations in curbing illegal sand mining. The section also reveals key findings on the reflexive governance of sand mining using evidence from illegal sand mining in Harare metropolitan province.

5.5.1 Environmental Management Act (Chapter 20:25)

5.5.1.1 Provision for institutional framework that addresses illegal sand mining

The study established that the Act provides for the setting up of regulatory boards to address environmental matters including illegal sand mining. The Environmental Management Agency (EMA) was established in terms of the Act to manage and protect natural resources. In an interview with EMA officials from the agency, it emerged that the institution has well defined structures and jurisdictions for dealing with various environmental issues, most of which complement and address illegal sand mining. Thus, the Environmental Monitoring and Planning (EMP) unit works together with Environmental Education and Publicity (EEP) unit in that regard. Study participant GE 3, an EMA official (Personal Communication, 14 August 2020) noted that,

“EMA is set in terms of the Act. It’s a mandate we have through the Act of Parliament to ensure that we manage and protect the natural resources. The Act clearly spells out on various appointments and functions of inspectors and officers from which illegal sand mining is monitored and controlled”.

Similar sentiment emerged from other government officials as participant GE 5, an EMA official (Personal Communication, 14 August 2020) explained that,

‘In terms of our functions, we have various departments, and this issue of sand mining is mainly addressed through our EMP. EMA is actually established in terms of the Environmental Management Agency, so we have to execute environmental management duties through the respective departments and persons within the organisatio’.

Another participant GE 1, an EMA official (Personal Communication, 14 August 2020) asserted that, "...the act requires us to manage all environmental issues. Sand mining is one of such issues we focus on. Existing institutional framework within EMA is a fulfilment of the Act".

This indicates that the Environmental Management Act provides for setting up an institutional framework to manage and govern environmental issues including illegal sand mining. Although, the framework is generic regarding environmental issues, it provides for the monitoring of unsustainable activities such as illegal sand mining through the relevant departments or units. Madebwe et al. (2006) noted the EMA was established in terms of the Act to address all environmental issues in Zimbabwe. Other studies also confirm the existence of relevant institutions established in terms of environmental laws to manage and protect the environment and natural resources (Mandelker, 2010; Boling, 2010; Chevallier, 2014, Masud, 2015). This supports the view that governments regard environmental management as an important responsibility and so responsible institutions administer the Act.

5.5.1.2 Specific legal provision that addresses illegal sand mining

Study results indicated that the EMA also contains some sections that specifically address illegal sand mining. The statutory instrument (S.I) 7 of 2007 of the Environmental Management Act mainly addresses four key aspects, namely extraction of clay and sand, environmental impact assessment procedures, prevention of veld fires and protection of water systems (wetlands and public streams), thus recognise the need to promote sustainable utilisation of sand. This emerged in interviews conducted by government officials as participant GE 3, an EMA official (Personal Communication, 14 August 2020) noted that, "...the S.I 7 of 2007 specifically focuses on the sand abstraction by attempting to set up conditions upon which one can go ahead and mine sand".

Another participant GE 1, an EMA official (Personal Communication, 14 August 2020) similarly highlighted that,

"...the Environmental Impact Assessments (EIA) and Ecosystems Protection Regulation actually controls illegal sand mining. It sets up requirements that one has to comply with or fulfil in order to mine sand, for example environmental management plan prior to abstraction".

Other government officials also highlighted the existence of specific section of the Act that addresses issues of sand mining. Participant GE 6, an EMA official, 18 August 2020) noted that,

“...the regulation requires EIA first for sand abstraction. This is an effort to ensure that sand is mined in a sustainable manner and reclamation is done. A permit should be acquired once the agency is satisfied with plans to manage and reclaim the mining area”.

As indicated by the above responses, the EMA provides for the sustainable use of natural resources including sand and clay by setting up conditions to be met before any sand mining is done. Clearly, the Act is cognisant of the adverse impacts of illegal sand mining and attempts and the need to address it. It further demands that individuals, corporate sector, and communities acquire licenses in order to abstract, possess or transport sand.

5.5.1.3 Utility of existing conditions for sand mining and consumption

The Act demands acquisition of a permit in all processes of sand mining that include possession of claim, mining and transport of sand including a prescribed fee for the permit, and a penalty fee for non-conformity and non-compliance. This is a strength of the Act as it recognises that illegal sand mining impinges all of the above processes. Most government officials particularly from EMA, highlighted that the Environmental Management Act provides for acquisition of a permit prior to sand mining. Participant GE 3, an EMA official (Personal Communication, 14 August 2020) noted that, “Any person who wishes to extract, excavate, possesses, or permit the removal of sand or clay shall apply to the Agency in the form prescribed in the Second Schedule and pay a fee as prescribed in schedule two”.

It is clear from this that this Act provides for a permit system for sand mining. Participant GE 5, an EMA official (Personal Communication, 18 August 2020) explained that,

“...even the transport of sand requires permit from the agency. So, its not all about the extraction. The law is very clear on that”. In fact, the Act states that any person who contravenes section (1) shall be guilty of an offence and liable to a fine not exceeding level fourteen or to imprisonment for a period not exceeding one year”.

However, results showed that the Act does not include specific parameters and standards of sand consumption. Participant GE 3, an EMA official (Personal Communication, 14 August 2020) stated that,

“...there is no specific standard for consumption as per se. However, we believe sand at some point will be exhausted and that’s where we now need reclamation as per submitted environmental management plan”.

A review of the Act also shows that the penalty system focuses on registered sand miners and there are no clear provisions as to how the Act addresses unregistered and illegal sand miners in terms of registration defiance and law non-compliance.

Furthermore, a review of the fines revealed that contravention at level fourteen attracts a fine of fifty thousand Zimbabwean dollars (ZW\$50 000-00) which is roughly US \$550. That means one can contravene sub-section (1), pay the required fine and continue to mine outside the law requirements given the rate of devaluation of local currency against the USD. In this study, it emerged that illegal sand miners mainly sell sand using foreign currency particularly Rands and USD, and with local currency drastically falling against the foreign currency, most offenders can afford to pay the fines as they earn foreign currency from sand. The law lacks flexibility as to currency systems and this compromises the efficacy of fines in environmental governance, management and utilisation. Such issues emerged from most local community participants. Participant IL 13, an illegal sand miner, Zengeza (Personal Communication, 14 August 2020) expressed that,

“My brother, what is US \$40 to us? We raise this much on a single day, so we are not bothered. We just pay and come on the site and make more money. We are not so worried about small spot fines for EMA. The fine is even less than US\$60”.

The comment of the illegal sand miner clearly highlights the inefficiency of the penalty system due to the multi-currency system in Zimbabwe. Chimhete (2004) noted that the fines were generally low and inadequate to stop illegal sand mining activities in the country. This clearly indicates that the penalty system itself is weak.

5.5.1.4 Provision for accountability, responsibility and stakeholder engagement

The Act further stipulates that one should submit an environmental action plan in consultation of various key stakeholders such as local authorities and local inspectorate in seeking permit. Sub-section (4) requires that the applicant develop a comprehensive rehabilitation plan to the EMA before operations commence. Sub-section (5) complements the foregoing by requesting or demanding the applicant to consult local authorities and local inspector in developing the

plan. Participant GE 6, an EMA official (Personal Communication, 18 August 2020) explained that,

“...yes, the Act requires that one has to consult other key stakeholders such as local authorities in developing the plans. This is to ensure that the environmental management plan is compressive and exhaustive of all socio-environmental issues associated with sand mining”.

Other key government participants also highlighted the facility regarding accountability and responsibility of any persons in environmental protection. Participant GE 1, an EMA official (Personal Communication, 14 August 2020) noted that,

“...the Act places accountability and responsibility of environmental management to everyone. We therefore assume that prior to any mining, one makes adequate consultations and develop a compressive management plan that is cognisant of all issues of concern to human beings and the surroundings”.

This response confirms that the EMA recognises key principles of accountability, responsibility, and inclusivity of various stakeholders in promoting sustainable sand mining. However, the Act does not provide for specific consultation or participatory implementation, monitoring, and evaluation of any sand mining activities. The latter is mainly a requirement of the agency through its inspectors, thus marginalising other key stakeholders in the whole cycle of managing illegal sand mining among other environmental issues. Participant GE 6, an EMA official (Personal Communication, 18 August 2020) highlighted that,

“No, the act does not state how and who should collaborate in addressing illegal sand mining but calls for consultations in developing environmental management plans from other actors. As such, it is not legally binding in case no further consultations are done by the miner during implementation or project evaluation. So it’s our responsibility as an agency to check on compliance”.

The foregoing findings clearly show that the Environmental Management Act does not specifically state responsibilities of key actors such as local community in environmental protection including how they are held accountable for environmental malpractices. The Act places more responsibility and accountability on the EMA as a state institution mandated to protect and management the environment. Case studies from Ethiopia, Tanzania and Uganda and findings by Mowo et al. (2016) similarly noted that existing natural resource management

(NRM) by-laws lack stakeholder consultations in their formulation, implementation and enforcement. Mitullah (2003) also noted that most laws are silent on accountability of local communities. However, Ladlow (2015) argued that most legislation requires that the private sector should be legally responsible for their adverse impacts on the environment. This suggests that accountability is a key component of legislation.

5.5.2 The 2013 Constitution of Zimbabwe

5.5.2.1 Provision for institutional framework that addresses illegal sand mining

With regard to provisions for institutional framework when dealing with illegal sand mining, results of the study indicated that the 2013 Constitution is very silent. This is despite its cognisance of the importance of environmental matters, evident in a section that particularly focuses on environmental rights, from which issues of sand mining fit in from a socio-environmental standpoint.

Results from this study indicate that although the constitution recognises socio-environmental sustainability issues, it is generic in terms of the establishment of a specific institution to deal with particular facets of environmental concerns, including illegal sand mining. It only promotes general environmental sustainability in the pre-text, namely that every stakeholder will play its part in promoting environmental rights. This emerged in interviews conducted with government officials as Participant GE 4; an EMA official (Personal Communication, 18 August 2020) noted that,

“There is no specific mention or identification of who should what. However, it sets the tone for everyone to be environmentally responsible. By the way, the Constitution is the supreme law, and as you are aware, it is too broad and attempts to address various socio-economic, political and environmental issues. So, with regards to the environment, it places more importance on environmental rights. However, the Environmental management act captures more on this matter”.

Participant NG 1, a GGZ official (Personal Communication, 21 August 2020) supported the above view, as he noted that,

“Section 17 of the Constitution particularly sub-section 1(a) advocates for an environmental health, safety, and wellbeing of human beings. No specific mention of institutional structures as such. Similarly, sub-section 1 (b) recognises the need to implement legislations that promote

sustainable development that provides for human safety, health, and well-being. Similarly, sub-section 1 (b) promotes sustainable development and calls for environmental legislation implementation”.

The above comments show that the constitution is silent on the institutional frameworks for environmental governance. Rather, it provides for implementation of various measures to protect people against environmental disturbances without specifically speaking on particular environmental issues such as illegal sand mining. However, a review of literature shows that constitutions are mere supreme laws upon which more specific and sector-based legislation emerge (Murharjanti, 2019; Dziva, 2018; Bösl et al., 2010). This suggests that constitutions are key components of the legal framework that seek to address a wide array of social, environmental, political and economic issues affecting countries.

5.5.2.2 Specific legal provision that addresses illegal sand mining

Although the constitution places importance on environmental rights, it does not have a specific provision that deals with sand mining. However, there is an appreciation of the need to promote sustainable environmental management including design and implementation of relevant laws and regulations. Sub-section 1(a) advocates for an environment that provides for human safety, health and well-being. Similarly, sub-section 1 (b) promotes sustainable development and calls for environmental legislation implementation. Interviews held with some key study participants from the government confirmed the above findings from document analysis. Government officials highlighted flaws in the Constitution in terms of its generality in prescribing and setting on environmental governance. However, the constitution recognised environmental issues as a critical element of the society through a human rights approach. One of the key study participants GE 1, an EMA official (Personal Communication, 14 August 2020) explained that,

“The section 17 of the Constitution also requires that appropriate measures be taken to promote environmental rights by protecting natural resources and preventing pollution and environmental degradation. Indeed, the constitution broadly attempts to address environmental issues from a socio-environmental perspective. It applies a wide approach to achieving environmental sustainability”.

The NGO community also confirmed that the constitution is generic in nature despite its wide scope of application. Participant NG 3, a ZDA official (Personal Communication, 21 August 2020) explained that,

“As you may be aware, national constitutions are supreme law that often do not provide specific legal parameters on a subject matter. Specific sectoral laws should address these issues in my view. That is why we applaud that at least our own constitution is aware of environmental rights. Environmental management act and other applicable laws then come in to supplement the supreme law”.

It is clear from these comments that this constitution is cognisant of various practices or activities that do not only degrade the environment but also violate human rights. Illegal sand mining is obviously among these practices. This suggests that the 2013 Constitution is cognisant of the link between illegal sand mining as an environmental issue with other social aspects of human lives. Indeed, scholars commend the 2013 Constitution for its focus on socio-environmental sustainability to include human rights issues (Odney, 2013; Chirisa & Muzenda, 2013; Chigudu & Chirisa, 2020). A review of section 73 also shows that the government is committed to fulfilling environmental rights through resource and legislative support. The Constitution further provides for responsibility of every citizen, the corporate sector and any other stakeholders to observe environmental rights.

5.5.2.3 Utility of existing conditions for sand mining and consumption

Results of the study indicated that the Constitution neither provides for conditions regarding sand mining nor consumption standards. Document analysis of the constitution further revealed that this supreme law does not prescribe conditions for environmental non-conformities and non-compliances in respect of environmental rights espoused in the law itself. Interviews held with key government study participants confirmed that there is no provision on requirements for one to extract sand in the 2013 constitution of Zimbabwe - as in the case of Environmental Management Act and Mines and Minerals Act. One of the key participants from a government environmental authority, participant GE 3, an EMA official (Personal Communication, 14 August 2020) noted that,

“The Constitution does not have a specific clause on elements of the environment including illegal sand mining. This obviously means there is no possible talk about other key legal issues on consumption and mining standards. What the constitution mainly focuses on is for

responsible actors to promote environmental rights through appropriate legal and institutional mean”.

The clearly shows that the constitution is more of a generic legal guideline upon which other legislations emanate. Most participants from the government highlighted that the constitution therefore does not provide for sector specific conditions such as other legislation like the Environmental Management Act. Participant GL 3, an ELB official (Personal Communication, 28 August 2020) noted that,

“...no, we can't talk of adequacy of conditions of the Constitution in terms of addressing illegal sand mining issues. This now lies with relevant institutions, regulations and legislations that deal with such matters. So, the Constitution is so broad and generic to issues you are interested in. EMA act and maybe mining laws yeah, they have clear legal requirements for one who may wish to extract sand and so forth”.

The above sentiments clearly point out the generic nature of the Constitution of Zimbabwe in terms of addressing illegal sand mining matters. The constitution does not have prescribed conditions or provision that specifically focus on illegal sand mining in Zimbabwe. However, the 2013 Constitution, unlike previous constitutions gives more attention to environmental rights (Odney, 2013; Chirisa & Muzenda, 2013; Chigudu & Chirisa, 2020).

5.5.2.4 Provision for accountability, responsibility and stakeholder engagement

Study results indicated that the 2013 Constitution neither provides nor stipulates elements of good governance concerning sand mining as part of a socio-environmental issue. This includes transparency, accountability, responsibility and participation of various key participants such as the local community in promoting environmental rights. The constitution only stipulates the role and function of state in promoting environmental rights without highlighting the need for stakeholder collaboration in addressing environmental issues such as illegal sand mining. While the state assumes greater responsibility, the importance of a responsible citizen and its impact on human rights and sustainability is peripheral in the Constitution. This emerged from interviews held with most government officials.

Participant GE, an EMA official (Personal Communication, 14 August 2020) highlighted that,

“Like I said earlier, the constitution generally calls for environmental sustainability in the country. It does not specifically state who should be doing what, how and with what effect despite its call for environmental rights of all”.

Similar sentiments supported this view on the deficit of clarity on stakeholder roles and engagements on environmental issues with a view to promoting environmental rights.

Participant GE 1, an EMA official, (Personal Communication, 14 August 2020) explained that,

“There is no mention of how every citizen shall actively work towards promoting environmental rights. The constitution is quite. Only specific institutions are mandated as a culmination of the constitution to manage and protect the environment such as EMA and local authorities”.

In addition to the above views from government officials, key study participants from civil society organisations also highlighted that the constitution is not exhaustive in terms of prescribing sectoral governance requirements. Participant NG 2, an official from a local NGO, LDRAT (Personal Communication, 21 August 2020) expressed that,

“The constitution does speak much about issues of transparency and stakeholder participation among other key governance principles. Despite being generic on environmental matters such as sand mining, at least there was need for more emphasis on good governance within the constitution”.

It is clear from the above responses that the 2013 Constitution over emphasizes the need for promoting environmental rights without highlighting specific roles of various stakeholders in achieving that goal. Furthermore, there is silence on key elements of good governance of sustainable mining such as transparency and accountability. Nevertheless, the recognition of environment as a stand-alone section in the Constitution presents a great opportunity for addressing illegal sand mining. In fact, the Constitution is a strong legal instrument for addressing social, environmental, economic and political issues affecting societies (Mwenda & Kibutu, 2012). This suggests that the Constitution indirectly supports other legislation on environmental issues, mining and community welfare. Chirisa and Muzenda (2013) noted that the 2013 Constitution encourages the formulation and implementation of environmental laws and regulations such as the Environmental Management Act (Chapter 20:27) in Zimbabwe.

5.5.3 Mines and Minerals Act (Chapter 21:05)

5.5.3.1 Provision for institutional framework that addresses illegal sand mining

Research indicates that the Mines and Minerals Act provides an institutional framework responsible for sand governance in Zimbabwe. Specifically, the Act provides for the establishment of a responsible Board to administer the Act and define functions of persons involved in any mining processes. The Ministry of Mines and Mining Development (MMMD) is mandated to regulate all mining activities in Zimbabwe. This emerged in interviews conducted with the government agencies responsible for environmental management and protection, for example, participant GE 1, an EMA official (Personal Communication, 14 August 2020) expressed that,

“Our Environmental Management Act is supported by other pieces of legislation such as the Mines and Minerals Act. This Act resulted in the establishment of Ministry of Mines that oversees all issues in the mining sector including regulating mineral and sand extraction. We work together with this key stakeholder in regulating such environmental issues”.

Another participant GE 2, an EMA official (Personal Communication, 14 August 2020) also supported the above view by stating that,

“...local authorities’ by-laws’ and mining legislation support Environmental Management Act in the sense that all the legislations somehow regulate activities in the mining sector. Particularly, Mines and Minerals Act gives powers to Mines Inspectors to sue anyone that mine sand with permit from them”.

It is clear from these comments that the Mines and Minerals Act provides for establishment of institutional framework for addressing illegal sand mining. Dhliwayo (2016) noted that the Act provides for the establishment of a responsible Board to administer the Act and define functions of persons involved in any mining processes. The NGO community also confirmed the above findings. Most participants reiterated that state institutions, for example the Ministry of Mines and Mining Development administer the Mines and Minerals Act. Participant NG 3, ZDA an official (Personal Communication, 21 August 2020) explained that,

“I may not have much detail but in my understanding, the Act is passed through a parliament in Zimbabwe, and has to be administered by a specific government department or institution. For example, environmental management act is administered by EMA through its respective

ministry. The same applies with Mines and Minerals Act. It clearly states that the Ministry of Mines enforces that law, hence all issues to do with mining including sand mining is under its jurisdiction. So indeed yes, there is clear institutional framework in terms of the Act to address sand mining”.

Clearly, these comments indicate that the Mines and Minerals Act provides for setting up responsible institutions to administer and regulate all mining activities including sand mining. Document analysis also indicated that the Act further decentralises administration of all mining activities to provincial level. This eases documentation and monitoring of all mining activities (Dhliwayo, 2016). This author reiterated that most government laws are administered through state institutions. Mining regulation, including sand mining, is under the custodianship of the state in South Africa (Ogaluzo et al., 2016) and in Nigeria (Chevallier, 2014). This suggests the existence of state institutions responsible for enforcing mining and environmental laws as is the case with Zimbabwe legislation.

5.5.3.2 Specific legal provision that addresses illegal sand mining

Like the Environmental Management Act, the Mines and Minerals Act has a legal provision regarding sand mining. This provision specifically regulates sand mining and attempts to curtail illegal sand mining activities. A document analysis of the Mines and Minerals Act shows that the legislation particularly provides for the control of sand mining in Zimbabwe. *Part XII: Working on Alluvial, Eluvial and Certain Other Deposits* controls the extraction and use of the aforementioned natural resources. Classified under alluvial deposits, the Act restricts mining and consumption of sand without approval or permit from the Ministry of Mines. The Act defines alluvial deposit as;

‘any deposit, either non-coherent or consolidated, of any geological age, which has been formed by agency of wind or water 1 (a), any accumulation of sand, gravel or clay deposited by surface-water containing valuable minerals (1 (b’).

The above clause identifies sand as an alluvial deposit that is regulated in terms of the Act. Like any other minerals such as gold, diamond and chrome, sand mining requires permission from the Ministry of Mines and Mining Development. Section 222 clearly spells out control mechanisms for persons working or wishing to work on such sand deposits among other alluvial deposits. This means that the Act prohibits illegal sand mining, for example sub-section 3 states that,

“No person shall work any alluvial or eluvial deposit of a designated mineral except under an order issued in terms of section 225”.

Section 225 stipulates situations where the board may make an order. The above clause clearly prohibits any sand operations without a legal order from authorities. Undoubtedly, activities that are prohibited include but are not limited to mining, consumption and transporting sand illegally. Findings from the document analysis above showed that indeed, the Mines and Minerals Act supplements the provision of the Environmental Management Act on the regulation of illegal sand mining. Both Acts prohibit sand mining without permission from responsible authorities. Scholars applaud the Mines and Minerals Act for a clear instruction on setting up responsible institution, institutional framework for governance and specific legal provision (George & Steven, 2022). Part 1 (5) of The Mines and Minerals Act defines alluvial deposit as,

“any deposit, either non-coherent or consolidated, of any geological age, which has been formed by agency of wind or water 1 (a), any accumulation of sand, gravel or clay deposited by surface-water containing valuable minerals”.

This confirms the existence of specific provision for sand mining that attempts to regulate illegal sand mining. Similarly, the Environmental Protection Act 1994, the Minerals, and the Mining Amendment Act 1993 of Ghana set up responsible authorities and institutions to enforce that Act (Musah, 2009). In Kenya, for example, the government had to draft the National Environmental Management authority (NEMA) - a policy that governed all mining activities, sand and gravel mining included, in response to massive socio-environmental degradation caused by sand mining activities in the country (Nguru, 2008; Arwa, 2013). According to Arwa (2002), in Kenya, sand mining and all other mining operations are regulated under Mining Act Cap, 306 of laws of Kenya. The Environment Management and Coordination Act, (EMCA 1999) that demands rehabilitation of any mined-out areas augments the Mining Act Cap, 306. This suggests that most governments have adopted Acts with specific provisions that seek to address illegal mining activities such as sand mining.

5.5.3.3 Utility of existing conditions for sand mining and consumption

An analysis of the Mines and Minerals Act revealed that the Act prescribes conditions for mining and consuming sand. Like the Environmental Management Act of Zimbabwe, this law also demands for an application and acquisition of prospecting license. The permit system

provided in the Act serves as a point of departure from allowable sand mining and illegal sand mining. It is therefore a legal requirement that any form of mining including sand mining begins with acquisition of appropriate permit from the Ministry of Mines and Mining Development. Specifically, section 222 of Mines and Minerals Act states that,

“Any person wishing to extract sand must apply to the state for the right to do so and the act sets out a regulatory regime governing the exploitation of the resource, applied through the administration of various rights and permit”.

This suggests that any mining should follow the initial acquisition of permit. According to Section 225 of the Mines and Minerals Act of Zimbabwe, the Board appointed in terms of the Act can either accept or reject application for mining rights if prescribed conditions such as environmental management plans are not satisfactory. For instance, the Act requires a clear plan of land reclamation for any mining operation. If such a plan does not meet standard environmental controls, it will be subject to rejection. Document analysis further revealed that non-compliance is an offense that attracts penalties such as fines or imprisonment in terms of sub-section 5 and 6. Sub-section 5 particularly states that,

“Any person who contravenes subsection (3) or (4) shall be guilty of an offence and liable to a fine not exceeding level seven or to imprisonment for a period not exceeding two years or to both such fine and such imprisonment”.

It is evident from document analysis that the Mines and Minerals Act has clearly prescribed conditions for sand mining that seek to promote sustainable mining. A mining lease is a prerequisite for any mining activities including sand mining. The Board gives an order stipulating conditions for working on sand deposits. Thus, failure to comply with sub-section (3) and (4) is an offense. This is applauded for counteracting the chances of illegal sand mining and its impacts on the society and environment (Dhliwayo, 2016). This is a positive development in terms of good governance as this legal provision promotes accountability on both miners and authorities. Indeed, good governance is characterised by participation, consensus oriented, transparency, accountability, responsiveness, effectiveness and efficiency, equity and inclusivity, and the rule of law (Springer, 2016). These findings, however, challenge the responsible institutions to adopt reflexive governance through resource mobilisation, more stakeholder engagements and continual review of such national policies to keep them relevant to emerging issues in the sand mining sector. This ensures that conditions prescribed in the

laws align with emerging trends in the sand mining sector. According to Moore et al. (2021), reflexive governance provides for reflexive adaptation of regulations or policies.

Nevertheless, published literature indicates that most legislation on environment and mining issues contain specific conditions that have to be met as part of the mining permit systems. In Nigeria, the Mineral and Mining Act of 2007 also emphasizes a reclamation plan submission prior to any form of mining (Ogaluzo et al., 2016). This is to effectively govern the extraction of sand and other related deposits and prevent illegal sand mining activities. The Act therefore augments the Environmental Management Act and the Urban Councils Act that also speak to protection of land and sustainable utilisation and management of sand and gravel.

5.5.3.4 Provision for accountability, responsibility and stakeholder engagement

Document analysis revealed that the Mines and Minerals Act does not have specific provision regarding accountability, responsibility and stakeholder engagement. However, the Act promotes accountability and stakeholder participation in governance processes. For example, the Act utilises a multi-stakeholder governance approach in the process of acquiring mining rights through section 223 that demands any miner to consult various key interested authorities in the mining and environment sector as part and parcel of acquiring prospecting license. Specifically, sub-section three (3) provides for applicant's requirements for a mining order and states that any application for mining rights has to pass through key offices of the responsible minister for land administration, landowner/ occupier and responsible local authorities/council. Section 15 of the Act states that,

'The applicant shall send a copy of his application and the supporting plan to— (a) the Natural Resources Board; and (b) where the land affected by the application is— (i) State land, the Minister responsible for the administration of that land; (ii) Communal Land, any rural district council established for the area concerned; (iii) private land, the owner and the occupier, if any. (4) An application in terms of this section may relate to more than one mining location'.

This condition provides for a thorough assessment of any applicant that seeks to abstract sand before the Board provides an outcome of the application, and this is to promote sustainable alluvial/sand mining. More so, this promotes a spirit of accountability and responsibility among miners, hence counteracting illicit sand mining activities. Further document analysis revealed

that the Mines and Minerals Act also provides for dispute resolution between landowners and prospectors, a key issue in accountability and liability matters. Section 32 of the Act states that,

‘If any dispute arises between the holder of a prospecting licence or a special grant to prospect or an exclusive prospecting order and a landowner or occupier of land as to whether land is open to prospecting or not, the matter shall be referred to the Administrative Court for decision’.

The above clause of the Act is a clear indication that this law is cognisant of conflicts that potentially arise around issues of legitimacy, compliance and land use between different stakeholders. Thus, it provides for opportunity to resolve such issues through the relevant legal systems in Zimbabwe.

However, document analysis also revealed that stakeholder engagement is only more visible on licensing procedures. There remains low stakeholder participation in policy and program formulation, implementation and review in mining issues. George and Steven (2022) argued that the Act is not holistic in nature despite existing multi-institutional processes for permit acquisition. Indeed, the law is silent on how grassroot community, as well as CSOs and NGOs can participate in decision-making on licensing, monitoring of mining activities and review of policies for effective reflexive governance of sand mining. This also compromises the goal of the Stakeholder theory to engage all concerned stakeholders in all business processes and activities in order to achieve social sustainability (Laszlo et al., 2010).

However, much of the special grant system provided for in the Mines and Minerals Act focused on minerals and not sand. Given that there is a growing trend of sand mining in Zimbabwe, this marginalisation therefore exposes a reflexive governance gap. Part XX only provides for special grants for coal, natural gas and mineral oils. Sub-section 298 states that,

“Rights to mine coal, mineral oils or natural gases may only be acquired under special grant”.

This suggests that no one can acquire rights to mine the above extractive resources unless a special grant is issued by the minister through relevant authorities. This is in the pre-text that sand mining is not a major extractive activity, yet, today illegal sand mining is widespread, generating extensive markets including commercial purposes and had become a global concern. This is a serious reflexive governance gap on the part of the Mines and Minerals Act

regarding grant system. As noted by Feindt and Weiland (2018), existing policies, regulations and institutional measures should reflect present societal needs.

5.5.4 Urban Councils Act (Chapter 20:09)

5.5.4.1 Provision for institutional framework that addresses illegal sand mining

The study noted that the Act provides local authorities with the responsibility to protect and manage activities that may affect the environment within their jurisdiction. This includes setting up structures to implement programs and policies as well as enforcing the Act. For example, the Act provides for the establishment of standing committees of council to deal with environmental matters. Section 96 (4) states that,

‘Every council shall appoint an environmental management committee which shall be responsible for environmental matters relating to the council’.

This clause clearly shows that the Urban Councils Act decentralizes environmental management responsibility within local authority jurisdictions. This confirms that the Act supports the institutional framework for addressing environmental issues such as illegal sand mining. Most local authority officials also confirm the above result. One of the study participants, Participant GL 2, an HCC official (Personal Communication, 25 August 2020) highlighted that,

“It is a requirement in terms of Urban Councils Act that we set up environmental committees that administer and addresses environmental issues within our jurisdiction. So that committee addresses environmental matters such as waste management and extractive activities including illegal sand mining”.

The above response clearly shows that the Act provides for an institutional framework that deals with environmental issues including addressing illegal sand mining. The Urban Councils Act also places institutional responsibility to protect natural resources by prohibiting harmful activities on the environment and society (Nhamo & Unit, 2003; Mapira, 2011). Unlike the Environmental Management Act, this Act regulates both commercial and non-commercial activities that perpetrate illegal sand mining through a wide range of institutional responsibilities within local authorities (Mushonga, 2022). This suggests that the Urban Councils Act supports the establishment of institutional frameworks to address environmental issues including illegal sand mining within respective jurisdictions. Research confirms the

existence of similar legislative and institutional frameworks for addressing illegal sand mining issues (Agrawal & Larson, 2006; Udoekanem et al., 2014).

5.4.4.2 Specific legal provisions that address illegal sand mining

Concerning specific provision for sand mining, results indicated that the Act directly regulates all excavation works or activities. Sub-section 24 of the Act provides for excavations within council land. Land users are required to enclose or protect all holes such as pits, ponds and other excavations. A critical analysis of sub-section 24 revealed that the Act does not only regulate mining activities by unregistered land users but also registered land users.

Furthermore, Part VIII, Section 129 provides for the adoption of by-laws by a local government board. These by-laws are also applicable to environmental issues within local authorities' jurisdictions. As such, illegal sand mining is regulated through these by-laws. Most participants confirmed the existence and utility of section 129 and 130 of the Urban Councils Act in terms of addressing illegal sand mining issues. Participant GL 3, an ELB official (Personal Communication, 28 August 2020) explained that,

“The Act is very clear in terms of institutional and legislative arrangements for addressing such environmental issues. For example, Section 129 clearly states that the Local Government Board (LGB) may with the approval of the Minister, make by-laws providing for matters that in its opinion are necessary or convenient for the better carrying out of or giving effect to its functions in terms of this Act. Obviously, there is legal provision to exercise power over such disturbing environmental issues by local authorities”.

Supporting the above sentiments, section 130 of the Act that states that:

‘A council may, in accordance with sections 225 and 229 two hundred and twenty-eight, two hundred and twenty-nine, make by-laws adopting by reference, wholly or in part, and with or without modifications, any model by-laws made in terms of section 129, and the model by-laws as adopted shall have effect as if they were by-laws made by the council’.

The foregoing findings from document analysis and interviews clearly shows that the Urban Councils Act contain specific legal provision that can address illegal sand mining and socio-environmental conflicts. Most key participants from local authorities also confirmed the above views. Participant GL 4, a CTC official (Personal Communication, 26 August 2020) noted that,

“This Act gives us autonomy of developing our own by-laws. These by-laws are the tools we then use to address various socio-environmental matters within our cities. Obviously illegal sand mining issues is regulated through these by-laws. In fact, we penalise in terms of by-laws any offenders that interfere with environment including these illegal sand miners”.

In addition, participant GL, an HCC official (Personal Communication, 28 August 2020) reiterated that, “...we have own by-laws that we formulated in terms of the Urban Councils Act. These by-laws help us in addressing environmental, social and economic issues affecting communities”.

The comments confirm that the Urban Councils Act provides a legislative direction among local authorities to address various issues including illegal sand mining matters. Muchadenyika and Williams (2016) commend that the decentralised by-law system allows local authorities to develop specific by-laws that address specific issues within their jurisdictions. However, Pachawo (2013) criticizes the Act for the lack of monitoring and evaluation framework on local authorities pertaining local governance efficacy in environmental matters

5.4.4.3 Utility of existing conditions for sand mining and consumption

Results indicated that the Urban Council Act provides for a permit system for any land use on local authority land including for sand mining. Section 18 prohibits activities such as brick making, extraction and removal of sand, quarrying and cutting of firewood, grass and brushwood without local authority permit. Most local authorities’ officials noted that the Act clearly spells out the conditions for one to conduct sand mining and failure to meet the conditions is an offense. Participant GL 4, a Chitungwiza Municipality official (Personal Communication, 26 August 2020) noted that, “...one has to acquire the permit before commencing any mining operation whether its sand, gravel or mineral. Once all conditions have been met, an approval letter will be awarded, and mining can begin”.

Supporting the above view, participant GL 1, an HCC official (Personal Communication, 28 August 2020) explained that, “...section 18 of the Act clearly states that extraction and removal of sand requires permit from the council. Non-compliance or violation carries some stiff penalties”.

Together, these sentiments confirm the existence of prescribed conditions for sand mining that attempt to regulate illegal mining activities in Zimbabwe. However, the Act is silent in terms

of specificity of standards of sand extraction and quantities of sand extraction. Local authority officials confirmed the existence of such gap within permit systems. Participant GL 4, an ELB official (Personal Communication, 26 August 2020) indicated that,

“The Act does not have a specific standard of sand extraction. It mainly focuses on sustainability in terms of socio-environmental impacts. As such, one can extract as much sand as he or she wants as long as all the paperwork has been completed and permit acquired”.

The above view suggests that the Urban Councils Act provides for a permit system for various land uses including sand extraction but does not stipulates sand mining and consumption standards that are key elements of sustainable mining. Chatiza and Bandaiko (2021) noted that legal frameworks that do define rates of consumption expose natural resource to exploitation. Nevertheless, the scholars agree that by-laws are important in addressing contextual-based environmental issues. Studies also confirm the adoption and utility of by-laws in addressing illegal mining (Aurah, 2013; Kirama & Mayo, 2016; Mowo et al., 2016). This suggests a common adoption of by-laws by governments in addressing illegal sand mining.

5.4.4.4 Provision for accountability, responsibility and stakeholder engagement

Results indicated that the Act does not have a clear provision on the above elements that are key to addressing illegal sand mining. However, the Act promotes stakeholder responsibility over sustainable mining. Sub-section 24 provides for excavations within council land and requires land users to enclose or protect all holes such as pits, ponds and other excavations. Most participants highlighted that the Act lacks that provision on stakeholder accountability and responsibility on sustainable sand mining and governance. Participant GL 1, an HCC official (Personal Communication, 28 August 2020) explained that,

“...the Act does not have a specific provision as per se, but calls for inclusive efforts and responsibility towards sustainable sand mining. The miners for example are required to reclaim their pits once mining stops. This way, the Act is giving the responsibility on the user to mine but observing environmental sustainability which is good”.

Similar to the above view, participant GL 2, HCC official (28 August 2020) also explained that,

“The demand for land reclamation by miners is obviously a direct call to be responsible for your own actions, hence accountability and responsibility as you said. That is why it is

regarded an offense if you do mine and do not reclaim after mining. So, I feel the Act clearly supports the aspects of stakeholder responsibility”.

These findings suggest that the Urban Councils Act does not have a specific provision on accountability and responsibility but indirectly promotes stakeholder involvement in sustainable mining. However, the engagement is mainly limited to the miners, which suggest that other key stakeholders such as local community remain marginalized. Studies show that most legislation is silent as to community participation in environmental governance (Aurah, 2013; Mowo et al., 2016; Chatiza & Bandaiko, 2021; Mitullah, 2003). Okot-Okumu and Nyenje, (2011) challenged governments to formulate by-laws that legally bind all stakeholders to play critical roles in the formulation, implementation and evaluation of programs and policies. This is to ensure that accountability, responsibility and participation is achieved, and in line with reflexive governance framework and stakeholder theories. The two frameworks call for adoption of relevant legislative and institutional measures to address prevailing governance issues, and stakeholder involvement in all these processes is important. Figure 5.12 below provides a summarized analysis of the legislative frameworks underpinning illegal sand mining in Zimbabwe.

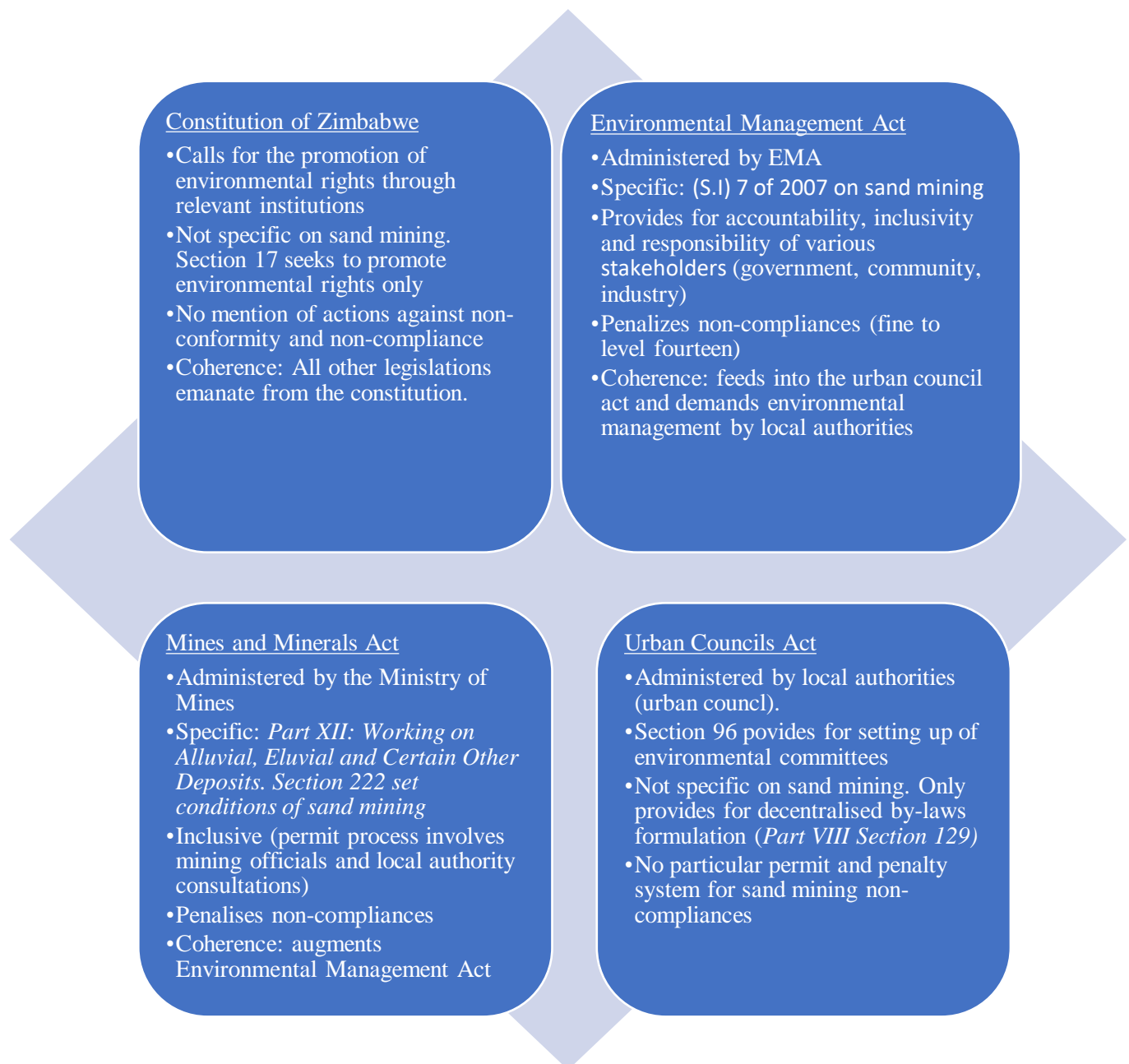


Figure 5.12: Summary of the legislative frameworks underpinning illegal sand mining

5.6 Analysis of reflexive governance of illegal sand mining

Further to observed inherent flaws with existing legislative framework on sand mining, the study noted there is a reflexive governance gap regarding illegal sand mining in Zimbabwe. This is despite the existence of various pieces of legislations and institutions that directly and indirectly regulate illegal sand mining issues. The study identified various obstacles to reflexive and good governance of sand mining in Harare Metropolitan Province. Emerging issues revealed by this study include syndicated communication systems for alerting offenders, low frequency of on-site monitoring, corruption and bribery, political interference and limited resources.

5.6.1 Emergence of syndicated communication systems

Results indicated that one of the obstacles to effective stakeholder engagements is the emergence of syndicated communication systems between government officials and the illegal sand miners. Some local authority officials alert illegal sand miners of all intended site visits or inspections, and the latter take precautions. Participant CR 8, a resident of Zengeza east (Personal Communication, 5 August 2020) highlighted that,

“Some council officers connive with illegal sand miners whom they work with in sand business and alert their peers on dates and times a blitz will be conducted. By the time, Officers come on the sites; the state of activity would have already changed including temporary vacation of miners and removal of any heaps of sand at homes and sites”.

This comment exposes some key obstacles to effective governance in combating illegal sand mining. Illegal sand miners have a well-calculated alert system in case of site visits by authorities. This makes site inspections and apprehension more complex as offenders vacate their sites whenever governments conduct site visits. Most illegal sand miners themselves confirmed that they have adopted communication systems that protect them against local authority officials. Study participant IL 4, a resident and illegal sand miner from Retreat Farm (Personal Communication, 10 August 2020) noted that,

“Even when the police come with EMA, it doesn't really work because once their car is spotted along First Street in Waterfalls, we call each other and even alert each other by cell phones. By the time they arrive here, we would have vacated the mining sites. Some of their officers also alert us, so literally it's a waste of their time. It will not work”.

The comment above exposes the complexity in apprehending illegal sand miners. However, studies show that combined blitz operations are widely used by governments in curbing illegal mining (Abraham et al., 2021; Leal Filho et al., 2021; Liu et al., 2021). Despite wide application, evidence suggests that effective governance is hampered by resistance, tension and violence (Liu et al., 2021). This is in line with findings of this study that revealed that strategic communication systems adopted by offenders in conjunction of government officials hinder effective sand governance.

5.6.2 *Limited on-site monitoring*

Although government institutions notably conducted blitz operations, the rate of conducting the exercises emerged as being very low. The lag between inspections and monitoring exercises in areas experiencing illegal sand mining is too large and paves way for rapid illegal sand extraction and land degradation. Interviews conducted with local community members exposes the inadequacy of blitz operations conducted to curb illegal mining in Harare Metropolitan Province. Participant IL 14, a resident and illegal sand miner from Zengeza (Personal Communication, 13 August 2020) noted that,

“EMA visits these areas but not often. We can operate for two weeks or more without seeing any EMA official here. Sometimes EMA comes with police, but we have since established with most police officers such that this doesn’t affect our operations much. We talk to them and continue operating”.

The above comment suggests a syndicated system of communication and low rate of inspections or raids by local authorities. Similar sentiments emerged from other illegal sand miners who confirmed limited site visits by authorities. Participant IL 13, a resident and illegal sand miner from Zengeza (Personal Communication, 14 August 2020) lamented that, “We have never seen EMA’s here over the past years. I wish they come and teach people on the importance of the environment. This will improve our stewardship and sense of responsibility on our own physical environments”.

The issue of weak regulation systems by local authorities also emerged from the industry. Industrialists expressed concern over the low rate of visits by municipal and EMA officials in hotspots that expose them to the risk of confronting the illegal sand miners on their own. Participant IN 3, a Derbyshire Quarry official (Personal Communication, 28 August 2020) explained that,

“Umm these government offices no longer perform as we expect. EMA used to come and check with us on these issues more regularly and even assess our level of compliance but they no longer come here more often. I do not remember the last time EMA came here but its long time since they last came. The same applies to municipal officers; they no longer come here more often”.

It is evident from these comments that minimal and infrequent multistakeholder blitz operations by local authority rather creates a fertile space for illegality. The low rate of site visits creates room for expansion of illegal sand mining activities within hotspot areas in the province. The local community confirmed that weakness in governance system. Study participant CR 5, a resident of Zengeza east (Personal Communication, 7 August 2020) noted that, “...the police relatively come here more often than EMA and council. The later can go for a month before coming here to check on these illegal and informal activities”.

Although EMA collaborates with ZRP, the above comment indicates that both inadequate multistakeholder engagements and weak enforcement are also barriers to effective governance of illegal sand mining in Harare Metropolitan Province. This is despite studies showing that adequate multistakeholder regulatory systems are key to achieve socio-environmental sustainability (Roloff, 2008; Lifvergren et al., 2009; Laszlo et al., 2010). Findings of this study challenge existing legislative frameworks to adopt reflexive governance approach towards sand mining sector in Zimbabwe.

5.6.3 Corruption and bribery

The study also identified corruption and bribery as impediments to good governance of illegal sand mining in Harare Metropolitan Province. Most participants reported that government officials get bribes from illegal sand miners to allow them to continue mine sand illegally, without apprehension. Communities criticise joint inspections and patrols for being mere assumption of duty rather than realistically serving the mandate of responsible organisations. Participant CR 1, a resident of Retreat Farm (Personal Communication, 3 August 2020) noted that,

“These government officers are just bribed with money and deal is closed. They do visit these sites but surprisingly no mining stops at times. They receive bribes and no longer act. Only few officers are genuine and when those ones do come, most illegal sand miners disappear because they surely apprehend you”.

Another study participant CR 4, a Retreat Farm resident (Personal Communication, 3 August 2020) affirmed that, "...close sources in Harare says capital city's top municipal officers are accused of cashing in on sand poaching".

The industry also confirmed that local authority and law enforcers perpetrate illegal sand mining through suspected corruption. Participant IN 3, a Derbyshire Quarry official (Personal Communication, 28 August 2020) highlighted that,

"The problem is everyone including the officials themselves especially the ones from ZRP and Council are greedy for money, so they always accept bribes and make relations with illegal sand miners. They are the same Officers that communicate with the illegal sand miners of any on-site raids that will be planned".

Whilst there are some notable stakeholder engagements between police and other stakeholders from the industry and the government, the above evidence suggests that corruption is one of the most serious obstacles of effective governance of illegal sand mining. Knutsen et al. (2017) noted that corruption promotes malpractice, non-compliance and environmental destruction. In this study, clearly, corruption has become a vehicle of illegal sand mining and the socio-environmental conflicts.

5.6.4 Political interference

Politics also emerged as an obstacle to effective governance of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province. Political figures such as war veterans use political muscle to violate property rights of private mining companies, thereby creating territorial conflicts between landowners and illegal sand miners. Despite concerted efforts by victims of illegal sand mining, and particularly the industry or mining companies, responsible authorities also find it difficult to exercise regulatory or enforcement powers for state-owned land. Chaotic land use, land rights and mining systems prohibit efforts to address illegal sand mining in such areas. This is an obstacle to reflexive governance of sand mining as emerged from concerned industry officials as study participant IN 3, a Derbyshire Quarry official (Personal Communication, 28 August 2020) expressed that, "This area is dominated by war veterans. Sometimes when we raise our heads over illegal operations in our premises, they intimidate us trying to pacify us. Recently, we filled a case against one of the war vets who refuted formal warnings against operating in our premises".

Clearly, this response reveals that illegal sand mining is not only a socio-economic and environmental issue but also a politically driven issue. Supporting the above views, mining officials from the private sector also castigated the government for not addressing their conflict with politicians. Participant IN 1, an Eyecourt Quarry official (Personal Communication, 28 August 2020) noted that,

“We are deeply concerned by the manner politics is used to manipulate us as industry. Our voices are not heard despite repeated efforts to seek assistance from both local authorities such as councils and EMA, and even the community leadership. Everything is politicized and you would notice that some community leadership is part of the whole system of illegal sand business. Surely, how can policies work in societies where policy formulators perpetrate illegality?”

These comments from the private sector indicate that politics is used as an instrument of both human and environmental rights violations rather than instrument for promoting sustainable sand mining as espoused by the stakeholder theory and good governance as advocated by the Constitution of Zimbabwe. Even some government officials further stated that state land is very difficult to regulate, as there is much political dominance and freelance activity. Participant GE 4, an official from EMA (Telephone Interview, 14 August 2020) explained that, “Retreat Farm is a state land, and this is why it is difficult to regulate illegal sand mining there. No one specifically owns it hence rampant illegal sand extraction taking place there”.

Indeed, political interference in land rights and mining rights is an obstacle to reflexive governance of illegal sand mining in Zimbabwe. Empirical evidence suggests that politics is often used to advances personal interests at the expense of societal and environmental needs (Cliffe et al., 2011; Shoko et al., 2020). As revealed by this study, politics was utilised for land acquisition and influence over sand mining rather than on promoting sustainable sand mining. Given that reflexive governance allows for design and implementation of relevant actions and policies (Vadrot et al., 2022), politics, as study results indicated, becomes a serious obstacle to its adoption and implementation.

5.6.5 *Limited resources*

The study also noted that lack of adequate resources impeded effective governance of illegal sand mining in Harare Metropolitan Province. It emerged that most institutions were not able to fully execute their environmental mandates due to limited resources to support programs

such as blitz operations on illegal sand mining sites. Most participants indicated that most exercises required adequate funds and equipment which may not be readily available. Participant GE 2, an EMA official (Personal Communication, 14 August 2020) highlighted that,

“The major challenge we have in organising successful programs towards illegal sand mining is limited funds. Usually, these programs for example blitz involve working with various actors such as community, media and police, so once we plan to conduct them, there should be adequate resource support. At times, resources may not suffice. This explains why at times we take long time before we conduct these programs”.

Even local authorities confirmed that resource scarcity has a significant effect on institutional engagements in addressing illegal sand mining. Participant GL 1, an HCC official (Personal Communication, 25 August 2020) noted that,

“We are trying our best to deal with illegal sand mining but sometimes resources pull us back. We have a shortage of vehicles to conduct frequent monitoring of all illegal sand mining sites. Some of our programs require approval and even financial support from the ministry, so as long we have no funds disbursement, it we can't make any no progress. At times, we even fail to cooperate with EMA because of resources. We need to work with EMA and other key partners in devising long terms solutions to illegal sand mining. We hope it will be a thing of the past soon”.

This comment clearly reveals that resource scarcity is indeed one of the obstacles to good governance of illegal sand mining. Enforcement of laws and regulations requires resource support (Ujoh, 2014, Russo, 2010). This suggests that existing socio-environmental conflicts closely relate to resource scarcity that affect capacity of responsible authorities or institutions to enforce laws that protect communities and the environment. Ujoh (2014) noted decreased economic productivity contributes to conflicts and a weakened state. This suggests that resources are key to effective governance of illegal sand mining in Zimbabwe. As noted by Duit et al. (2016) reflexive governance involves the constant review of practices and policies to ensure that they remain relevant to present societal needs. This suggests that resource availability is key to implementing reflexive governance. Unfortunately, study results indicated that scarcity of resources within the government, and particularly state institutions, hinder

reflexive governance practices in Harare Metropolitan Province. Bhatasara (2020) noted that resource scarcity is a problem within local governance systems in Zimbabwe.

5.7 Summary

This chapter presented findings on the political ecology of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province. Study results were indicated and discussed around four main themes, namely: drivers of illegal sand mining including social, economic and political factors as sub-themes, impacts of illegal sand mining and nexus with conflicts, stakeholder collaborations in addressing illegal sand mining, and the utility of existing legislative framework and governance in curbing illegal sand mining and conflicts. The following chapter discusses the findings of the study.

CHAPTER 6 DISCUSSION

6.1 Introduction

This chapter discusses findings presented in Chapter 5 with a view to providing a broader picture on the critical issues influencing illegal sand mining and associated socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe. Discussion of findings is linked to the four theoretical frameworks upon which the study was premised, namely the political ecology, land resource conflict theory, stakeholder theory, and reflexive governance. It is informed by the four main themes that emerged from the qualitative data analysis and interpretation - drivers of illegal sand mining, impacts of illegal sand mining and socio-environmental conflicts, stakeholder collaborations in addressing illegal sand mining, and utility of existing legislative framework on sand mining. This is followed by an analysis of reflexive governance of illegal sand mining.

6.2 Drivers of illegal sand mining

This section discusses social, economic and political drivers of illegal sand mining. Social drivers focus on unemployment, poor living standards and poverty and economic drivers relate to national economic performance. Political drivers relate to politically-driven government policies that directly and indirectly perpetuate illegal sand mining and associated conflicts.

6.2.1 Social drivers of illegal sand mining

Study results indicated that urbanisation, unemployment, poverty, poor standards of living and proliferation of informal settlements are the social drivers of illegal sand mining in Harare Metropolitan Province. However, urbanisation in Harare Metropolitan Province emerged as the leading push factor towards illegal sand mining in the province while the remaining social factors were consequent to this urbanisation.

6.2.1.1 Urbanisation and illegal sand mining

Study results indicated that the influx of people in Harare had resulted in illegal sand mining among other illegal activities. In all the three case sites (Retreat Farm, Zengeza East and Epworth), the majority of participants - community leadership, civil society and local authorities - identified urbanisation as the main driver of illegal sand mining. However, in Epworth, unlike the other two case study sites, over 50% of the key study participants identified urbanisation as a fuel to existing accommodation problems, unemployment and poor standards

of living that combined to contribute to rampant illegal sand mining. Since Epworth is a highly crowded informal settlement in Harare, this suggests that most residents are unemployed but rather engaged in a range of informal as well as illegal activities, such as illegal sand mining. This result is in agreement with findings from previous studies that show that urbanisation increases demand for housing (Jacob, 2010; Kamis, 2011) but illegal sand mining induced by urbanisation is more an outcome of limited livelihood opportunities and less because of residential expansion within the three case study sites. In the present study, sand demand is driven by a combination of increasing unemployment and construction activities in and around these areas in Harare Metropolitan Province.

Sand is a raw material required for construction purposes (Adedeji, 2014, Lempriere, 2017; Chevallier, 2014) and urbanisation-induced sand demand has contributed to illegal sand mining in China, Singapore and India (Lempriere, 2017; Peduzzi, 2014). Most academic studies confirmed that urbanisation is the leading driver of illegal activities such as illegal mining (Veranda, 2010; Sada & Shrestha, 2013; Shaji & Anilkumar, 2014). In contrast, a study by Ye et al. (2020) noted that much illegal sand mining was not urbanisation-induced but rather that a construction boom was the leading driver of illegal mining. In other countries, studies indicate that illegal sand mining mainly occur along the coasts (Karikari, 2013; Jonah et al., 2015), that is common in Zimbabwean context. Despite the variation in nature and scale of illegal sand mining, studies confirm that urbanisation fuels illegal sand mining (Milton, 2010; Saviour, 2012; Gosh, 2012). The sand business has become an important economic activity for local communities due to its demand and value at both subsistence and commercial level (Masalu, 2010; Ratnayake, 2013). The market value of sand from the informal sector makes illegal sand mining lucrative for both suppliers and the market. Studies attribute this emerging trend to high urbanisation and unemployment (Singh et al., 2014; Mah, 2015). This suggests that urbanisation is both a push and a pull factor for illegal sand mining. In the present study, it emerged that most unemployed youths into illegal sand mining in order to meet sand demand induced by urbanisation and construction activity growth. Research identified construction as the main driving activity of illegal sand mining in many countries (Lempriere, 2017; Peduzzi, 2014; Propescu, 2018; Gavriletea, 2017).

Sand is mainly used for construction purposes particularly for manufacturing concrete (Duan et al., 2019). A dramatic example of this is that, resulting from economic growth, China used more cement between 2011 and 2013 in infrastructure development compared with cement

used in the USA in the entire 20th century (Swanson, 2015). Although this study did not examine the relative consumption of sand, results indicate that urbanisation, unemployment and construction emerged key drivers of illegal sand mining. Edwards (2015) noted that the cement industry is the largest consumer of sand and gravel. In this study, unfortunately, urbanisation and illegal sand mining resulted in a myriad of socio-economic and environmental problems such as social conflicts, market competition and environmental degradation, respectively. This finding augers well for the political ecology framework that views social-environmental problems as a connected hub of various social, economic and political factors (Dawson, 2021; Batterbury, 2018).

6.2.1.2 Unemployment, poverty and poor standards of living

Unemployment emerged as one of the main social drivers of illegal sand mining in Harare Metropolitan Province. In all three case study sites, most study participants noted that unemployment drives many youths into illegal sand mining activities. Poverty and poor standards of living due to unemployment compounded to increase the rate of illegal sand mining. However, in Retreat Farm, unlike the other two case study sites, many study participants from the local community, both community leaders and residents, viewed unemployment as the main problem related to illegal sand mining. Rather, most local communities felt that sand mining is a lucrative employment opportunity that emerged from popular government policies such as land reform. This is because prior to the land reform program, the area was owned by Whites, thus depriving indigenous communities the freedom of land use. In contrast, Zengeza and Epworth did not significantly benefit from the land reform policy, thus unemployment emerged a serious concern to local community, and a driver to illegal sand mining in their localities.

Although this study identified unemployment as one of the key socio-economic drivers of illegal sand mining in the province, previous studies indicated that most illegal sand mining in developed countries is not driven by unemployment (Peduzzi, 2014; Beiser, 2017; Sverdrup et al., 2017). Beiser (2017) noted that unemployment is relatively low in developed countries.

Nonetheless, evidence suggests that high unemployment is one of the leading social drivers of illegal sand mining. Plecher (2020) estimates that unemployment rate was close to 5% in 2020 and increased to 8.07% in 2021. Previous studies also confirmed that unemployment was a key driver of illegal mining including sand mining (Davey, 2011; Green, 2012; Madyise, 2013;

Chevallier, 2014). In addition, Madyise (2013) noted that unemployment and poverty combined with a high cost of living forced local communities to engage in illegal activities such as illegal sand mining. The UN (2018) reported that most developing countries experience a high cost of living, poor living standards and unemployment that contribute to a high crime rate.

In Africa, studies established that sand mining is a source of employment (Arwa, 2010, Masalu, 2010; Chevallier, 2014) despite the detrimental consequences posed to communities and the environment (Dahal et al., 2012; Micomyiza, 2018; Ali, 2020; Huang, 2020; van Arragon, 2021). However, most studies emphasized unemployment as an outcome of urbanisation. In contrast, the present study observed unemployment as an outcome of national economic meltdown. Thus, poverty and declining standards of living among the citizens propagated indiscriminate sand mining activities by local communities. Similarly, Mwangi (2007) and Madyise (2013) agreed that unemployment is the primary cause of illegal activities including sand mining by most youths in Africa. Despite the detrimental effects of illegal sand mining on society and the environment (Dahal et al., 2012; Micomyiza, 2018; Ali, 2020; Huang, 2020; van Arragon, 2021), researchers observed a significant employment of youths (Arwa, 2010, Masalu, 2010; Chevallier 2014).

Regarding the age and gender of illegal sand miners, results from the three case study sites in Harare Metropolitan Province indicated that the COVID-19 pandemic resulted in lockdowns to increase unemployment and this drove many youths, both male and females, from their usual workplaces into alternative activities such as sand mining (Arwa, 2010; Masalu, 2002; Mwangi, 2007). The study by Arwa (2010) revealed that both men and women are engaged in sand mining with the latter directly involved in sand extraction and indirectly in provision of support services and goods to illegal sand miners. Mwangi (2007) noted that the mining of gravel and sand for construction purposes and the present study noted that men were involved in mining, loading, transporting, and offloading of sand. This finding is in agreement with findings by Madyise (2013) who reported that that mostly youths are either directly employed as sand miners or as manual loaders of sand into trucks in Botswana. Similarly, at the Wild Coast of South Africa, illegal sand mining employs both adults and youths with the latter being mainly hired as sand loaders while adults were truck drivers (Mngeni et al., 2017). While these studies report that youths are involved mainly in beach and coastal illegal sand mining, the

present study established that illegal sand mining was pronounced near and around residential areas particularly along small river systems and open spaces.

Although this study identified unemployment as one of the key socio-economic drivers of illegal sand mining in the province, previous studies indicated that most illegal sand mining in developed countries is not driven by unemployment (Peduzzi, 2014; Beiser, 2017; Sverdrup et al., 2017). Beiser (2017) noted that unemployment is relatively low in developed countries. However, extant empirical evidence suggests a strong link between unemployment and illegal sand mining. For example, a study by Shaji and Anilkumar (2014) in India revealed that unregistered companies that informally employed a few individuals to assist in the mining processes practice illegal sand abstraction. Similarly, Jonah et al. (2015) identified social aspects that include inadequate employment, high profit margins, ease of access to the coast and low environmental awareness of residents as the main reasons why people engage in illegal coastal sand mining. A study by Adedeji (2014) on the assessment of environmental impacts of inland sand mining in parts of Ogun State, Nigeria noted that some companies were engaged in both informal employment and illegal sand mining. Companies engaged the services of local community for illegal sand mining, and operations involving relatively sophisticated machinery.

In contrast, local community members engage in illegal sand mining for a living in Zimbabwe's Harare metropolitan province. Furthermore, illegal sand mining activities mainly involve rudimentary methodologies. In contrast, Gavriletea (2017) observed that in countries such as India, illegal miners mainly use sophisticated machines to extract large volumes of sand for business purposes. Despite the variations in the manner, geographical context and scope of illegal sand mining, all studies concur with the current findings on unemployment as one of the main drivers of illegal sand mining.

Findings suggest that employment creation in the sand mining sector has created various stakeholder conflicts due to conflict of land use. The income generated from the illegal practices keeps communities engaged in illegal sand mining despite an outcry from other affected and concerned stakeholders. The illegal sand miners employ any means possible to resist the demands of authorities against illegal sand mining, as they have no alternative jobs to sustain their lives. Studies confirm that illegal sand mining is associated with various socio-environmental conflicts among various stakeholders such the government, community and sand miners (Madyise, 2013, Beiser, 2017). This confirms the argument submitted by the land-

resource conflict theory that multi-stakeholder interests over common land resources tend to trigger conflicts. Despite the variations in scales and forms of illegal sand mining, the studies attest that illegal sand mining was largely due to unemployment and this has become a centre of socio-environmental conflicts the world over. Such miners have violated the environmental and social laws, including open defiance, in order to retain their illegal activities in the face of unemployment. Mngeni *et al* (2016) particularly exposed that in South Africa unemployed illegal sand miners placed local authorities under siege at sites as a way of expressing discontent over deprivation of sand mining.

While these studies acknowledge poverty and unemployment as drivers of illegal sand mining, they mainly point out weak governance systems as facilitators of illegal sand mining. In this regard, weak governance was also identified as an indirect driver of illegal sand mining (Chevallier, 2014; Adedeji, 2014). A study in Ghana confirmed that poor law enforcement was less of a driver but more readily explained the persistence of rampant illegal sand mining activities in the country (Bosco & Sumani, 2019).

This is evident that despite being a source of employment, illegal sand mining is associated with various socio-environmental conflicts the world over which resonates with the land-resource-conflict theory (*see section 2.3*).

6.2.1.3 Proliferation of informal settlements and illegal sand mining

Results of the present study indicated that the growth of informal settlements is one of the social drivers of illegal sand mining in Harare Metropolitan Province. This was more pronounced in Epworth which is an informal settlement with relatively cheap accommodation. Thus, overcrowding in another residential suburban area with high accommodation costs and in proximity to available sand sites will drive illegal sand mining. In addition, illegal sand mining in Retreat Farm informal settlements was also politically driven by the land reform policy while in Zengeza, illegal sand mining was rather driven by demand for sand due to residential expansion in Chitungwiza and nearby suburbs. In spite of these various factors, interviews with most government officials and local community leadership indicated that illegal sand mining was not particularly related to proliferation of informal settlements.

Other studies suggested that a high concentration of populations in informal settlements and availability of sand coupled with a high cost of living had resulted in indiscriminate illegal sand mining (Chitsike, 2003; Marais *et al.*, 2018)). Most such residents are impoverished and

jobless, thus, they have resorted to illegal sand mining as an alternative livelihood as indicated by Chitsike (2003) who noted that unplanned settlements expose local environmental resources to the risk of abuse and exploitation. In addition, this author noted that the Zimbabwean land reform program and associated poor land use planning weakened governance of land use. Thus, the present study observed that local communities staying in illegal and unplanned settlements such as Epworth and Retreat Farm were engaged in various illegal activities including illegal sand mining to earn a living.

Illegal sand mining is an outcome of illegal settlements in areas such as Retreat Farm and Epworth in Harare Metropolitan province. However, while a South African study reported that these two aspects were interrelated, the establishment of illegal settlements were a consequence of illegal mining activities (Marais et al., 2018). These authors also reported ineffective government regulation of informal settlements around mining areas despite existing comprehensive policies to integrate community members and home ownership. Therefore, illegal sand mining is viewed as primarily driven by poor governance. Other studies also show that natural resource endowment often leads to emergence of informal settlements and illegal activities as occurred Australia (Marais et al., 2013), Europe (Feagin, 1990) and North America (Halseth, 1999; Gómez-Betancur et al., 2022). Although the cause-effect relationship varies among these studies, findings generally agree with the findings of the present study that illegal sand mining more closely follows the establishment of illegal settlements.

The present study suggests a close link between informal settlements and illegal sand mining in Harare Metropolitan Province. Informal settlements are often overpopulated and feature activities that pave the way for illegal activities such as sand mining (Marais et al., 2018; Butcher, 1993). These authors noted that illegal mining expansion resulted in housing problems in North America, Australia and Europe. In contrast, this suggests that if housing demand was low in many informal settlements, there would be a reduction in the number of residents who might become involved in illegal sand mining. In addition, such individuals might become geographically separated from areas where there were building activities as well as land suitable for illegal sand mining. This would then require their relocating to such areas.

Although there are limited studies exposing the link between illegal settlements and illegal sand mining, studies point to illegal human settlements and illegal practices being closely linked (Saunyama, 2017; Kafe, 2017). However, a study by Madyise (2013) showed that most inland sand mining activities predominantly occur in unplanned settlements where the majority

of people live a hand-to-mouth existence. Similarly, Kwangwama et al. (2022) noted that the unplanned nature of settlements promotes illegal practices and social problems such as theft, robbery and poor sanitation. Saviour (2012) also noted that illegal business activities such as selling alcohol at unregistered points, gambling and extracting natural resources are common in illegal settlements. Therefore, illegal settlements significantly promote further illegal activities such as illegal sand mining, especially in countries with poor land use planning programs and policies.

6.2.2 Economic drivers of illegal sand mining

6.2.2.1 Economic hardships

General economic hardships experienced by citizens due to poor national economic performance also emerged as a contributory factor to illegal sand mining in Harare Metropolitan Province. This issue emerged in all the three case sites although this was of much concern to local community residents and illegal sand miners in Epworth and Zengeza East. Key study participants from local authorities, NGOs and CSOs supported the above views. In contrast, industry was relatively more concerned with their conflict of interest with illegal sand miners, and economic hardships were only supplementary issues to the wider problem of politically-driven policies perceived to empower local community.

In Epworth and Zengeza, most participants from the local community and civil society emphasized that the poor national economic performance was the root cause of illegal sand mining. Thus, closure of industries and the rising cost of living in a jobless economy emerged as salient issues, as compared to Retreat Farm. As such, resulting social problems such as unemployment, poverty and poor standards of living were identified as push factors for illegal sand mining and other illegal activities. These interlinked socio-economic factors drove most citizens into illegal sand mining for a living. Similar to these findings, Arwa (2013) noted that illegal sand mining is an alternative economic activity for absorbing economic shocks in the face of a dwindling job market in most developing countries.

Economic hardships in Africa contributed to various illegal activities, including illegal sand mining (Lange, 2011; Mushonga, 2022; Davey, 2001; Greens, 2012; Chevallier, 2014). These studies indicated that substantial numbers of local communities were employed in the extraction, transport and selling processes of sand. Chevallier (2014) noted that an increase in

informal employment in developing countries was a response to economic shocks, and a decline in industrial performance and the formal job market.

Thus, poor economic performance in a country can drive illegal mining activities (Chevallier, 2014; Green, 2012; Lawal, 2011). A study by Masalu (2002) in Tanzania reported that delivery of sand using carts generated roughly USD 1.50 per cart, and that vending particularly at illegal sand mining sites has become a common phenomenon. Similarly, in Botswana, Madyise (2013) noted that illegal sand mining has led to the emergence of various vending points by young and old men selling foodstuffs, electrical devices, cosmetic products and clothing. The foregoing findings support findings from this study that also revealed that one cubic metre of sand costed US \$6 in Harare Metropolitan Province. As at the first quarter of 2023, illegal sand miners sell sand at prices ranging from \$40 to \$50 per five cubic metres. This is less than half the price (\$100 to \$120) charged for the same amount of sand bought on the formal market (Chronicle, 2012).

In the present study, illegal sand mining emerged as a source of income for communities who were unemployed in other formal and informal sectors. A study by Mushonga (2022) noted that even though illegal sand mining generated a low income, this allowed local community members to meet some of their basic needs. Similarly, the present study noted that illegal sand miners generally earned a low income despite working day and night mining and transporting sand. In addition, the present study noted the emergence of support service provision such as beverages and catering at illegal sand mining sites and nearby areas, particularly by women. Other studies asserted that vending is expanding and improving livelihoods for communities in developing countries (Mitulla, 2003; Brown, 2018). Indeed, this evidence clearly shows how illegal sand mining has been widely viewed as an economic shock absorber in many countries. Thus, statistics from the Mine Safety and Health Administration in Nigeria indicated that in the last quarter of 2001 Niger state alone employed over 700 sand and gravel miners, accounting for 40% of the total employment in the informal mining sector (Lawal, 2011). Thus, economic performance is instrumental in determining the level of illegality in many countries (Alfvin, 2019; Mbaiwa, 2008) as well as in Zimbabwe (Mushonga, 2022).

Nevertheless, a well-regulated informal sector makes a significant contribution to national income through taxation (Lawal, 2011; Power & Power, 2013). Lawal (2011) noted that the government earns about 8% of profits from each sand miner and the miner obtains 2% of accrued revenue. While there is a lack of global data on actual financial gains and losses due

to illegal sand mining, most scholars agree that some governments benefit from sand and gravel mining in the informal sector (Jonah & Adu-Boahen, 2016; Bosco & Sumani, 2019). In Kenya, local authorities require unregistered sand miners to pay a small fee for short-term sand mining in a bid to harness the economic potential of illegal sand mining (Mwangi, 2007). This generates revenue into the national fiscus (Ibid). In contrast, the present study noted there was no obvious, positive relationship between illegal sand mining and national economic growth. Rather, the two variables were characterised by conflict between various stakeholders where, for example, the influx of illegal sand miners and abundant supply of sand within the informal market was a major blow to tax-burdened registered miners. In contrast, the stakeholder theory demands that, instead of conflicting interests, parties should have common resolutions towards addressing socio-environmental issues and illegal sand mining. The subsequent impact of reduced revenue in the formal sector leads to a reduction in government income, thus illegal sand mining requires more than just regulatory activities for real national socio-economic development. In essence, poor economic performance results from illegal sand mining.

6.2.3 Political drivers of illegal sand mining

Politically, the present study established that government policies including the Indigenisation policy of 2008 and the Land Reform Program that can be traced back to 1980s facilitated illegal sand mining activities. This section discusses these findings in terms of published studies and theoretical frameworks that were used in the present study.

6.2.3.1 Land reform program and illegal sand mining

The Fast Track Land Reform (FTLR) Program emerged as one of the major political drivers of illegal sand mining in Harare Metropolitan Province. Thus, evidence emerged particularly from Retreat Farm where the local community benefited from the government's policy. The FTLR was a government's initiative starting in 2000, aimed at empowering the landless black majority through vast land acquisition from the minority whites (Shoko et al., 2020). According to Mando et al. (2019), the FTLR program that began in 1980 through *willing buyer willing seller* approach took a sudden government shift to compulsory land grabbing from the whites to black Zimbabweans. This was termed the Fast Track Land Reform Program which saw about 4,324 farms being redistributed by the end of 2003 (Cliffe et al., 2011).

Results from Retreat Farm where the majority of residents were beneficiaries of the program indicated that illegal sand mining is directly an outcome of this government's initiative. Most

from the local community participants, particularly the residents and community leaders, highlighted that following the FTLR program in Zimbabwe, land use suddenly shifted from commercial agriculture to low-to-medium scale sand mining operations including illegal sand mining. In contrast, land use changes were insignificant in Epworth and Zengeza, and so most of the participants in these two sites rather pointed to economic and employment issues as key drivers of illegal sand mining. It also emerged that the land reform process did not only accelerate illegal mining but also complicated governance by responsible authorities. The perceived empowerment by communities has indeed become a leading political factor that exacerbated illegal sand mining activities in Harare Metropolitan Province and other parts of the country.

Local community members viewed this program as an empowerment initiative meant to give them freedom over land use (Magure, 2014; Shoko et al., 2020). On the other hand, the sudden shift in land use by the minority beneficiaries of FTLR program also accelerated illegality and malpractices within resettlement areas (Cliffe et al., 2011). Thus, these authors reported that in areas that were once farms were turned into business centres and settlements for some war veterans and this increased the demand for sand, subsequently prompting illegal sand mining activities, for example in Retreat Farm. This is in agreement with findings of the present study that observed social and political conflicts emanating from land ownership and use. This also agrees with the land-resource-conflict theory that views land as a source of conflict due to varied land use interests (Ujoh, 2014). In this study, sand mining conflicts mainly emerged from the illegitimate seizure of vast land by political actors.

Findings from Mkodzoni and Lawrence (2019) similarly revealed that the new land tenure system undermined the traditional laws on environment and land use, creating conflicts. The new farmers with unclear tenure rights conflicted with radicalised workers over land use. Local communities felt deprived of their traditional land by illegitimate, political-oriented land barons. This is in line with observations made by Hentze and Menz (2015), who highlighted that land reform program mainly benefited minority politicians at the expense of the targeted ordinary majority of land-starved Zimbabwean citizens. Similarly, Cliffe et al. (2011) noted that most politicians utilised land reform to advance self-interests. Findings by Shoko et al. (2020) also showed that most resettlement areas are business centres in Sovelele resettlement area in Mberengwa.

The rise in illegal sand mining activities in Harare Metropolitan Province occurred within this paradigm shift of land use. The majority of FTLR program beneficiaries, who were termed '*new farmers-cum-small-scale miners*', were mainly supporters of the ruling party, the Zimbabwe African National Union-Patriotic Front (ZANU PF) (Magure, 2014; Mkodzongi & Lawrence, 2018). This confirms findings from the present study which revealed that illegal sand mining increased in the aftermath of the FTLF program in Zimbabwe with communities viewing this government's initiative as an empowerment tool promoting land use. In this study, it emerged that most sand mining operators are unlicensed and enjoy political backup in their activities. This worsens, rather than combats, illegal sand mining in Harare Metropolitan Province.

Results also showed that the land reform system and its socio-environmental ramifications caused various forms of conflicts among stakeholders. The rudimentary methods of sand extraction are a cause of concern to environmental authorities such as the EMA. War veterans who possess vast land grabbed through the land reform program use political power to override environmental laws at the expense of community welfare and environmental authorities, thus generating an area of conflict. Beevers (2019) noted that the massive influence of politics on natural resource management and governance. This suggests that politics can potentially improve or worsen governance of mining activities. In this study, environmental authorities identified legitimacy issues concerning land as an impediment to effective governance of sand mining in some newly resettled areas. This agrees with findings by Peduzzi (2014) who observed a deficiency of commitment by political leadership in addressing illegal activities that plunder natural ecosystems. This author also mentioned the limited attention given to illegal sand mining issues on global political agendas over the years. Turner (2010) noted that politicians are well positioned to address some of the biggest challenges associated with resource wealth. However, political individuals such as war veterans accelerated illegal sand mining activities instead of taking active and leading roles towards reflexive governance (van der Jagt et al., 2021).

In contrast, other studies showed that some government policies have made positive strides in the regulation of sand mining, especially in the European Union (EU) and the United Kingdom (UK) (Liu et al., 2021). This is in contrast with findings from the present study where the government's land reform policy mainly focused on land redistribution without consideration of the environmental issues such as illegal sand mining. Mando et al. (2019) noted that the

FTLR program resulted in various socio-environmental issues including illegal mining, environmental degradation and pollution. Political power overriding environmental authorities' compromises effective governance and this contradicts the aims of the stakeholder theory that advocates for stakeholder collaborations including the politicians in achieving social and environmental sustainability (Clement, 2005). Rather, these findings are in line with the land-resource-conflict theory that sees land as a source of conflict for various land users.

In Asia, a study by Chilamkurthy et al. (2016) attributed widespread illegal sand mining activities and subsequent multistakeholder conflicts to weak governance, particularly lack of specific regulation. To further explain this the political ecology framework analyses the complexity of social and environmental changes resulting from conflicting social, political and economic processes (Taylor, 1999; Bassett and Zimmerer, 2003; Schubert, 2005). As the present study established, politics has complicated the utilization and protection of land from illegal sand mining activities. Protected areas and conservation are significant domains of political ecology with political ecologists attempting to reveal how these spaces of conservation evolved into areas of socio-environmental conflicts (Benjaminsen & Svarstad, 2018; Bassett & Zimmerer, 2003). This is evident in the present study where the FTLR program paved the way for political interference in sand mining and created conflict among interested parties including authorities, the private sector and even community members. Chaotic land seizures coupled by an induced black empowerment mantra have accelerated the wanton illegal sand mining activities in the province.

Furthermore, the land reform process was associated with various human rights and environmental violations (Mando et al., 2019). A few individuals with political positions and influence mainly grabbed land without complying with formal processes of land acquisition (Alexander, 2006; Mando et al., 2019). Alexander (2006) particularly viewed the FTLR program as rather an environmental and livelihood threat, as sustainability of land has declined since then. With most indigenous landowners having limited capacity and adequate resources to sustain agriculture, vast pieces of land were either left idle or used for other non-agricultural practices and became sites of illegal sand mining. This also emerged in a study by Chitsike (2003) who noted that haphazard land redistribution processes culminated in weak corporate land security systems that exposed sand-endowed land to illegal sand mining.

Despite this study exposing the link between political factors and illegal sand mining in the Zimbabwean context, other studies on illegal sand mining did not really expose did such a

direct relationship (Sreebha & Padmalal, 2011; Adedeji, 2014; Chevallier, 2014; Chen, 2017). Rather, these reported findings mainly pointed to poor governance at the institutional level, particularly with local authorities, for causing indiscriminate sand mining. Green (2012) identified as the main issue the lack of a clear and comprehensive legislative framework for sand mining governance in South Africa. In contrast, the present study unravelled the powerful influence of politics on sand mining processes in Zimbabwe. This is reflected by the political ecology theory that highlights the exercise of political control over natural resources by politicians whose political agendas override ecological importance.

6.2.3.2 Indigenisation policy and illegal sand mining

Besides the government's land reform policy, the present study also identified the government's indigenisation policy as one of the political drivers of illegal sand mining in Zimbabwe's Harare Metropolitan Province. This emerged mainly from interviews held with Epworth and Retreat Farm residents. According to Marazanye (2016), the Indigenization and Empowerment Act, signed in March 2008, provided for indigenous black Zimbabweans to benefit from foreign mining investments made in their communities. The benefits include, among others, acquisition of shares and working capital for their own businesses.

The present study established that the economic prospects of this policy and associated benefits stimulated much optimism of economic transformation among the indigenous citizens particularly in Epworth and Retreat Farm. In the latter, citizens viewed the potential for local economic and social development through direct mining and investment returns. Similarly, in Epworth, most local communities whose informal settlements had not been demolished over the years as the government promised to regularise them, commended government's empowerment policies and programs. Unlike Retreat Farm and Zengeza, local community members, especially community leadership and other senior citizens, viewed such government programs as meant to empower them to any form of economic, developmental, and productive land use. To them, illegal sand mining was an economic activity that emerged as part of government's empowerment policy. There was much misinterpretation of the government's indigenization and empowerment Act by most residents from Epworth community. This policy related to foreign direct investments, and local community share ownership through direct mining and investment returns. According to Marazanye (2016), direct mining involves indigenous people enjoying mining rights. On the other hand, investment returns included mining revenue in which the government was entitled to a share (Chipika & Malaba, 2011).

According to Shumba (2014), the policy mandated locally operating foreign companies to cede 51% of their shares to indigenous citizens. One way to achieve this was through partnership with local community organisations in the mining sector (Ibid).

However, most Zimbabweans, particularly local community, misinterpreted the policy reform and viewed it as an empowerment tool to open access to natural indigenous resources such as land and minerals. Indigenous communities felt more empowered to own and utilise land and benefit from it without interference. On the other hand, some citizens felt that the policy did not bring much anticipated local development and this caused resentment, sand resource abuse and conflicts. In response, local community members considered illegal sand mining as an alternative self-empowerment tool through which they might meet their long-anticipated benefits from the government policy. Indeed, the Indigenization and Empowerment Act has facilitated the rise in illegal sand mining in Zimbabwe. Although there are controversies on Zimbabwe's indigenization policy, the contribution of this policy towards illegal sand mining is undoubted (Magure, 2014). The author argues that the diversity of land use beyond agriculture, that underpinned indigenisation and empowerment act, was a vote-buying strategy by the government. Unfortunately, with the policy not bearing long-term anticipated benefits, illegal mining activities such as sand mining became rampant.

While there are few reports providing a link between illegal sand mining and government policies of this nature, some authors acknowledge the existing relationship between government policies, mining investments and local community development (Mngeni et al., 2016; Mngeni et al., 2017). A study by Elavenil et al. (2017) similarly revealed that lack of real local development from mining investments resulted in socio-environmental conflicts in Tamil Nadu, India. Similarly, Masalu (2002) noted the lack of positive correlation between investment policies and community development as stipulated by the policies, and this was a source of conflicts and a driver of rampant illegal activities in the mining sector. These findings resonating with findings from the present study that clearly exposes the gaps between policy formulation and policy implementation, a situation that is responsible for causing some socio-environmental problems as observed in this study.

6.3 Illegal sand mining: Impacts and nexus with socio-environmental conflicts

6.3.1 Environmental impacts and conflicts

Environmental impacts caused by illegal sand mining has resulted in many conflicts among different stakeholders in Harare Metropolitan Province. Similar environmental impacts and subsequent conflicts were observed across all three case studies in Retreat Farm, Zengeza and Epworth. This section discusses various environmental issues including environmental pollution, environmental degradation and environmental governance. This section further discusses how various illegal sand mining-induced environmental issues resulted in associated conflicts. In this section, the researcher discusses findings in terms of relevance to theoretical frameworks.

Water pollution

Water pollution emerged as one of the environmental issues associated with illegal sand mining in Harare Metropolitan Province. This is in line with findings from previous studies that also identified pollution of water, land and air as adverse environmental consequences of illegal sand mining activities (Saviour, 2012; Power & Power, 2013; Church & Crawford, 2018). Masterson (2018), in their *cost-benefit analysis of frac-sand mining* in America, noted that illegal mining alters landscape and causes environmental pollution. It has such an impact that the current study noted conflicts between various stakeholders in Harare Metropolitan Province. Similarly, a qualitative study by Church and Crawford (2018) on mining conflicts in China noted illegal mining operations resulted in serious water pollution that endangered lives of local communities from Qinghai province. These authors noted that the community protested against the government for poor regulation of illegal mining.

Clearly, this confirms findings made in the present study where illegal sand mining resulted in the pollution of water sources utilised by communities for various domestic purposes. The local community also castigated government failure to control the situation. In response, some local communities have resorted to resistance against illegal sand miners where possible. This is a clear indication of the utility of the stakeholder theory that seeks to address such socio-environmental problems through a multi-stakeholder approach. The theory advocates for stakeholder collaboration in achieving socio-environmental sustainability (Clement, 2005; Fontaine et al., 2006; Freeman et al., 2010). However, these studies mainly focused on medium- to large-scale mineral mining operations in the formal sector. As such, their findings

are do not provide insights into water pollution and conflicts in the context of sand mining. In this study, illegal sand mining caused water insecurity and safety issues, which emerged as key drivers of socio-environmental conflicts.

Furthermore, evidence from this study indicates that governance was also central to socio-environmental conflicts. The community particularly felt that the government is not fully protecting them against illegal sand miners and associated malpractices. This resonates with findings from previous studies that indicate that water pollution and conflicts were exacerbated by poor governance (Saviour, 2012; Quinn et al., 2018; Pereira, 2012; Lloyd et al., 2022). Stebins (2006) examined the impacts of sand mining on water and air pollution and discovered that tailing and waste dumps from the mines contaminate both surface and underground water sources, as well as soils and also attribute this to weak governance. While this study qualitatively established the impact of illegal sand mining on pollution, Saviour (2012) in contrast conducted a quantitative analysis of water pollution due to sand mining. The study established that mining-induced water pollution causes soils to turn reddish, lowers their pH and increases electrical conductivity – to kill aquatic life such as fish and plants. Stebbins (2006) also noted that open pits and surfaces after sand mining react with oxygen to form acid rain that drains into the ground to pollute water. Despite the varied methodologies, these studies confirm findings made in the present study that the impacts of illegal sand mining and water pollution were associated with socio-environmental conflicts in Harare Metropolitan Province.

However, most quantitative studies, despite their empirical evidence suggesting that illegal sand mining affect water quality, safety and properties (Turnel et al., 2007; Pereira, 2012; Dahal et al., 2012), did not establish the nexus between these environmental ramifications and socio-environmental conflicts (Turner et al., 2007; Rodriguez & Beard., 2006; Pereira, 2012). Nevertheless, review and personal experience-based study by Green (2012) confirmed findings made in the present study that indeed illegal sand mining is a source of water pollution and an instrument of conflict among stakeholders. Mngeni et al. (2017) noted that despite providing income for communities, illegal sand mining has triggered conflicts between community and the government. Ladlow (2015) noted that local communities suffer the worst impacts in spite of policies that are formulated to protect them. However, most of these studies were quantitative and could not explain the subsequent sand mining-induced conflicts from a broader social, economic and political perspective as did this qualitative study. Furthermore, the studies focused mainly on minerals such as copper and iron and not sand. In this study, such water

pollution caused socio-environmental conflicts among various stakeholders particularly residents, authorities and the industry. Similar findings by Church and Crawford (2018), who examined mining conflicts in China, noted that conflicts mainly centred on governance of illegal mining by the government as local community continue to suffer environmental impacts of these activities. Indeed, this suggests that like any other mining, illegal sand mining causes environmental pollution-induced conflicts and exposed governance gaps in Zimbabwe. This challenges the existing governance system to adopt reflexive governance towards illegal sand mining to achieve social, economic and environmental sustainability.

Land pollution

Findings suggest that land pollution is one of the socio-environmental problems associated with illegal sand mining in Harare Metropolitan Province, particularly in illegal settlements such as Retreat Farm and Epworth. In Zengeza, the public around sand endowed areas caused much of the pollution by dumping waste in these open spaces utilised for illegal sand mining. However, in all cases, evidence shows that illegal sand mining resulted in land pollution. A similar qualitative study by Madyise (2013) that examined environmental impacts of sand and gravel for urban development in Gaborone, Botswana, also observed that illegal sand mining caused land pollution and subsequent conflict. The study observed that miners disposed of their waste in open pits caused by sand mining and on riverbeds causing land pollution leading, in turn, to an outcry from the public. As in the present study, illegal sand miners and other local residents operating in and around illegal sand mining sites indiscriminately disposed of solid waste such as papers, cigarettes, food leftovers and plastics to cause serious land pollution.

In a similar study in Australia, Goddard (2007) noted that illegal sand mining generated waste dumps that polluted the environment and contaminated both land and underground water storage facilities. Findings from Kenya also indicated that both residents and illegal miners used abandoned sand pits as dumping sites for solid waste causing serious pollution (Mwangi, 2007). Although the current study did not quantitatively establish the impact of illegal sand mining on ground and underground water, findings from the above publications agree that illegal sand mining causes land pollution. In this study, illegal sand mining occurred in illegal settlements where there are no adequate sanitary facilities such as dumping sites. As a result, open pits and spaces used as dumping sites for solid waste became a source of land use conflict between community members, authorities and miners. Previous studies confirm that local community were in conflict with illegal sand miners from pollution of private spaces and

backyards during mining operations. This is a true reflection of the land-resource-conflict theory as authorities regulate illegal sand mining activities yet illegal sand miners defy compliance in favour of mining. The land-resource-conflict theory highlights conflict that arises from access to and utilisation of a common land resource. Indeed, land pollution was one of the serious environmental consequences of illegal sand mining that triggered conflicts among various stakeholders in Harare Metropolitan Province.

Air Pollution

Air pollution also emerged one of the environmental issues associated with illegal sand mining. However, this was more evident in Retreat Farm with vast open spaces cleared by illegal sand miners for the purposes of illegal sand mining. Burning during land clearance and this use to thermally break rocks, in particular, caused much air pollution. These findings are in agreement with reports that shows that illegal mining causes air and water pollution (Power & Power, 2013; Madyise, 2013; Duncan, 2020; Ndimele et al., 2022). Masterson (2018) noted that an air quality monitoring survey conducted in 2012 by the Chippewa citizens for mining operations in their locality revealed that there was a significant increase in particulate pollution. According to Ogaluzo (2012), of over 51% of the days under which the monitoring was done, particulate matter exceeded air quality standards as prescribed by the Wisconsin Department of Natural Resources. While this reported study quantitatively established the impacts of illegal sand mining on air pollution, the present, qualitative, study did not. Nevertheless, both studies exposed the pollution-fuelled conflicts between miners and local community over their public health concerns.

Previous studies also noted pollution-induced conflicts in illegal sand mining areas. A study by Bezzola et al. (2022) noted that the value of sand for construction purposes had led to a plethora of anthropogenic ramifications on the environment and society, including conflicts. The scramble to access minerals often triggers conflict between various interested stakeholders (Ashton et al., 2001). Similarly, Willis and Garrod (1999) and Duncan (2020) noted that environmental pollution, land degradation and alteration of landscapes, together with inadequate regulation by authorities, trigger socio-environmental conflicts. Madyise (2013) affirmed that the dust and smoke from trucks ferrying sand, and the noise pollution from the poorly trucks that are poorly serviced, and in most cases not roadworthy, resulted in community outcry and retaliation. Similar conflicts also emerged in a study by Musah (2009), where communities in East Gonja district complained of water pollution in their localities. The author

further noted that conflicts emanated from the noise, risk of landslides and diseases. Similarly, Andrews et al. (2018) noted that conflicts emerged between the mining companies and communities also prompted by the unfulfilled commitments by the companies in San Cristobal in 2011. Similar conflicts emerged in Las Bambas between the same stakeholders with communities feeling betrayed following companies' failure to fulfil contractual pledges with local communities (Ibid). Such evidence shows that illegal sand mining is generally a source of pollution and socio-environmental conflicts.

Environmental degradation

Besides environmental pollution, illegal sand mining caused serious land degradation in Harare Metropolitan Province. Various reports indicate that illegal mining is responsible for environmental degradation (Ogaluzo et al., 2006; Stebbins, 2006; Goddard, 2007; Nguru, 2008; Musah, 2009; Bagchi, 2010; Lawal, 2011; Aromolaran, 2012; Saviour, 2012; Pereira, 2012; Green, 2012; Power & Power, 2013; Madyise, 2013; Shaji & Anilkuar, 2014; Peduzzi, 2014; Maarten de Jong et al., 2015; Mngeni et al., 2017; Masterson, 2018). Masterson (2018) noted that intensive mining degrades the environment resulting in the loss of its natural beauty. These authors, however, did not delve on the localized, less intensive effects of sand mining that can have the same impacts, as emerged in this study. Most studies focused on large-scale intensive mining (Bagchi, 2010; Lawal, 2011; Power & Power, 2013; Shaji & Anilkuar, 2014; Masterson, 2018). Illegal mining operations cause land degradation, ecological imbalances, and alteration of land use patterns (Stebbins, 2006; Ogaluzo et al., 2016; Madyise, 2013). In Botswana, localized illegal sand mining around Gaborone has left open pits and open patches that accelerate soil erosion in mining sites (Madyise, 2013). This agrees well with findings made in the present study which showed that there was land degradation caused by illegal sand mining in of all three study sites.

A quantitative study by Green (2012) observed that current rates of sand extraction in some parts in eThekweni catchment in South Africa exceeded natural sediment yield resulting in a net loss of sand from the environment. This author reported that this alters river systems, destroys riverine vegetation and cause biodiversity loss and geomorphological scars. Madyise (2013) noted that continuous mining of sand without environmental controls is the main cause of soil erosion in Botswana. Nguru (2008) similarly observed that illegal sand mining has resulted in the reduction of grassland areas by a significant hectrage (Ibid). This clearly shows a significant loss and disturbance of biodiversity due to illegal sand mining. Although these

studies were quantitative, they agree with findings of the present study that illegal sand mining has indeed resulted in widespread land degradation in Zimbabwe's Harare Metropolitan Province.

Similarly, Atejiye and Odeyemi (2018) noted that excessive abstraction of sand exposes hillside and causes coastal erosion. Although his study mainly focused on coastal sand mining as opposed to the current, it revealed that illegal sand mining resulted in land degradation and soil erosion. A study by Shaji and Anilkumar (2014) indicated that the width of the river in Olathani increased by approximately 69 meters between 1961 and 2008 while, during the same period, in the Arakkunnu area, the river widened by 126 meters due to sand mining. The study also established that more than 50 acres of land was lost in Olathani area. Lawal (2011) asserted that extraction of sand that exceeds natural replenishment to cause bed degradation, sediment suspension and transport subsequently leading to siltation. This study quantitatively established that sand mining also causes water turbidity, a finding that the current study did not establish due to its qualitative methodology. However, both studies revealed that uncontrolled illegal sand mining alters physical landscape through deforestation and burning, open pits, and soil compaction by trucks. More so, head cutting erosion, increased water velocities and concentrated flows can occur upstream of the extraction site due to a steepened river gradient. This evidence suggests that the findings of the present study truly reflect the impact of illegal sand mining on various forms of land degradation.

Similar to this study, various reports highlighted the connection between pollution and conflicts (Lawal, 2022; Shaji & Anilkumar, 2014; Madyise, 2013; Atejiye & Odeyemi; 2018). These studies also confirm that uncontrolled mining creates a hostile socio-environmental landscape due to various subsequent socio-environmental impacts. This clearly shows that illegal sand mining, land degradation and conflicts are closely related. Thus, the political ecology framework is best suited to this study, as the theory attempts to examine all social, economic and political issues around the subject (Batterbury, 2018). In this study, all various forms of environmental impacts triggered stakeholder conflicts, mainly over governance issues.

Loss of biodiversity

The study also revealed that illegal sand mining threatened biodiversity in Harare Metropolitan Province especially in Retreat Farm where there was vast land clearance, burning and land degradation. In Epworth and Zengeza, much of the biodiversity loss/disturbance included land

degradation as no land clearance activities were evident as in the case of Retreat Farm. In fact, in the latter, evidence indicated that certain species were constantly disappearing due to persistent deforestation caused by illegal sand miners. However, in all cases, alteration of river systems due to illegal sand mining-induced soil erosion was evident. A distinct observation made in Retreat Farm, unlike the other two case sites, is that of siltation of a nearby dam owned by a private company. Undoubtedly, such environmental ramifications resulted in disturbance and loss of biodiversity, including both fauna and flora. Similar studies confirmed that illegal sand mining has led to the disturbance of ecosystems and loss of biodiversity (Saviour & Stalin, 2012; Lawal, 2011; Saviour, 2012). In Niger, illegal sand miners destroyed cultivation and grazing lands (Lawal, 2011; Aromolaran, 2012).

In contrast with the present study, Aromolaran (2012) revealed that rural communities in Ogun state lost their agriculture land to illegal miners. A study by Nguru (2008) also revealed that illegal sand mining reduced agricultural land by 1.7 % from 35 739 hectares to 29 430 hectares. In a similar study, Stebbins (2006) revealed that illegal mining destroyed soil structure and profile in American states and attributed this to continuous mining and vegetation clearance. Other studies also indicated that illegal sand mining has resulted in the destruction of mangrove forests in India (Kuttipuram, 2006; Bagchi, 2010; Pereira, 2012) while some authors observed that that illegal sand mining led to the emergence of new invasive species (Nguru, 2008, Mngeni et al., 2017). In his study, Nguru (2008) discovered a new cover type shrub covering 15 117 hectares evolving near the illegal sand mines within the period 1992 to 2006. However, these studies mainly focused on coastal sand mining and not localized inland sand mining, as is the case with Harare Metropolitan Province. Nevertheless, all the studies concede that mining tends to involve land clearance and biodiversity erosion, as was established in the present study.

Hill and Kleynhans (1999) highlighted that mining operations often affect biota and their habitats. These authors added that deforestation reduces biomass and food availability for aquatic organisms such as fish. Furthermore, nearby water sources including privately owned local dams were contaminated to obviously affecting aquatic organisms. Similarly, a study conducted by Ekosse et al. (2004) on the environmental impacts of mining on soils around mining areas in Botswana established that there was massive ecosystem disturbances due to illegal sand mining, including declining soil fertility. Soils changed their chemical properties for instance increased pH due to deforestation. Bagchi (2010) emphasized that environmental

degradation together with high evaporation rates on exposed riverbeds makes for water shortages for both animals and humans.

In a similar study, Sada and Anushinya (2013) observed wells constructed between 2002 and 2011 had decreased the water table by approximately 34 feet due to sand mining in Kathumandu. This study concluded that illegal sand mining caused long-term impacts of groundwater depletion, water scarcity and food insecurity affecting biodiversity in the region.

While the present study established the general impact of illegal sand mining on biodiversity loss, other studies provided a quantitative analysis of these impacts (Nguru, 2008; Pereira, 2012). Nguru (2008) quantified the rate of biodiversity loss experienced in the Mjanaheri-Ngomoni areas and observed that woody shrub land areas reduced from 64 040 hectares to 53 451 hectares due to illegal sand mining. In addition, de Jong et al. (2015) noted that despite the Dutch authority's stipulations surrounding large-scale sand extractions, the ecological impacts of deep extractions remain unknown. Green (2014) also noted that illegal sand mining had removed about a third of all sediments interfering with water tables. In a similar study, Shaji and Anikuar (2014) also noted that illegal sand mining in Neymar River has compromised water quality, species diversity, and land stability. Masterson (2018) similarly noted that newly discovered species in Brazil such as São Paulo marsh ant wren disappeared because of rapid illegal sand mining activities. All these studies clearly point to destruction of vegetation, alteration of soil profile and landscape due to illegal sand mining in Harare Metropolitan Province.

6.3.2 Social impacts and conflicts

6.3.2.1 Conflict over land use

The study also revealed that illegal sand mining and interference by illegal sand miners with other land use has fuelled social conflicts between the residents, government authorities and private sector over varied land use in all the three case study sites in Harare Metropolitan Province. Relatively more such conflicts were reported in Retreat Farm, a state land and where the local community assumed ownership and control over land and its resource endowments. Unlike Epworth and Zengeza, there is close proximity between sand mining companies and residents in Retreat Farm, as such, illegal sand miners easily interfere with activities and land owned by nearby private mining companies.

However, common observations made across all the three case sites include conflicts between local residents and illegal sand miners over land use who interfered with farming activities. In Retreat Farm, illegal sand mining displaced some local families. Similarly, conflicts with local authorities emerged in all the case studies over undesignated land use and illegal sand mining. Indeed, illegal sand miners were problematic to authorities, residents and the industry in all cases. Unfortunately, the aggressive nature of illegal sand miners has forced communities to concede loss of agriculture land and livelihoods while others retaliated against illegal mining practices. The study also noted that illegal sand miners mined sand in reserved land owned by local authorities such as graveyards in Epworth. In Retreat Farm and Zengeza, empirical evidence only revealed that such cases occurred in other areas in Harare. Reports support these findings involving land use-induced conflicts. Thus, a study by Arwa (2002) revealed that illegal sand mining caused conflicts between sand miners, truck drivers and landowners due to conflict of land use, depriving farmers of their farming area while truck drivers created roads through private land to reach mining sites while operating in privately owned areas in Kangonde in Kenya. Similarly, Martinez-Alier et al. (2016) examined environmental conflicts in India and South America revealed that displacement of communities due to sand mining operations resulted in social conflicts. Illegal sand mining deprives communities of their agrarian livelihoods and traditional and customary land use practices (Ibid). Findings by Bogcha (2010) also indicated that conflicts took the form of community protests over mining-induced displacements in Chiru Barwadih village, India. Environmental justice movements expressed concern over the brutality and human rights violations by both legal and illegal sand miners (Ibid). The loss of heritage, environmental resources coupled with a lack of fair compensation for such losses has been instrumental in conflicts in most parts of the country (Peduzzi, 2014, Singh et al., 2014; Lempriere, 2017). This evidence confirms the findings of the present study on socio-environmental conflicts caused by illegal sand mining in Zimbabwe.

Other studies confirm the concern over weak governance of illegal sand mining resulting in socio-environmental conflicts. Similarly, studies on illegal sand mining also confirmed conflicts related to loss of traditional land by local communities (Adedeji, 2014, Mwangi, 2007, Madyise 2013. Shaji and Anilkumar (2014) noted that mining conflicts in India were caused by the displacement of community from their traditional and illegal miners attacked farmers who resisted proposed land purchases while illegal sand miners themselves fought over sand mining site access.

6.3.2.2 *Destruction of traditional and heritage sites*

Destruction of heritage sites also emerged as a social issue associated with illegal sand mining and the socio-environmental conflicts in all the three case sites. In Epworth and Retreat Farm, study results indicated that some illegal sand miners destroyed graveyards and private properties during mining operations. Common to all these cases were conflicts between illegal sand miners and religious groups over the invasion of church gatherings. Similarly, authorities responsible for mining and environmental issues in all the three areas expressed discontent over illegal sand mining activities. In Retreat Farm and Epworth, these unethical and environmentally unfriendly practices have triggered local authorities to resort to some spontaneous raids for illegal sand miners.

Studies reported that illegal mining practices distort traditional and heritage values of societies. Martinez et al. (2016) noted that in Las Bambas, Peru, the value attached to non-monetary aspects such as sacred places and other indigenous territorial rights prompted the local community to confront illegal sand miners. This confirmed the eruption of social conflict due to destruction of traditional sites. In a similar study, Andrews et al. (2015) noted that the restriction of local communities to pursue their heritage and traditional practices due to illegal sand mining has been the centre of conflicts in Ambatovy. In his study, Musah (2009) attested to the fact that conflicts mainly emanated from the adverse impacts of illegal mining on natural environment, society and cultural heritage in Ghana.

As highlighted earlier, loss of heritage and traditional sites including worship points due to illegal sand mining raised social conflicts with religious groups of the society. It also emerged from Retreat Farm that poor regulation coupled with lack of compensation for the affected communities were their main concerns. While some communities commended on government policies, another section of local community in both Retreat Farm and Epworth felt betrayed and resorted to illegal sand mining as an alternative means of compensation. As noted by Pereira (2012), compensation that does not match value of land lost due to mining is a clear human rights violation and an unjust practice. Compensations given to farmers were inadequate and created hostile relations among the chiefs, sand miners, farmers and landowners in Brong Ahafo Region (Ibid). However, these studies mainly focused on formal mining unlike this study that investigated illegal sand mining. As a result, findings revealed that there have never been compensation plans or initiatives for victims of illegal sand mining. Rather, industry whose land was invaded was concerned about reclaiming their private property and not compensation

as such. Hence, much of the socio-environmental conflicts were more prevalent between the illegal sand miners and the private sector due to similar business interests in the extractive sector and the convergence of overlapping mining operations. Clearly, these results reflect the arguments by the land resource conflict theory that point out that land is a common resource that is subject to multi-, but varied, stakeholder interests and conflicts.

6.3.2.3 Rise in the rate of social malpractices and loss of property

Illegal sand mining has also resulted in social problems such as robberies, theft and loss of lives for people and livestock in Harare Metropolitan Province. While issues of theft, prostitution and high crime rate emerged from all the three cases, loss of livestock was relatively a main issue in Zengeza. This is because Zengeza is located near rural communities where livestock and people trapped in open pits left by illegal sand miners. However, most participants from all the case sites indicated that the rise in crime in their areas is a result of the growing illegal sand mining activities that is increasingly attracting people from different parts of Harare and Chitungwiza to engage in sand mining business.

Other studies similarly showed that illegal sand mining activities are associated with loss of lives for both animals and humans (Nguru, 2008; Madyise; 2013; Shaji & Anilkuar, 2014; Katisya-Njoroge, 2021; Zhu, 2020; Zhu, 2022). The latter examined the socio-environmental impacts of sand mining on Neyyar river and revealed that open pits claimed the lives of many local people including children. Findings by Madyise (2013) further contended that pits caused by pit sand and gravel extraction has claimed the lives of children and livestock in some parts of Botswana. This has instigated conflicts between miners and communities on one hand, and community and the government on the other. In the present study, communities expressed concern over the illegal sand mining causing them to risk their lives due to environmental degradation and the aggressive behaviour of illegal sand miners.

Similar disturbing situations emerged in a study by Nguru (2008) who noted that during the rainy season, humans, wildlife and livestock drowned in gullies and pits left unrehabilitated after illegal sand extraction. However, Martinez-Alier et al. (2016) noted that illegal sand mining had claimed human lives during protests and response systems by authorities. These authors reported that local residents were brutalized for standing up for their traditional rights to land, so that one member of the Save Pantukan Movement, a network of indigenous peoples in Compostela valley province was killed for her persistent advocacy and call for

environmental and heritage protection. Besides loss of lives, other scholars show that illegal sand mining puts lives of people on risk through pollution (Church & Crawford, 2018; Masterson, 2018). This created conflicts in China where communities in Qinghai province felt that the government should upscale its regulatory efforts against water pollution caused by illegal sand miners (Environmental Justice Atlas, 2018 in Church and Crawford, 2018; Huang & Xu, 2020).

The current study noted the rising cases of robberies and thieving due to illegal sand mining in Harare Metropolitan Province. Shaji and Anilkuar (2014) observed an increase in alcohol consumption, while Masterson (2018) and Taabazuing *et al* (2012) identified water insecurity and displacement due to illegal sand mining as the main social problems experienced by the communities. Shaji and Anilkuar (2014) noted that the lucrative price value of sand at more 75 thousand rupees per load promoted prostitution and alcohol intake. Most mining sites experienced misconduct and malpractices for almost all age groups of population including teenagers. Masterson (2018) also noted that rampant illegal sand mining activities caused perennial water shortages for household purposes placing heavy burdens on women. This author concluded that communities became environmental refugees due to massive illegal sand mining and environmental degradation that made their communities uninhabitable. Taabazuing *et al.* (2018) similarly observed a social paradigm shift for communities living in and around sand mining sites involving insecurity, poverty, food insecurity and forced migrations. Clearly, these findings agree with findings made by the present study that illegal sand mining generally brought in social problems and conflicts especially for local communities.

6.3.2.4 Human rights violations

The study also noted that illegal sand mining resulted in human rights violations in Harare Metropolitan Province. These included violations to the right to education, security and safety and fair labour practice. Local communities and particularly youths were the most affected group of the population. In all three case study sites, children participated in either mining, gathering sand, loading or offloading sand, or transporting sand. Although illegal sand mining was relatively more dominated with males, female counterparts including children were also involved suggesting that they did not have adequate time for academic studies violating their rights to education. In Retreat Farm, children worked together with their parents in order to raise an income for the family.

Furthermore, results from all three case study sites revealed that along with the growing numbers of aggressive illegal sand miners, came a rise in robbery cases and various other forms of unethical practices within communities. As in Epworth and Zengeza, there were also concerns over violent acts that occurred among illegal sand miners themselves resulting in injuries and fatality fears. Similarly, the active engagement of young boys and girls in illegal sand mining observed across all case studies raised concern over fair labour practices and rights of children. Previous studies also showed that illegal mining absorbed almost all age groups of population into the sector performing various activities (Ghosh, 2012; Madyise, 2013; Mahadevan, 2019) compromising the right to education for school-going age groups (Azumah, Baah & Nachinaab, 2021). These studies also observed human rights violations associated with abuse, violence, unfair labour practice and heritage dilution.

However, most of these studies focused on the gold mining sector and Azumah et al. (2021) whose study focused on illegal gold mining, similarly observed a rise in school drop-out rate as children turned to illegal mining in Ghana. Masalu (2010) estimated that 20% of illegal miners were aged 18 years or younger. Similarly, studies indicated that approximately 15% of the illegal sand miners in Kenya were below the age of 18 years while 40% were between the age of 18 years and 35 years (Nguru, 2008; Arwa, 2013). Lawal (2011) asserted that in Africa it has become a trend to find children engaged in illegal mining activities such as sand mining. This is indeed a disturbing trend as most school going children miss education due to out-of-school income generating activities such as sand mining. Indeed, spending more time out of school for children is a clear violation of children's right to education (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2020). This reflects findings made by this study on human rights violations by illegal sand mining in Harare Metropolitan Province.

Most studies associate human rights violations with a high crime rate, misconduct, non-compliance, and violence (Lucrezi et al., 2009; Singh et al., 2014; Adedeji, 2014). Nguru (2017) noted that the poor regulation of illegal sand mining facilitates criminality, thus human rights violations and conflict become an inevitable consequence. A study by Elavenil et al. (2016) revealed that there were high rates of prostitution and robbery in communities within sand mining hotspots in India. This obviously compromises human security and safety. In this study, poor waste disposal within illegal sand mining sites threatened the public's right to health and clean environment. While these foregoing studies show similar findings on safety

and health, they mainly focused on health issues of air and water pollution arising from mineral processing (Soelistijo, 2011; Thavarajah et al., 2016; Stewart et al., 2020). In contrast, this study revealed that most illegal sand mining processes are a threat to safety and health, trigger conflicts and cause environmental degradation. Remuneration, competition for market and scramble for sandy spaces emerged as they key sources of conflict among the illegal sand miners themselves. Indeed, the issues are socio-economic in nature, and can be political in the perspective of national economic meltdown experienced in Zimbabwe. Conflicts among illegal sand miners, with authorities and local communities were violent and a safety and life threat. The multi-stakeholder on-site visits by the police and other authorities was also a prescriptive measure for safety and security against illegal sand miners.

6.3.3 Economic impacts and conflicts

Results indicated that illegal sand mining resulted in economic impacts and subsequent conflicts in Harare Metropolitan Province. The stiff competition for the sand market as indicated in Retreat Farm, where most private mining companies operate, was a source of conflict between industry and illegal sand miners. In Epworth and Zengeza, there was relatively less evidence, suggesting that illegal sand mining is economically detrimental. However, the majority of key study participants from industry, local community leadership, civil society and government authorities all pointed at conflicts centred on the sand market between industry and illegal sand miners. It further emerged that this subsequently resulted in significant loss of revenue by the government.

A study by Chevallier (2014) revealed that natural resources such as minerals contribute more than 40% of national gross domestic product (GDP). This suggests that a substantial revenue is lost through illegal sand mining. Mark (2021) noted that a country with a wide mineral resource base and proper governance significantly records a higher economic performance and growth. In contrast, the present study observed that there is significant loss of national revenue from illegal sand mining as the informal sector is neither taxed nor fully harnessed. Lawal (2011) argued that a poor institutional framework for the informal sector suggests that a government cannot record any significant financial gains from the sector. In some countries, a well-regulated informal sector makes a significant contribution to national GDP (Saviour, 2012). Thus, governments can harness illegal sand mining for national socio-economic development.

While there is a lack of global data on actual financial gains and losses due to illegal sand mining, most researchers agree that some governments benefit from sand and gravel mining in the informal sector (Jonah & Adu-Boahen, 2016; Bosco & Sumani, 2019). In Kenya, local authorities require unregistered sand miners to pay a small fee for a short-term sand mining in a bid to harness the economic potential of illegal sand mining (Mwangi, 2007). This way, illegal sand mining can contribute to the national income and development (Masalu, 2010). Waelde (1992) noted that, if well regulated, illegal sand mining potentially provides a significant source of revenue through profit-related royalty payments and through fixed taxation. In contrast, poor governance of illegal sand mining contributes to poor economic performance of the formal sector. Mark (2021) noted that the influx of illegal sand miners and abundant supply of sand on the informal market is a major blow to tax-burdened registered miners.

Despite the socio-economic benefits of illegal sand mining at individual, community and national level, lack of transparency and accountability over ownership of land, registration and licensing of illegal sand miners remains a sustainability issue (Chevallier, 2014; Adedeji, 2014; Manoj 2017, Liu et al., 2021). Prestianawati et al. (2019) noted that revenue generated from this sector does not significantly feed into the national income basket due to corruption, bribing and poor governance system. The rate of environmental degradation is also a cause of concern, as illegal sand miners do not prioritize this. Indeed, politics, economies and society have influence over illegal sand mining processes, thus, given the literature gap on this, attempts to unpack illegal sand mining and conflicts in a Zimbabwean context.

In a similar study, Liu et al. (2021) also revealed that competition in the formal sector, particularly the sand mining sector, has a great adverse impact on the financial contributions of that sector towards national pockets. Indeed, illegal sand mining is a socio-economic and environmental cost, as emerged in this study. Studies are, however, silent on how economic impacts resulted in conflicts among different stakeholders (Chevallier, 2014; Adedeji, 2014; Manoj 2017, Liu et al., 2021; Prestianawati et al., 2019). In contrast, findings from this study suggest that the competition for market between informal sector and formal sector created hostile relations between the two stakeholders and the formal sector in turn castigated the authorities for failing to regulate the activities.

6.4 Stakeholder collaboration in addressing illegal sand mining

6.4.1 Collaboration among government institutions

The study established that most government institutions such as EMA, local authorities and ZRP positively collaborate in addressing illegal sand mining. However, significant engagements mainly occur in the planning and implementation of programs and policies that seek to curtail illegal sand mining and socio-environmental issues. This was evident in the three sites at Retreat Farm, Zengeza and Epworth. These findings positively speak to the stakeholder theory that highlights the importance of engagement involving business, authorities, community and many other stakeholders in achieving social sustainability (Lawal, 2011; Marschke & Rousseau, 2022). This study noted that multistakeholder blitz exercises were practised positively towards addressing illegal sand mining. Previous studies share similar findings as they noted that combined blitz operations were widely used by governments in curbing illegal mining (Abraham et al., 2021; Leal Filho et al., 2021; Liu et al., 2021). However, the studies show that resistance, tension and violence characterize such regulation exercises. In this study, results indicate that illegal sand miners were so aggressive that local authorities resorted to combined blitz operations and raids on mining sites.

Despite the inherent conflicts associated with mitigation efforts, the present study observed some positive collaboration between the police and the environmental authorities in addressing illegal sand mining activities in Zimbabwe. Such multi-stakeholder engagements can significantly curb illegal sand mining (Arwa, 2013; Lim et al., 2021). However, some studies identified a lack of government commitment, support and poor stakeholder representation as barriers to such institutional engagements (Kervankiran et al., 2016; Dryzek & Pickering, 2017; Mekuria et al., 2021). However, a study by Arabi (2019) observed a much more intensive approach towards illegal miners that involves community-based police, national police and army conducting blitz operations against illegal sand mining. This proved a more effective approach to stop illegal mining following several futile efforts by environmental authorities. The present study only observed an active engagement of ZRP in addressing illegal sand mining in Harare Metropolitan Province.

Despite these variations, clearly, governments embark on integrated multi-stakeholder approaches when addressing illegal activities in their countries. A study by Andrews et al. (2018) similarly noted that the government collaborated efforts of the army and police to address the problem of illegal mining and drive the illegal miners away from restricted areas

in some parts of Ghana. However, a phased approach of deployment enabled illegal miners to return to the sand mining sites once the police and army had left. This is in agreement with findings made in the present study that observed lack of consistency on the involvement of police in monitoring illegal sand mining at illegal sand mining sites. Illegal sand miners have resorted to temporarily vacating mining sites during police patrols and raids. More so, some government officers connive with the community, particularly illegal sand miners, and alert them of their intentions to raid illegal sand mining sites. As such, illegal sand miners take heed and this disrupts the usefulness of such on-site blitz operations. This disrupts the efficacy of such multi-stakeholder engagements that the stakeholder theory calls for in achieving social sustainability.

Despite the above issues, the present study noted government institutional engagements agree with published studies that confirm stakeholder engagement being instrumental in addressing socio-environmental issues. Musah (2009) also revealed that various mining and environmental departments have collaborated so well in dealing with illegal mining and related extractive activities in Ghana. Various institutions have assumed responsibilities in regulating and managing natural resources such as minerals, sand and gravel for instance the Environmental Protection Council (EPC) collaborates with the Minerals Commission to adopt guidelines mandating EIA for all mining activities in Ghana. In 1994, such institutional collaboration led to the formation of the Environmental Protection Agency (EPA) that manages, regulates and conserves extractive resources such as minerals, gravel and sand. While the study does not reveal the extent of impact of such collaboration as opposed to findings of this study, it is clear that it was a widely embraced initiative in the mining sector governance.

Similarly, findings by Chevallier (2014) also showed that there were notable collaborations established to address emerging issues in the mining sector in South Africa. Illegal sand mining similarly falls under the jurisdiction of the Department of Environmental Affairs. Other studies show that the department works with other departments and sub-departments such as the Department of Water Affairs (DWA) that are decentralised provincially to address environmental issues (Davey, 2001, Green, 2012, Chevallier, 2014). The Department of Mineral Resources (DMR) also plays a concerted role in addressing illegal sand mining as guided by the Mineral and Petroleum Resources Development Act of 2002 (Ibid). All minerals including sand and gravel fall under the jurisdiction of DMR (Green, 2012). Clearly, this study, together with abovementioned studies agree that there is decentralisation of responsibilities

over illegal sand mining for environmental and mining authorities in most countries. In South Africa, however, the coordination of various government departments such as the EMA, Councils and MMMD remains weak and ineffective in stopping illegal sand mining (Green, 2012).

Studies conducted in South Africa also indicate that engagement of DME with the Department of Environmental Affairs and Development Planning (DEADP) has been unsatisfactory (Green, 2012; Chevallier, 2014 Mngeni et al., 2017). According to Chevallier (2014), DME has undermined the DEADP at provincial level and rather influenced the private sector, particularly mining companies to disregard the DEADP's environmental compliance demands. The ignorance of law by DME fuelled illegal mining operations by both registered and unregistered miners and made enforcement difficult. Green (2012) noted that lack of cooperative governance between such stakeholders and the overlapping functionalities makes governance of illegal sand mining relatively more difficult in South Africa despite some notable collaborations between environmental regulators and land use planners in eThekweni region. Similar to the current study findings, the DME officials sidelined joint inspections and indicate that there exists weak collaboration between local authorities, EMA and other institutions with similar mandate on environmental issues.

In contrast, some studies confirm a concerted approach to mining governance including sand mining. Gordon et al. (2009) noted that in Australia, all levels of government bear the responsibility over protection of biodiversity. The federal government, all state and territory governments are empowered to restrict any urban activities that interfere with biodiversity. All these institutions are signatories to the National Strategy for the Conservation of Australia's Biological Diversity (Department of Environment, Sport and Territories, DEST, 1996 in Howes, 2021). That is a significant collaboration effort able to address environmental issues such as illegal sand mining. The Environment Protection and Biodiversity Conservation Act of 1999 administer and mandate all these institutions to protect biodiversity.

6.4.2 Stakeholder collaboration, corruption and conflicts

Despite such collaborations and commitments, mining conflicts have remained prevalent the world over (Isung, 2021; Morrigan, 2010; Nickless et al., 2014; Peduzzi, 2014). In the present study, some multi-stakeholder collaborations towards illegal sand mining were marred with corruption, lack of consistency and inefficient governance systems causing many conflicts in

Harare Metropolitan Province. However, unlike Retreat Farm, these issues emerged salient in Epworth and Zengeza where substantial local communities complained about poor governance, and particularly due to corruption and poor regulations. In Retreat Farm, due to political back up, illegal sand miners and other local communities share similar views in justifying sand mining as a positive opportunity rather than a socio-environmental concern. However, the industry castigated authorities for poor governance of illegal sand mining.

Similar findings emerged from Epworth and Zengeza where both local communities and civil society criticised joint inspections and patrols for being mere assumption of duty rather than realistically serving the mandate of responsible organisations. The frequency of inspections was low, paving the way for rampant illegal sand mining. Previous studies show that most land acquisition and mining processes have been marred with corruption (Maconachie, 2022; Asori et al., 2022; Obala & Mattingly, 2014; Newenham-Kahindi, 2011; Edwards et al., 2014; Cooray & Schneider, 2018; Tastet, 2019; Wegenast & Beck, 2020). According to the US Agency for International Development (USAID) Office of Conflict Management and Mitigation (2004), the economic value associated with mineral resources drives people into corruptive practices. This weakens governance systems and particularly multi-stakeholder efforts (Ayee et al., 2011; Davidson et al., 2022).

While corruption is widely documented, there are few publications exposing how corruption has adversely weakened governments and stakeholder engagements in the illegal sand mining sector. In contrast, the present study identified corruption as being embedded in stakeholder engagement in addressing illegal sand mining. Communities felt collaboration with perpetrators for malpractice is a waste of time. They criticized the government for the lack of sustainable engagement initiatives. In most cases land and mining claims are owned by a few individuals holding influential positions in politics and organisations of authorities (Keeling & Sandlos, 2015; Vela-Almeida et al., 2018). Other studies attributed such unethical practices to weakened stakeholder and sand mining governance (Saviour, 2012; Taabazuing et al., 2012; Green, 2012; Pearson, 2013; Poncian & Kigodi, 2015; Gavriletea, 2017; Poncian, 2021). Taabazuing et al. (2012) explored mining conflicts and livelihood struggles in Ghana and reported rampant corruption and bribery involved in the registration of small-scale miners. Consequently, most artisanal miners have resorted to illegal sand mining to obviate expensive bribes. Saviour (2012) asserted that lack of laws regulating sand mining at grass root level, corruption among traditional leadership and absence of stakeholder collaborations hinder

effective illegal sand mining regulation. Indeed, the present study also exposed that corruption and bribery have hindered effective containment of illegal sand mining in Harare Metropolitan Province. A study by Poncian and Kigodi (2015) explored natural resource conflicts in Tanzania similarly observed that corruption and power struggles over natural resources are serious perpetrators rather than solutions to mining conflicts. Gavriletea (2017) reported that corruption hampers the efficacy of penalty systems in most developing countries. In his study on sand governance in South Africa, Green (2012) also added that strained relations between key stakeholders that include regulators, miners and politicians, with the latter perpetrating corruption in the sector, interfered with good, reflexive governance of sand mining. The similarity of these study findings clearly highlight the obstructive effect of corruption and political interference on collaborative efforts to addressing illegal sand mining.

6.4.3 Collaboration of government institutions with the community

Results indicated that community plays an important role in the regulation of illegal sand mining in Harare Metropolitan Province. However, the collaboration of government with community emerged as being very low in the three case sites. Thus, the local community is the custodian of their environment and have first-hand experiences of illegal sand mining. They also reported cases of illegal sand mining and socio-environmental malpractices to the relevant authorities.

Studies confirm that there exists active engagement of local communities with national government institutions in the construction of embankments to reduce sand mining-induced flooding risk in Dakar and Mbour (World Bank, 2018). Furthermore, the government conducts awareness campaigns with communities against illegal sand mining (ibid). On the other hand, communities spearheaded native tree coastal afforestation projects to improve resilience of coastal ecosystems against illegal sand mining. In contrast, the present study observed that individual companies in Retreat Farm rather implemented such initiatives suggesting lack of stakeholder collaboration. In fact, companies practiced afforestation and plantation to protect their territories from illegal sand mining activities. In contrast, a study by Toupane et al. (2021) revealed that in Senegal, Dakar, communities established surveillance systems to help the government in monitoring illegal sand mining activities. While findings suggest some community engagements towards illegal sand mining, their participation was insignificant in controlling illegal sand mining. In a similar study, a lack of technical knowledge and resources, as well as non-conformity by some local communities have hindered the efficacy of community

engagement programs for sustainable mining in Nigeria (Igwe et al., 2017). Thus, a lack of adequate resources, corruption and ignorance have been identified as the main barriers towards effective stakeholder engagements in addressing illegal mining in Africa (Takeuchi and Aginam, 2011; Akinyemi et al., 2019; Juju et al., 2020). Rather, conflicts characterised much of the societal relations.

Socio-environmental conflicts are so prevalent and compromise stakeholder engagements in addressing illegal sand mining. In the present study, residents were frustrated over limited government's engagement of other key stakeholders including local community members in addressing illegal sand mining and the associated socio-environmental conflicts. In a similar study, Sada and Shrestha (2013) noted that limited community engagement over mining displacement and subsequent compensation processes had resulted in serious mining conflicts in Nepal. Other studies, however, commend the community's active roles in promoting legality in mining processes and activities by reporting any non-conformities to regulations (Ishihara & Pascual, 2009; Evans, 2012; Micomyiza, 2018; van Arragon, 2021). Studies also showed that communities have collaborated in conducting campaigns against indiscriminate mining by both registered and unregistered companies (Kemp, 2010; Kemp et al., 2011; Bradshaw & McElroy, 2014; Gavidia & Kemp, 2017; Coulson et al., 2017).

In contrast, the present study revealed that communities initiate engagements with police and other environmental authorities only after there is land use conflict with illegal sand miners. The study established that there is lack of community or grassroot level structures to deal with socio-environmental matters. The community leadership and its structures are not visible in illegal sand mining issues despite public outcry of the negative experiences of these activities. Studies show that communities have criticized government failure to create local structures to help regulate land barons who perpetuate illegal sand mining (Madyise, 2013; Greens, 2012, Chevallier, 2014, Arwa, 2013). Shaji and Anilkumar (2014) noted that in the Thiruvananthapuram District of Kerala, India, illegal sand miners purchased land adjacent to coasts and rivers without notable local authorities' intervention to stop such dangerous activities to nearby communities. These authors also noted that illegal sand miners attacked any landowners who rejected their bids, thereby creating a state of insecurity among local communities. These findings reflect existing institutional gaps and socio-environmental conflicts among various stakeholders, including local community members, in most countries.

Indeed, limited community education and awareness on sand mining is an outcome of poor stakeholder engagements in Zimbabwe. Similar studies also confirmed that limited knowledge on the environmental impacts of sand mining hindered effective illegal mining governance, including sand mining in South Africa (Green, 2012; Chevallier, 2014). Thus, community education in nature conservation is critical in achieving sustainable development (Hopkins & McKeown, 2002; Tilbury & Wortman, 2008; Aguayo & Eames, 2017). As supported by the stakeholder theory, multi-stakeholder interactions are key to achieving social and corporate sustainability (Freeman et al., 2010). A poor community engagement by and with other key stakeholders in addressing socio-environmental issues observed in this study is a clear contradiction of the stakeholder theory that calls for collaborative efforts in addressing sustainability issues such as illegal sand mining. While government institutions such as EMA do work with communities, this engagement is low and inadequate to curb illegal sand mining. In fact, much of the collaboration is between government departments such as ZRP and the office of the district administrator (DA).

The study further noted that there is lack of clarity on the formal processes, grassroots structures and legitimacy of state land. All these issues have exposed the environment to massive illegal sand mining activities, community conflicts and many other social problems. Similar studies show that the increase in illegal mining-induced conflicts is due to a lack of clear governance structures incorporating industry, community and the government (John, 2009; Saviour, 2012; Ashraf et al., 2011). Saviour (2012) noted that poor collaboration systems in the mining sector have resulted in duplication of duties and omission of some key result areas. Clearly, this confirms the significance of stakeholder engagement in achieving economic, political and socio-environmental sustainability in the mining sector. A lack of stakeholder engagement is indeed significant in conflict, non-compliance and environmental degradation in the sand mining sector. In the present study, limited local authority engagement with communities and sand miners was evident. There are no multi-stakeholder and sectoral programs designed by the Harare City Council to systematically address illegal sand mining, among other environmental issues, and create long term socio-environmental solutions. Minimal and infrequent multistakeholder blitz operations organised by local authority rather create a fertile space for illegality in both settlements and sand mining.

However, some studies found out that local communities played an active role in addressing illegal sand mining. Green (2012) affirmed that despite overlapping mandates, the significance

of local authorities has been commendable in regulating illegal sand mining in South Africa. The scholars noted that some local authorities have successfully secured interdicts against illegal sand miners while others such as eThekweni Municipality condemned operations of Golden Dawn Investments that did not comply with environmental discharge regulations. Nevertheless, studies indicate that most regulatory regimes are characterised by weak governance systems characterised by socio-environmental conflicts, law defiance and local governance gaps in most countries (Padmalal et al., 2008; Saviour, 2012; Davey, 2001; Manoj, 2017; Chevallier, 2014; Adedeji, 2014; Ashraf et al., 2011; Chilamkurthy et al., 2016; Mngeni et al., 2016; Chen 2017). Indeed, the issue of implementing good governance remains a salient problem in Zimbabwe and other countries. There is high marginalisation of the local community in planning, implementation and review of policies and programs that can address illegal sand mining and conflicts. This suggests a gap in terms of reflexive governance in Zimbabwe. As noted by Vadrot et al. (2022), reflexive governance entails implementing policies and programs that are more relevant to the current societal needs, and in this case addressing illegal sand mining and conflicts. Good governance should be characterised by transparency, participation and inclusivity (Voß & Kemp, 2005; Elander, 2022; Leonard, 2022).

With a community faced with a myriad of socio-economic and environmental problems caused by illegal sand miners, not engaging them in building sustainable strategies emerged as an instrument of conflict. Elander (2022) noted that conflicts are more prevalent in weak and poorly regulated systems. Results from the present study indicated that local community members are not fully engaged in sand mining matters. This is despite literature confirming the benefits of stakeholder engagement in addressing environmental issues (Ranängen & Zobel, 2014; Mutti et al., 2012; Gunarathne et al., 2016, Torres et al., 2021). Findings from Lee (2021) similarly indicated that despite the participation of various stakeholders in resident participatory ecosystem service assessment, discussions concerning their roles and the nature of cooperation have largely not borne fruit. However, other studies observed positive roles and engagements conducted by environmental authorities in other countries. Berkowitz et al. (2020) noted that environmental management authorities set up committees that represented the government, non-governmental officials and the local community to govern illegal sand mining. Rogerson (2011) suggested that governments implement inclusive strategies that harness unemployed youths engaged into illegal sand mining activities. In Germany, a study by Sauer and Hiete (2020) on multi-stakeholder initiatives as social innovation for governance

and practice noted that voluntary multi-stakeholder initiatives (MSI) promoted responsible mining. Stakeholder groups from various origins cooperated to complement, concretize, initiate, prepare and help implementing policies and practices for responsible mining. In contrast, such initiatives were insignificant in Zimbabwe. Community engagement is minimal.

These findings shows that low levels of stakeholder engagement is generally a global issue. The Stakeholder Theory challenges such a phenomenon where stakeholders work in isolation. In fact, the theory views stakeholders such as business, community, government and individuals as assets for driving socio-environmental performance (Clement, 2005; Garvare & Johansson, 2010). Thus, a lack of community engagement is in direct conflict to the Stakeholder Theory. Other studies also show that grassroot level communities are in some cases neglected and ill represented in multistakeholder programs for environmental governance, despite their vulnerability and the socio-environmental ramifications of illegal mining activities (Ferguson, et al., 2012; Chen et al., 2015; Jaafar et al., 2021, Zhang et al., 2022). A similar study by Nnatuanya (2021) described the low level of awareness of local people on the environmental impact of sand mining in Ayomnaokpala. Thus, engaging communities inform policy makers of lived experiences, expectations and potential actions of communities in addressing local and national environmental issues (Wiesenfeld & Sánchez, 2002; Noreau & Boschen, 2010).

Although studies confirm the omission of community members in policy and program formulation, implementation, evaluation and review, most studies show that police have played a frontline role in regulating illegal mining including working with environmental authorities (Masalu, 2002; Athukorala & Navaratne, 2008; Upadhyay, 2019). Miller (2022) noted that most governments employ a cat and rat approach rather than seeking solutions that integrate community, industry, NGO and government to build sustainable sand mining solutions. According to Arwa (2013), effective environmental governance requires a multi-sectoral and multi-stakeholder approach. In some countries, community programs such as education, awareness, afforestation and reclamation in mining sites involved the government, community and industry (Desportes et al., 2016; Berkowitz et al., 2020). This is not the case with Zimbabwe where the study observed limited stakeholder engagement, particularly government-community engagement, in addressing illegal sand mining.

Other studies also show a similar trend. In South Africa, a report suggests that local authorities put their own safety first while letting go of illegal sand mining (Chevallier, 2014). This author

rather challenged the government to implement joint enforcement operations on illegal sand miners in a more organised and coordinated manner. According to the World Bank (2018), bans adopted by most West African governments on sand mining have remained fruitless due to lack of regulation and poor enforcement. This suggests that laws and regulations are quite comprehensive in most cases but poorly implemented. Abraham et al. (2021) related this to poor institutional frameworks for effectively implementing legislative frameworks for sand governance. Local communities who are in most cases the victims of the socio-environmental ramifications of illegal sand mining feel unrepresented and unprotected and, thus, they rather perpetuate conflict with authorities (Singh et al., 2014; Duncan, 2020). Studies showed that most community-induced mining conflicts are exacerbated by lack of and poor enforcement of government policies that protect people and the environment (Obioha, 2005; Taabazuing et al., 2012; Singh et al., 2014; Andrews et al., 2017; Espin & Perz, 2021)

Rather than achieving social sustainability, lack of community engagement efforts by the government triggered severe socio-environmental conflicts in mining areas. Pearson (2013) suggested that lack of government commitment towards the welfare of communities jeopardized by illegal sand mining has rather caused persistent conflicts between government and pressure groups. In a similar study, it emerged that environmental matters received less attention by the government that was more focussed on economic gain (Power & Power, 2013). In Nigeria, findings by Abraham et al. (2021) showed that registered miners rather defied environmental guidelines from authorities and perpetuated illegal sand mining by hiring too many sand dredgers within their sites. A similar study by Mensah and Okyere (2014) on mining, environment and community conflicts also noted that limited government-local community engagement caused conflicts over compensation, resettlement packages, unfulfilled promises, mistrust and lack of alternative livelihoods for economically displaced groups. Similarly, this study generally observed limited community education and awareness on illegal sand mining despite the rising trend of illegal sand mining in Zimbabwe. Most education and awareness programs by the Environmental Management Agency mainly focussed on veld fires and other environmental issues, and not sand mining. Studies confirm the lack of adequate community engagement towards addressing such illegal activities. Despite an emerging, nascent awareness of these salient environmental issues, there remains few alternatives yet proposed by civil society, academia and national governments (Kervankiran et al., 2016; Sonna et al., 2022). This suggests that fragmented stakeholder governance is one of the reasons for persistent illegal sand mining and conflicts the world over.

6.4.4 Collaboration of government institutions with industry

Although the study availed some evidence of collaboration between authorities and the industry, the latter was not adequately engaged in programs for addressing illegal sand mining and conflicts. This, in spite of the fact that local authorities have a governance responsibility over all socio-environmental issues affecting their areas of jurisdiction. The present study showed that there is limited public-private engagement in combating illegal sand mining issues in the province. In Retreat Farm, all participants from industry highlighted that they felt marginalised by not fully engaged in planning, implementation and review of programs that address their plight. In all cases, most engagements took place between civil society, community and government authorities. However, in Retreat Farm where there are relatively more sand mining companies, there was little evidence as to this as few participants were available from the industry. Nevertheless, the government itself acknowledged the limited engagement with industry, particularly as to sand mining. In all the three case study sites, responsible authorities identified limited resources as the main obstacle to engagement efforts, and this related to reflexive government governance constraints.

What remains prevalent are the conflicts between the government authorities and industry with the latter castigating government's local authorities for poor governance of illegal sand mining. Illegal sand miners continue to mine within their private lands and engaging them has always been marred with open resistance and violence. This is similar to findings by Andrews et al. (2018) who noted that company-community relations were characterised by tension and violence in Las Bambas and San Cristobal. These authors noted that land ownership and boundary issues have remained salient while failure of some mining companies to fulfil their obligations on local community development have worsened the situation. Studies also showed that poor government regulation of any external forces in the operations of private sector results in public-private sector conflicts (Hilson & Yakovleva, 2007; Özkaynak et al., 2012; Pranzini et al., 2015; Akintola & Fakoya, 2016; Alfvín, 2019; Qurbani, 2020). These studies noted that several issues related to investment, monetary and fiscal policies as key drivers of conflict. In contrast, the present study identified poor governance as the key driver of conflict and the main concern of the private sector in Zimbabwe. It emerged that sand mining companies are more concerned with legitimate efforts of government in protecting them from illegal sand miners. Against this background of poor government intervention, some companies have rather begun implementing self-defence systems in their conflict with illegal sand miners. These include engaging security services from other companies, use of digital surveillance systems and

creation of buffer zones to restrict illegal sand mining. This is despite evidence indicating that public-private partnership is essential in achieving environmental sustainability (McFallan & Logan, 2008; Sobrino, 2015; Valéro, 2015; Franco & Ali, 2017; UNEP, 2019). Deppeler et al. (2021) noted that public-private partnership effectively built sustainable education systems in Australia. Indeed, there is extensive documentation on the efficacy of public-private partnership in promoting social sustainability. The challenge remains as to implementing stakeholder engagement programs that particularly address illegal sand mining (Mensah & Okyere, 2014; Valéro, 2015; Miller, 2022). Cheshire et al. (2014) noted that lack of meaningful collaboration between the mining sector and the policy makers compromised sustainable mining in Australia.

The UNEP (2019) argued that poor public policy formulation and implementation may lead to conflict. A study by Bagchi (2010) revealed that there was industry-government conflict over non-compliance to sand mining regulations in India. Singh et al. (2014) confirmed that India's mining sector is often characterised with conflicts over governance. A similar study by Hussain et al. (2017) similarly observed that coordination of private-public engagements has been problematic, resulting in persistent illegal coastal sand mining in Bangladesh.

Chevallier (2014) noted that private sector associations and industrialists have called for better regulatory measures against illegal sand miners as environmental costs continued to soar due to environmental degradation. Limited public-private engagements in addressing illegal sand mining and the socio-environmental conflicts are a clear contrast to the stakeholder theory that calls for stakeholder collaboration for social sustainability. Results indicated that institutions operate more in isolation than in collaboration. Limited stakeholder engagements rather perpetrated conflicts between industry and illegal sand miners. In contrast, various institutions and programs have been successfully set programs to deal with looming illegal sand mining in Australia (Cheshire et al., 2014). Thus, public-private partnership emerged as a key driver for socio-environmental and corporate sustainability (Ibid). In a similar study, representation of community, industry and government in integrated mining governance framework in 2014 has significantly reduced the rate of illegal mining in Ghana (Basu et al., 2015). This study showed that the framework represented all key sectors including the government, industry, community and NGOs. Similarly, Yankson and Gough (2019) noted that the establishment of market linkages between small-scale miners and large-scale miners by the government reduced market conflicts between industry and illegal sand miners in the country. This clearly shows the utility

of multi-stakeholder collaboration in sustainable sand mining and development. This also speaks to the stakeholder theory that advocates for stakeholder collaborations in addressing such issues (Ehnert & Harry, 2012).

In this study, illegal sand mining was characterised by more conflict between the private sector and the public rather than stakeholder engagement initiatives to address illegal sand mining. In a similar study in Peru, tense relations between communities and miners have called for private-public engagement in addressing socio-environmental issues emanating from illegal sand mining (Martinez-Alier et al., 2016). These authors noted that at Bulyanhulu, government facilitated forced displacement of illegal sand miners while local authorities and police took a closer control of communities (Ibid). In the present study, companies such as Eyecourt Quarry engaged police to deal with illegal sand miners in their jurisdiction of operations – with a low success rate. However, at Las Bambas, industrialists embraced and supported police confronting communities who were engaged in illegal mining while at San Cristobal, the central government collaborated with municipal governments, industrialists and the community to bring stability in the mining areas. These findings clearly show that the industry plays an important role in addressing illegal sand mining matters when it collaborates with other key stakeholders.

6.4.5 Collaboration of government institutions with NGOs and CSOs

Although NGOs and civil society organisations also play an important role in environmental issues, results from Retreat Farm, Epworth and Zengeza showed that there was very limited participation and collaboration between government institutions and NGOs as well as CSOs in addressing illegal sand mining. However, in Epworth, there was fair collaboration with local authorities such as the ELB and CSO- ZDA in programs that address various community issues including illegal sand mining and conflicts. These institutions often work together in planning and implementing programs that improve welfare of local community.

The engagement of NGOs and CSOs is however generally limited in Harare Metropolitan Province. The NGO sector acknowledged their need for partnership in addressing various forms of social and environmental problems but cited lack of engagement drive by the government. In Retreat Farm, some government officials indicated that they do not have any form of existing engagements with NGOs towards sand mining. In contrast, previous studies showed that government and non-government sector collaborations has significantly curtailed

illegal mining (Arwa, 2013; Singh, 2014). A study conducted by Arwa (2013) on artisanal sand mining in Kenya revealed that community-based organisations worked with government departments in restoring degraded environments and reporting environmental cases. The author also noted that such environmental protection practice was incentivised, suggesting positive stakeholder engagement towards socio-environmental sustainability. While resistance by illegal miners remains a common phenomenon in most countries, a study by Singh (2014) on illegal sand mining conflict showed that collaboration between environmental authorities and non-profit organisations in environmental education and awareness significantly reduced the rate of illegal sand mining in India.

Indeed, achieving socio-environmental sustainability in the mining sector requires that community, government, civil society and local authorities work together (Leal Filho et al., 2021). Mngeni et al. (2017) also noted that stakeholder engagement is important in bringing together solutions from a broader perspective and hence proffering inclusive solutions on environmental issues. This emerged in a study by Musah and Barkarson (2009) who noted that environmental committees constituting government, non-government and private sectors have been set up to address among other issues illegal sand mining and proven to be successful in Iceland. In Ghana, decentralised governance of environmental and mining matters from national to district level have had a significant impact in addressing illegal sand mining. Such autonomy has witnessed the collaborations of other departments and organisations such as Ghana Education Service, NGOs and the Forestry Commission in the formulation and implementation of sustainable development plans including the protection of the environment. Such positive stakeholder engagements emerged as very low in the present study suggesting a poor embracement of the stakeholder theory in addressing such socio-environmental issues of illegal sand mining.

The study noted a very low NGO intervention in sand mining sector. This was due to poor coordination between the relevant authorities and non-profit institutions. In contrast, in Ghana, sand mining governance involves a more systematic and functional multi-stakeholder governance system (Jonah & Adu-Boahen, 2016). This study rather observed marginalised community engagements in institutional and legislative frameworks for promoting sustainable sand mining at grass root level. Similarly, Amin (2020) noted that most environmental governance systems failed to bring together key stakeholders because of poorly developed institutional frameworks. Absence of by-laws and poorly coordinated enforcement systems

facilitate indiscriminate sand mining, environmental degradation, and conflict (Tastet, 2019; Gondo *et al.*, 2019). Amin (2020) noted that inadequate education for communities supports socio-environmental misconduct in search of minerals.

The absence of specific programs and platforms involving the NGOs, community-based organisations, politicians and industry exposes the institutional flaws of responsible authorities. As highlighted by the Stakeholder Theory, various stakeholders should work together towards sustainable organisational performance (Sauer & Hiete, 2020). Stakeholder collaborations open opportunities for resource support and technical support to addressing national and community problems (Mutti *et al.*, 2012; Gunarathne *et al.*, 2016; Ranängen & Zobel, 2014). Thus, NGOs and civil society organisations can often help in capacity building programs for addressing community problems including environmental issues (Lauwo *et al.*, 2016). In some cases, NGOs take an active role in environmental law enforcement (White, 2012). This is in contrast with findings made in the present study where the role of NGOs was limited to a few socio-environmental facets where sand mining was not a key result. In contrast, a study by Dashwood and Puplampu (2015) noted fruitful collaborations between the government, NGOs and the community in implementing sustainable mining and development initiatives in Ghana. Other studies also confirmed positive collaborations between industry, NGOs and community towards sustainable mining (Hoberg & Phillips, 2011; Rogerson, 2011; Lim *et al.*, 2021). These findings resonate with the Stakeholder Theory that views multi-stakeholder engagement as fundamental in promoting social sustainability. In this case, involving all key stakeholders in illegal sand mining promotes social, economic, political and environmental sustainability. Unfortunately, this appears to be minimal in Zimbabwe.

Andrews (2015) noted that one of the key challenges facing the African mining sector in general, particularly regarding its governance regime, is an inability to bring together stakeholder interests and incentives into a coherent unit. In some cases, the discussion proceeds with radical top-down measures, which further reduce the possibilities of involving all the key stakeholders (Grant, 2009; Geenen, 2012). The situation is even more troubling in the ASM sector, where government authorities and local miners do not agree on what these interests and incentives should entail. In Ghana, the rate and sophistication of illegal mining has outpaced the institutional framework that surrounds the small-scale mining sector (Teschner, 2012). A study by Zhu (2022) also revealed that civil society, the media and the public opposed government's initiative to clamp down on the informal sector including sand mining due to

ignorance on the socio-environmental ramifications of such illegal mining activities. Basing on similar observations in Bangladesh, Bari and Haque (2022) noted that stakeholder mobilisation and engagement was effective in combating socio-environmental problems such as illegal sand mining remains a salient issue.

Nevertheless, most academic studies confirmed that engagement between non-government organisations and other stakeholders is indeed important in curbing illegal sand mining. A study by Sada and Shrestha (2013) noted that NGOs such as Environment Conservation Forum (ECF) collaborated with local communities in conducting awareness campaigns for sustainable mining. This positively stimulated local authorities to inspect and ban some illegal mining companies in Nepal. Similarly, in Ghana, NGOs collaborated with district assemblies and other government departments such as Ghana Education Service and Forestry Commission to develop and implement short-medium term plans (Musah, 2009). In South Africa, NGOs conducted sand budget studies in eThekweni jurisdiction to establish rates of unsustainable sand extraction (Chevallier, 2014). A study by Nguru (2008) in Kenya also revealed that some NGOs collaborated with local communities and other stakeholders around Ngomeni town to implement afforestation programs as part of ecosystem conservation. About 1.6 hectares of mangrove forests and 1000 trees were planted as part of rehabilitation program for illegally degraded mining environments (Ibid). In Sri Lanka, studies indicate that NGOs have taken active roles in advocacy and lobbying for sustainable mining (Gunaratne, 2015). Other studies also confirmed the active roles of NGOs in promoting sustainable sand mining (Cho, 2006; Ratnayake, 2008; Chevallier, 2014; Purnomo, 2021; Abraham et al., 2021). Although the role of NGOs in socio-environmental sustainability is well documented in the scientific literature, findings suggest that there is little focus on illegal sand mining as a stand-alone program intervention in Zimbabwe. Similarly, AbouAssi and Trent (2016) noted that most NGOs focus on climate change, food security and health interventions. This supports findings from the present study that suggest that illegal sand mining has received relatively little attention compared to other socio-environmental issues.

6.5 Institutional frameworks for addressing illegal sand mining

There are existing institutional and legislative frameworks that directly and indirectly address illegal sand mining. However, in Zimbabwe, only the Environmental Management Act and the Mines and Minerals Act directly focus on sand mining issues whilst the 2013 Constitution and Urban Councils Act indirectly seek to address illegal sand mining. Other studies confirmed that local government systems in most countries give local authorities responsibilities over socio-environmental matters in their respective areas (Laswad et al., 2005; Ribot et al., 2006; Udoekanem et al., 2014). This suggests that most national legislation provides for the establishment of environmental agencies whose functions resonate with those observed in the present study where EMA has the same mandate on environmental management and protection. Environmental authorities generally regulate activities that may cause environmental disturbances in the form of pollution and degradation. These institutions are established in terms of relevant legislation (Mandelker, 2010; Boling, 2010; Chevallier, 2014, Masud, 2015), as is the case with Zimbabwe.

The Australian federal government has legislated the prohibition of any activity that threatens biodiversity and communities (EPBC Act, 1999). Similarly, in South Africa, sand mining is regulated in terms of the National Environmental Management Act of 1998 (Davey, 2001; Chevallier, 2014) which is administered by the Department of Environmental Affairs (DEA). The main national environmental regulatory authorities are the Department of Environmental Affairs. Davey, however, criticised the governance system for lack of coordination between the DEA and the Department of Minerals and Energy. This agrees with findings made in this study that indicates that there is poor coordination between the EMA and local authorities in addressing illegal sand mining. In Chile, environmental management and regulation follows a multi-sectoral approach involving regional institutions administering their environmental programs under the coordination of the central environmental agency (Tafur, 2011; Knill et al., 2019). These authors noted that decentralised environmental governance systems had significantly addressed environmental issues in the country including illegal sand mining. Similarly, regulation of environmental problems is effectively provided for in most western countries such as France (Kaljonen, 2006), New Zealand (Valentine et al., 2007) and the USA (Genskow, 2009; City of Cape Town, 2000). However, Chilamkurthy et al. (2016) commended the relatively better implementation of regulatory systems in the European Union. In contrast, findings in the present study showed that despite the existence of legislative and institutional

frameworks that can potentially address sand mining issues, implementation remains a challenge. Thus, illegal sand mining continues to be a socio-environmental issue in Harare Metropolitan Province.

However, most studies confirmed that indeed sand mining issues are regulated in terms of relevant laws and regulations. For example, Musah (2009) noted that the Environmental Protection Act of 1994, and the Minerals and the Mining Amendment Act of 1993 regulate all environmental issues such as illegal sand mining in Ghana. The two regulations are complementary in regulating activities that cause environmental disturbances such as illegal sand mining. This author noted that the Environmental Protection Act provided for the establishment of Environmental Protection Agency (EPA) that is responsible for the protection of natural resources and environment. This agrees with findings made in this study which observed EMA as a responsible agency being established in terms of Environmental Management Act in Zimbabwe to perform similar functions. In Australia, biodiversity conservation is a mandate of the government (Gordon et al. 2009). Thus, the state utilises a holistic approach in environmental management. The Federal Government and all Australian state and territory governments are signatories to the National Strategy for the Conservation of Australia's Biological Diversity (Ibid). All foregoing instruments or legislative frameworks emphasize environmental impact assessments for mining projects, including sand abstraction. Similarly, research suggests that the Environmental Management Act provides a clear direction on functionality of the Environmental Management Agency. The Agency should perform various functions and with stipulated powers in its mandate to protect the environment in terms of the Act. Thus, there is decentralisation of environmental management up to district levels.

However, despite the existence of these institutions, the present study noted institutional gaps in fully curbing illegal sand mining activities. There is poor enforcement of laws that govern illegal sand mining. Previous studies confirmed that poor enforcement systems compromise the efficacy of environmental legislations (Jonah et al., 2015; Tafur, 2011; Knill et al., 2019). Jonah et al. (2015) criticised mandated environmental institutions like the Environmental Protection Agency (EPA), the Ghana Police Service and the local Metropolitan and District Assemblies for failure to enforce environmental policies towards illegal sand miners. Despite the existence of regulatory frameworks, Musah (2009) attested to the fact that authorities in East Gonja district failed to implement effective enforcement of laws. In Tanzania, the Department of Natural Resources, that is responsible for the sustainable use of natural

resources, has not been able to address illegal sand mining due to poor enforcement (Masalu, 2002). This evidence suggests that existing legislative and institutional frameworks are not adequately addressing illegal sand mining, mainly due to poor governance systems.

6.5.1 Specific legal provisions that address illegal sand mining

Regarding legislative provisions on sand mining issues, results from this study indicated that only the Environmental Management Act and the Mines and Minerals Act contain specific provisions for addressing illegal sand mining. The Environmental Impact Assessments (EIA) and Ecosystems Protection Regulations SI 7, 2007 control the extraction of clay and sand. It further identifies clay and mining abstraction as projects that require EIA in order to protect the environment and surrounding communities from malpractices such as illegal sand mining. Sub-section (4) requires that applicants develop a comprehensive rehabilitation plan for submission to the EMA before operations commence. As noted by Madebwe et al. (2006), sub-section (5) augments the foregoing by demanding the applicant to consult local authorities and local inspectors in developing the plan. Similarly, other studies also confirmed the existence of specific provisions on sand mining. Thus, for example, schedule II, undertakings of L.I. 1652 of 1999 of the EPA Act of Ghana requires project environmental impact assessment including sand mining activities (Amankwah, 2013; Debrah et al., 2021; Olagunju et al., 2021). However, Musah (2009) commented on the lack of clear guidelines on sand and gravel extraction limits and closure standards that provided room for illegal sand mining. In Iceland, the EIA Act 106/2000 and the 1997 Planning and Construction Law (Agenda 21, 1997) are the two main instruments governing illegal sand mining and other environmental issues (Árnadóttir, 2002; Cook et al., 2016, 2018). The two instruments have specific sections that speak to mining of minerals and other extractives. These studies clearly agree with findings of the present study on the general existence of specific laws that seek to address environmental issues, particularly sand mining.

Similar to the Environmental Management Act, *Part III* (14, 15 and 16) of the Urban Councils Act also highlights the need for preservation and conservation of natural resources in council land. Mutema (2012) noted that although this may not be exhaustive from an environmental perspective, the Urban Councils Act also places institutional responsibility to protect natural resources by prohibiting harmful activities (Mutema, 2012, Mbiba, 2022, Mushonga, 2022). Section 18 states some activities considered in terms of the Act include fishing, hunting, brick making, extraction and removal of sand, quarrying and cutting of firewood, grass or brushwood

(Mapira, 2011). Section 130 empowers local authorities to formulate and implement by-laws to legally empower local authorities to regulate destructive activities such as illegal sand mining to augment the more generic laws and regulations of environmental issues. However, Pachawo (2013) felt that the Act is not legally binding on by-laws as it states that councils may make laws. Nevertheless, Kirama and Mayo (2016) noted that municipalities use by-laws to govern activities within their jurisdiction, including environmental management. In Uganda, the Government and Local Government Act (1997) regulates all environmental issues. Similar to findings of the present study, urban councils possess full authority to develop their own by-laws in Uganda (Okot-Okumu and Nyenje, 2011).

Besides the regulation of land use and conservation of environment, the Urban Councils Act also decentralises the development and adoption of by-laws by local authorities (Muchadenyika & Williams, 2016). This is also a commendable aspect of the Act considering that the geographical nature of council land differs in terms of natural resource endowment and activities. Although by-laws have been widely adopted across the globe, research shows that they do not fully address environmental problems such as illegal mining and waste disposal (Okot-Okumu & Nyenje, 2011; Aurah, 2013; Kirama & Mayo, 2016). Inadequate community participation in the process of by-law formulation and enforcement is the main reason for the ineffectiveness of most NRM by-laws in Ethiopia, Tanzania and Uganda (Mowo et al., 2016). Their results indicated that existing natural resource management (NRM) by-laws lack stakeholder consultations in formulation, implementation and enforcement. For that reason, they have not fully addressed community issues.

In Zimbabwe, the inadequacy of by-laws and the framework and capacity to address urban issues (Chatiza & Bandaiko, 2021) relates to poor regulation of illicit sand mining. A study by Mitullah (2003) based on synthesis of empirical evidence from Kenya, Cote d'Ivoire, Ghana, Zimbabwe, Uganda and South Africa concluded that stakeholders, especially community members are not well informed regarding these by-laws. Despite by-laws emerging as a common practice across countries as efforts to address illegal sand mining, their effect remains insignificant as indiscriminate sand mining activities continue. In the present study, it emerged that the council's by-laws together with other environmental laws fail to address illegal sand mining..

However, like the Urban Councils Act and the Environmental Management Act, the Mines and Minerals Act that controls all mining operations in Zimbabwe and provides for the protection,

conservation and sustainable utilization of alluvial deposits that include sand (Dhliwayo, 2016; Kwangwama et al., 2022). Part XII: Working on Alluvial, Eluvial and Certain Other Deposits. Section 222 prohibits persons from working on sand deposits among other alluvial deposits without the approval of authorities. Studies showed similar findings on the existence of specific legislative frameworks for mining (Jänicke, 2006; Grin et al., 2010). A review by Ogaluzo et al. (2016) also showed that all mining activities in Nigeria are regulated in terms of the Mineral and Mining Act of 2007 that prohibits illegal mining and provides for reclamation work after extraction of mineral deposits. These authors however commented on the non-compliance of mining companies as to the provisions of the Act, leading to illegal sand mining.

Similarly, Chevallier (2014) noted that the Mineral and Petroleum Resources Development Act of 2002 puts all the minerals, including sand, under the custodian of state in South Africa. This is the main national instrument governing mining including illegal mining in the country. Like the Environmental Management Act of Zimbabwe, this law also demands an application for and approval of sand mining.

Furthermore, the Transkei Decree Act Number 9 of 1992 section 39 clearly stipulates that any activity of clearing or removal of sand within 1 km from the high-water mark is unlawful (Mngeni et al. 2017). Similar to findings of the present study, the Mineral and Mining Act of 2007 of Nigeria also emphasizes a plan for reclamation of land after mineral extraction (Ogaluzo et al., 2016). Similarly, section 225 of the Mines and Minerals Act of Zimbabwe further empowers the Board appointed in terms of the Act to either accept or reject application for mining based on qualification of the application in terms of the Act. For instance, the Act requires a clear plan of land reclamation for any mining operation. This also prohibits illegal sand mining, as failure to comply is an offense that attracts penalties such as fines or imprisonment. In contrast, findings by Nguru (2008) indicated that there is no specific law or policy governing sand mining despite the second schedule of the EMC A (1999) requiring all mining projects such as quarrying and open cast sand mining to undergo EIA. The Mining Act Cap 306 does not classify sand under extractive materials, and this complicates governance of illegal sand mining in the country (Ibid). However, in Nepal, sand is regulated by a set of instruments that include the Mines and Mineral Act, 1985 and its amendment in 1993 and the Mines and Mineral Regulation, 1999. These constitute the legal framework for administration and regulation of all mining and mining development activities (Sada & Shrestha, 2013). Like the Mines and Minerals Act in Zimbabwe, this Act also gives the state exclusive powers and

control over all minerals discovered underground or on the surface, irrespective of land ownership. More so, any person intending to mine any of such mineral deposits requires a permit or license from district councils.

Evidence from these studies relate to findings of the present study, showing that most countries generally have specific laws and regulations that govern illegal sand mining. In Ghana, the legislative framework for sand mining, under which illegal sand mining falls, constitutes the EPA Act 1994 (Act 490), and Minerals and the Mining Amendment Act 1993 (Act 475). These are the major state instruments regulating illegal sand mining and environmental degradation. Similarly, Musah (2009) noted that the Mineral and Mining law provides for a fair compensation of local communities for their farms taken for mining purposes. This is to curb illegal sand mining by promoting transparency and legitimacy of land ownership. Under current law, the mining companies negotiate compensation with people whose farm or property they wish to acquire, with the Land Valuation Board (LVB) acting as a neutral third party when negotiations break down (Taabazuing et al., 2012). The Section under schedule II, undertakings of L.I 1652 of 1999 of the EPA Act, requires that all mining projects go through EIA (Musah, 2009). However, both laws do not provide clearly defined guidelines on permissible areas and details for mining limits and closure standards (Ibid).

Rodriguez (1994) put forward the idea that solving environmental problems related to illegal sand exploitation requires the establishment of a complex regulatory system that constitutes environmental regulation, sand exploitation regulation, and land use planning regulation. Other researchers were concerned as to the possibility of long-term environmental implications that may be difficult to quantify when there is poor governance of illegal sand mining. Gavriletea (2017) asserted that mitigation of environmental impacts of illegal sand mining requires an in-depth understanding of the impacts and consequences of illegal sand mining. In this study, findings show that in Zimbabwe, sand is classified as a mineral deposit in terms of the Mines and Minerals Act. In fact, this section 224 sub-section 1 (a) of this Act regulates all activities that takes place in or interfere with banks, bed, marshes or river systems. Given that illegal sand mining extensively interferes with biodiversity including beds, streams and wetlands, the Act therefore covers this activity. Relating to other extractives such as minerals, the Act therefore places equal importance on sustainable sand mining.

6.5.2 Utility of existing conditions for sand mining and consumption

Despite the existing legislations on sand mining prescribing mining licensing requirements and penalties, results indicated that there are no clear prescribed standards regulating sand mining/extraction and consumption rates to achieve sustainable sand mining. Although most legislations provide for institutional formulation and responsibility and include specific provisions on sand mining, there remains a gap on mining and extraction standards of sand. For example, the Urban Councils Act places more emphasis on land appropriation and transfers for the purposes of estates development and other developments. Land reserves as well as transfers and acquisition do not provide clear standards of any land use in terms of environmental impacts.

This is supported by findings from previous studies that indicated that most legislation does not address the standards on land use and extraction rates that achieve socio-environmental sustainability (Okot-Okumu & Nyenje, 2011; Aurah, 2013; Kirama & Mayo, 2016). This suggests that existing legislative and institutional frameworks are inadequate in promoting sustainable sand mining practices. Thus, most studies confirm that the lack of clear regulatory extraction frameworks coupled with poor enforcement provide room for indiscriminate sand mining (Masalu, 2002; Saviour & Stallin, 2012; Saviour, 2012; Peduzzi, 2014; Martinez-Alier et al., 2016; Mark, 2021). Mining companies, contractors and individuals take advantage of poor standardisation of mining activities by governments and local authorities to extract sand indiscriminately destroying the environment and disrupting societal lives (Msalu, 2002; Singh et al., 2015; Kadoe, 2018). A firm and comprehensive legislative and institutional framework should be operational to curb illegal sand mining (Kadoe, 2018).

However, most mining grant processes are cumbersome and marred with corrupt practices (Andrews et al., 2018). Despite submission of all requirements, it is not surprising to see one's application rejected or delayed for no apparent official reason (Teschner, 2012). More so, legal records of mining licenses and leases that were not properly maintained making the whole permit processes flawed even though it is a legal requirement (Ibid). Andrews et al. (2018) also noted that the legislative frameworks that gave the state exclusive rights and control of mining concessions triggered conflicts with communities. The latter felt superimposed over their traditional tenure system without prior consultation.

In the present study, it emerged that the permit system required by environmental legislation is not comprehensive. For example, the Environmental Management Act does not prescribe parameters for sand processing. Like gold miners, illegal miners often process the sand to obtain an improved marketable grade of sand. The process involves the use of water obtainable from nearby wells, rivers and dams which are open for public consumption. The law is also not comprehensive on standard procedures for sand processing and extraction limits. This suggests that penalties applied to illegal sand miners are subjective and uncategorized according to the nature and impact of the process. In contrast, studies conducted in first world countries show that most regulations prescribe extraction limits for sand, as in Belgium (Degrendele et al., 2017) and the USA (Vila *et al.*, 2018).

Notwithstanding this gap, sub-section (2) of SI 7 of 2007 of the Environmental Management Act of Zimbabwe speaks to the prescribed fee for permit application for persons who seek to extract, excavate, possess or permit the removal of sand and gravel. However, the fees are too high and not affordable to most local sand miners in Zimbabwe. Thus, illegal sand mining becomes an alternative option to them. Although most governments have existing legislation that prescribe fees for sand mining and penalties for non-conformities (Sonak et al., 2006; Madyise, 2013), penalty system have not been adequate to fully address illegal sand mining and conflicts (Upadhyay, 2019; Ali, 2020) As indicated in the present study, the existence of a penalty system through a set of legislation in Zimbabwe does not translate into mining compliance.

6.5.3 Provision for accountability, responsibility and stakeholder engagement

The legal framework on sand mining is generally silent on good governance, particularly accountability, stakeholder responsibility and transparency. This mainly emerged from the analysis of four key legislations related to mining and environmental management that include the Environmental Management Act, the Mines and Minerals Act, the Urban Councils Act and the Constitution of Zimbabwe. However, except for the Constitution, other legislation have clear legal provisions on setting up institutional frameworks to enforce those laws. Particularly, the Urban Councils Act which, for example, provides local authorities to formulate by-laws to govern various issues affecting their communities. Similarly, the Environmental Management Act, and the Mines and Minerals Act provide for establishment of a Board, committees and respective institutions to administer and enforce such legislation.

However, some elements of good governance such as accountability, transparency and stakeholder participation remain silent in all the legislations. Stakeholder participation is key to both reflexive governance and sustainable sand mining, and is missing. Responsibility was only observed in the form of an institutional mandate and not a holistic system of sand governance. Similarly, legislation mainly speaks to accountability of malpractice through a penalty system. Despite illegal sand mining being a multi-stakeholder concern, there remains a gap in the accountability and responsibility of these stakeholders in the planning, implementation and review of legislation. Like Environmental Management Act, the Mines & Minerals Act and Urban Councils Act do not state or highlight the role that other key stakeholders such as local community, private sector, civil society and NGOS in achieving sustainable sand mining. Their accountability and responsibility, besides the penalty system, is fundamental. The laws only provide for accountability and liability post an offense rather than emphasising prevention of such malpractices. Thus, stakeholder participation in planning is very important in preventing further illegal sand mining practice. As noted by the Stakeholder Theory, all such stakeholders are key to achieving sustainable natural resource consumption and utilisation (Camilleri, 2015). Kirama and Mayo (2016) noted that while most legislation provides for responsible institutions to administer and enforce these laws, state autonomy affects the scope of stakeholder responsibilities in sand governance.

Other studies confirmed the silence of most legislation pertaining to how various other key stakeholders are accountable, responsible and may participate in environmental governance (Okot-Okumu & Nyenje, 2011; Aurah, 2013; Kirama & Mayo, 2016). Chatiza and Bandaiko (2021) noted that the inadequacy of by-laws and the framework and capacity to address urban issues in Zimbabwe links to poor regulation of illicit illegal sand mining in Harare Metropolitan Province. Existing by-laws are not sufficiently comprehensive to fully address illegal sand mining and conflicts (Ibid), hence the need for reflexive governance that requires tailor-made programs and policies for addressing existing environmental issues (Leonard & Lidskog, 2021; Vadrot, et al., 2022; van der Jagt et al., 2021; Pahl-Wostl & Patterson, 2021). Some scholars feel that despite the development of institutional and legislative frameworks that qualified as fully developed environmental state (Bäckstrand & Kronsell, 2015; Duit et al., 2016; Mol & Buttel, 2002), their efficacy was hampered by various obstacles ranging from entrenched consumer routines (Shove, 2004) to structural limits of the nation state (Jänicke, 2006). Similarly, a study by Mitullah (2003) based on synthesis of empirical evidence from Kenya, Cote d'Ivoire, Ghana, Zimbabwe, Uganda and South Africa revealed that the marginalisation

of key stakeholders such as local community in the formulation and implementation explains why existing laws and regulations are inadequate to combat socio-environmental issues.

However, this study commends the 2013 Constitution for its attempt to promote environmental sustainability from a human rights perspective. Sub-section 1(a) advocates for an environment that provides for human safety, health and well-being. This suggests that the constitution considers everyone as worthy of enjoying environmental rights. Even previous studies commend the 2013 Constitution for cognisance of socio-environmental sustainability (Odney, 2013; Chirisa & Muzenda, 2013; Chigudu & Chirisa, 2020). Clearly, this constitution, unlike others, provides for the formulation and implementation of necessary environmental laws and regulations in Zimbabwe, such as the Environmental Management Act (Chapter 20:27). Chirisa and Muzenda (2013) also viewed the 2013 Constitution as a positive milestone towards achieving environmental sustainability and human rights in the Republic of Zimbabwe. Their study noted that the state takes full responsibility for environmental matters through section 7 of the Constitution - a feature that distinguishes the instrument with other previous constitutions in Zimbabwe.

Although the 2013 Constitution, as with other legislation regulating environmental malpractices such as sand mining, is commended for recognition of environmental sustainability, they generally do not highlight the stakeholder roles and accountability regarding sand mining. However, previous studies have confirmed that constitutionally, and there has been a growing recognition of global environmental rights, for example in the DRC (Bindu, 2006), Kenya (Mwenda & Kibutu, 2012), Nigeria (Oluduro, 2010), South Africa (Scholtz, 2005) and Canada (Gibson, 1973). Section III of the Constitution of Namibia also focuses on a critical consideration of particular constitutional provisions and their formative role in a number of policy and legal domains, such as environmental rights and justice, the paradigm of equality and its actualisation, and a consideration of intellectual property rights (Bösl et al., 2010). Similarly, Indonesia's Constitution specifically provides for the right to a clean environment and other environmental matters (Murharjanti, 2019). In contrast, the 2013 Constitution incorporates environmental issues from a human rights perspective, and the right to a clean environment is a clause in the national legislation, that is the Environmental Management Act. In Canada, studies show that the constitution continues to divide environmental jurisdictions between the federal government and provincial authorities. Local communities have constitutional rights over indigenous resources (Cooke *et al.*, 2016). This

clearly aligns with the Stakeholder theory that sees everyone as key to achieving social and corporate sustainability (Freeman *et al.*, 2010).

In contrast, the present study noted that the 2013 Constitution only focuses on the state's function in promoting environmental rights without stating the contribution of other non-state stakeholders, such as communities, in protecting or violating the same rights. While there is resource and legislative commitment by the government, the importance of a responsible citizen and its impact on human rights and sustainability has to be constitutionally recognised. Highlighting the costs of environmental degradation and environmental rights' violation can foster best practice and sustainable development (Zvomuya, 2017; Mazikana, 2022). The 2013 Constitution also emphasizes the need for promoting environmental rights, but without highlighting the roles of other non-state stakeholders and their incentives for doing so. In particular, the role of grassroot communities is not well stipulated in both the 2013 Constitution and the legislation, which may potentially eliminate the sense of responsibility and accountability in natural resource governance, including sand mining.

Nevertheless, the recognition of the environment as a stand-alone section in the 2013 Constitution presents a great opportunity for addressing illegal sand mining. In other countries, constitutions do not place greater importance on environmental issues. For example, in Malaysia, studies show that there is no specific provision relating to environmental protection in the Constitution (Rahman, 2010; Maidan, 2012). The constitution of the USA does not provide for environmental rights but does have a good environmental performance (Scott, 2016). Uyigue and Ogbeibu (2007) also criticized the Nigerian constitution for its deficiency in administering environmental rights to people. Such deficiencies can be responsible for indiscriminate, non-environmentally friendly activities in some countries. Communities are particularly the custodians of their indigenous resources, and their rights to environment have to be recognised by policy makers (Rahman, 2010). This study unpacked how the 2013 Constitution of Zimbabwe, among other relevant legislation, addresses illegal sand mining and conflicts in Zimbabwe, as literature is starved in this area of knowledge.

6.6 Governance of illegal sand mining

Research has revealed that there is poor governance of illegal sand mining in Zimbabwe. The informal sector that mainly practices indiscriminate sand mining is poorly regulated leading to persistent socio-environmental ramifications on nearby communities. While there is a commendable set of laws and regulations that seek to address illegal sand mining and conflicts among other related mining and environmental issues, law enforcement remains weak. A number of issues that obstruct good governance of illegal sand mining emerged, and these include resource scarcity, political interference in land and mining rights, a syndicated system of alerting offenders to check ups, corruption and low on-site monitoring exercises. Furthermore, these constraints hinder reflexive governance of illegal sand mining in Harare Metropolitan Province. However, various studies on illegal sand mining support the above view on constraints to reflexive governance of mining particularly on resource scarcity.

Indeed, resources are key to effective governance (Mngeni et al., 2017; Chen, 2017; Gondo et al., 2019). The scholars highlighted the need for financial and human resources to implement effective governance systems for illegal sand mining. Similarly, Tastet and Beaches (2019) noted that implementing lasting solutions to illegal sand mining requires a combination of human effort and commitment, time and financial resources. Gavriletea (2017) also highlighted the need for clean mining technologies for sustainable sand mining, which is expensive for most countries. In a similar study, Filho et al. (2021) noted that transfer of investment technologies from source countries is associated with a high environmental impact which recipient countries may not be able to withstand due to limited resources and appropriate technologies. In Zimbabwe, a study by Rajah et al. (2012) revealed that governance of environmental management is marred by institutional inefficiencies, resource scarcity and lack of transparency. This shows that resource availability is key to implementing effective and good governance.

Besides resource scarcity, poor enforcement emerged as one of the key obstacles to effective governance of illegal sand mining in Harare Metropolitan Province. Specifically, the study noted that politics interferes with law enforcement while corruption and bribery worsen the governance system. Although underlying issues on weak governance vary with studies, there is a common view that illegal sand mining is caused by weak governance systems in most countries. In fact, much of the socio-environmental conflicts are centred around the adverse implications of poorly regulated sand mining on local community and industry. For example,

environmental pollution and degradation violate environmental laws and interfere with local community's safety and welfare (Ogazulo et al., (2016). Similar to findings from this study, these authors identified weak regulatory systems as mainly responsible for such socio-environmental malpractices. Similarly, Katisya-Njoroge (2021) noted that most environmental impacts are clearly regulated by existing laws but enforcement remains a challenge. This explains why most communities affected by illegal sand mining blame governments for not protecting them, given the existence of relevant legislation governing illegal sand mining. In the present study, local community and industry castigated the government for inept governance of illegal sand mining. Similarly, Mngeni et al. (2017) also noted that tense relations existed between the government and communities over illegal sand mining activities. Their study revealed that Wild Coast local communities locked up law enforcers over biased governance and corruption by government officials in the mining sector. Clearly, this exposes the fact that lack of transparency, fairness and objectivity restrain good and reflexive governance of sand mining. Indeed, good governance should be characterised by participation, consensus oriented, transparency, accountability, responsiveness, effectiveness and efficiency, equity and inclusivity, and the rule of law (Artelle et al., 2019; Springer & Almeida, 2015; Kothari et al., 2012).

In contrast, findings suggested that corruption and bribery was common among law enforcers and illegal sand miners. Studies confirmed that poor enforcement and corruption were the main barriers to sustainable mining governance (Padmalal et al., 2008; Saviour, 2012, Davey 2001; Manoj 2017; Chevallier, 2014; Adedeji, 2014; Ashraf et al., 2011; Chilamkurthy et al., 2016; Mngeni et al., 2016; Chen 2017). Chilamkurthy et al. (2016) asserted that lack of monitoring systems, regulatory policies and environmental impact assessments have led to indiscriminate mining, triggering severe damage to the environment and related ecosystem services. Most authors highlighted that the rudimentary methods of river sand mining coupled with weak governance and corruption have led to indiscriminate sand mining (John, 2009; Saviour, 2012; Ashraf et al., 2011). In Cambodia for example, studies revealed that the government banned the export of sand in 2007 but the regulatory framework was too weak to stop foreign companies from illegal sand dredging operations.

It is clear that most governance systems are not transparent, non-participatory and unresponsive, and this compromises good governance of sand mining. For example, Andrews et al. (2018) showed that conflicts between the mining companies and the communities

emerged partly because of unfulfilled commitments by the companies in San Cristobal in 2011. Chevallier (2014) examined illegal sand mining in South Africa similarly noted that private associations and industrialists castigate government's weak governance creating industry-government conflict. The author viewed illegal sand mining as rather a perpetrator of unnecessary environmental costs for private companies who bear the burden of poor regulations.

It emerged that industrialists did call for better regulations towards illegal sand mining citing costs on the environment and society such as destruction of vegetation, wetlands, riverbanks and alteration of ecological balances. Green (2012) also noted that the complex governance system of sand mining is a cause for concern for stakeholders and a source of conflict. The author also noted that lack of clarity on legislative governance of sand mining in the face of a multi-instrumental framework has remained an issue over the years. A high degree of institutional overlap of authorities in the management of environmental issues such as illegal sand mining emerged as a public concern. In the present study, industrialists operating in Harare Metropolitan Province also felt that the government is not doing enough to curb the problem. Some officials from the industry described the role of government in addressing illegal sand mining as legitimate but citing an inefficient governance system.

The present study further noted that poor enforcement and on-site monitoring systems by regulatory institutions restrained reflexive governance of illegal sand mining. Similarly, Church and Crawford (2018) revealed that communities in Qinghai in China were furious over government's lack of adequate regulation of mining companies that caused serious socio-environmental problems in their localities. Indeed, lack of good governance, is an instrument of socio-environmental conflicts in the sand mining sector. Green (2012) noted that the regulatory regime in South Africa is undermined by regulatory conflicts, local governance failures, and deficient compliance monitoring and enforcement systems. The regulatory conflict that has pitted mineral regulation, on the one side, against environmental and land use planning regulation, on the other, has been simmering for over a decade and has been characterised by strained relations between the regulators and by political brinkmanship. In a similar study, Musah (2009) discovered that the lack of by-laws and other regulatory instruments at district level has been one of the reasons for indiscriminate illegal sand mining practices that sparked conflicts with local communities who, in turn, criticised the lack of adequate laws to promote sustainable mining that do not adversely interfere with.

Rajesh and Shrestha (2013) suggested that in order to properly govern and have meaningful control over any activity, there is a need to have legislation that binds everyone who is involved in it. Similarly, Saviour (2012) highlighted the lack of scientific mining methodologies and technologies for environmental management as the main issues behind poor governance systems in developing countries. This author argued that enforcement is more effective when there is a balance of social, economic and environmental management systems. This suggests that resource availability, information access, technology and transparency underpin reflexive and good governance of resources.

Nevertheless, the findings of the present study clearly reflect the validity of using a political ecology framework in this study that views environmental issues from a wide range of social, economic and political factors. Indeed, corruption, political interference and resource scarcity emerged as some of the key issues in poor governance of illegal sand mining in Harare Metropolitan Province, Zimbabwe.

CHAPTER 7 RESULTS AND THEORETICAL FRAMEWORKS

7.1 Introduction

The four theoretical frameworks upon which the study was premised, namely political ecology, land resource conflict theory, reflexive governance framework and the stakeholder theory generally well support findings made using a case study of Harare Metropolitan Province as to the broad dynamics of illegal sand mining and conflicts in Zimbabwe. However, the geographical scope upon which these theories were proposed does not fully represent the prevailing social, economic and political landscape in Zimbabwe. Hence, some findings of this study were not a true reflection of these theoretical frameworks. This chapter discusses study findings in relation to the above theories particularly highlighting their validity, applicability and relevance in a Zimbabwean context.

7.2 Political ecology framework

As highlighted, political ecology analyses environmental changes that emanate from a complex set of social, political and economic processes (Blaikie & Brookfield, 1987; Hershkovitz, 1993; Bryant & Bailey 1997; Taylor, 1999; Page, 2003). Batterbury (2018) noted that contemporary political ecology was widely adopted by scholars because of its ability to explain how and why humans transform nature. The theory supports findings made by this study on the complex and intertwined social, economic and political factors that influence the high rate of illegal sand mining in Zimbabwe. The study particularly noted that illegal sand mining is driven by a set of factors resulting in various forms of socio-environmental conflicts among different stakeholders.

Economically, illegal sand mining is driven by poor national economic performance that has resulted in the closure of industries and so has limited employment opportunities for Zimbabweans. Illegal sand mining has been utilised as an alternative economic option for many families in Epworth, Retreat Farm and Zengeza. The study observed a close link between economic drivers and social issues. Due to a dwindling economy, there has been a gradual decline in living standards for the general populace due to unemployment and shrinking business opportunities at various levels. Indeed, social factors emerged as key drivers of illegal sand mining. Politically, government's land reform and indigenisation policies exacerbated the growing economically and socially induced illegal sand mining in Zimbabwe. Black Zimbabweans felt empowered by government policies resulting in growing interests in

uncontrolled utilisation of land for various land uses, including sand mining. These findings clearly agree with arguments put forward in the political ecology framework that views most environmental issues and changes as an outcome of complex and interconnected causal factors. As Bryant and Bailey (1997) noted, with time, especially from around 1990s, researchers realised that most environmental problems were a result of a broader context of politics, society and economy and, indeed, illegal sand mining in Zimbabwe emerged as a topical environmental issue that is driven by the same set of issues.

According to Robbins (2005), political ecology does not only provide critiques but also alternatives in the nexus between environment on one hand, and political, social and economic factors on the other. Indeed, findings of the study confirm the foregoing argument as it emerged that illegal sand mining resulted in a network of socio-environmental conflicts among various stakeholders such as residents, business community, government and industry. The interference of politicians in land acquisition facilitated indiscriminate sand mining and undermined effective governance of sand mining. Socially, illegal sand mining affected local communities by exercising coercion, violence and illegitimate authority over land use and governance issues. There was much conflict surrounding land use between illegal sand miners and residents. It was very difficult for both residents and authorities to stop illegal sand mining, as sand was an economic source of livelihood. This, in turn, reflects the interconnectivity of social, political and economic issues in explaining illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province.

The views of local communities towards the utilisation of natural resources from a political and economic point of views complicated regulation efforts. Government's land reform policy and indigenisation policy indirectly empowered local communities to upscale sand mining operations. As highlighted by Benjaminsen and Svarstad (2018), political ecology revealed the decisions that local communities make about natural resources in their localities, particularly sand and gravel, in the context of the prevailing political environment, societal regulations and economic pressure. Indeed, citizens of Zimbabwe anticipated much in the way of economic returns and local community development from such government initiatives. However, the highly anticipated positive outcomes did not materialise resulting in local communities retaliating in the form of indiscriminate illegal sand mining as a means of obtaining an income and sustenance. This is clearly supported by the political ecology framework which is understood by many scholars as a cross-cutting framework that converge politics, economics

and society in explaining such environmental issues (Bassett, 1988; Taylor, 1999; Page, 2003; Gray & Dowd-Urbe, 2013). Indeed, research studies indicated that political ecology has been widely adopted in sand mining studies in some countries (Abdus, 2008; Bagchi, 2010; Ashraf et al., 2011) including sand governance and conflicts (Davey, 2001; Green, 2012; Chevallier, 2014; Boloji, 2010; Arwa, 2013)

Together with findings of the present study, the political ecology theory challenges governments to formulate inclusive and broader frameworks that are cognisant of the intertwining issues around environmental issues as illegal sand mining. This is supported by Babe (2014) who noted that political ecology has as a foundation that it is the function of any government to formulate and implement ecological policies that address its environmental needs and problems, while at the same time monitoring its citizen's interaction with the same environment. In contrast, findings from the present study suggest an imbalance between environmental needs, problems and monitoring of illegal sand mining activities. Despite the existence of a set of laws and regulations for addressing sand mining issues, conflicts remained prevalent while environmental problems still exist. On-site and off-site regulation efforts were generally minimal due to resource scarcity, poor stakeholder collaborations and weak enforcement. Corruption between the regulators and the regulated was the main obstacle to effective regulation. Thus, social, economic and political issues require an integrated approach in addressing illegal sand mining, which is in line with the political ecology framework and the stakeholder theory.

Political ecology attempts to answer questions related to the politics of natural resource management, access, and control, environmental knowledge, and their interactive effects on livelihoods and environment (Benjaminsen & Svarstad, 2018). In the present study, the theory clearly explains the connectivity of such issues towards illegal sand mining in Zimbabwe. Land is a highly politicized and complicated feature of governance, legitimacy and control of land use, in this case, for sand mining. Politicians who claim legitimacy over much state land enflame conflicts with other interested stakeholders over varied land use interests. However, given the scale of existing operations there appears little progress was made on addressing illegal sand mining. The complexity of regulation of such land including that under the jurisdiction of local authorities coupled with a weak governance system has resulted in a myriad of social problems in areas such Retreat Farm, Epworth and Zengeza ranging from social displacements, health and safety issues and social malpractices that all fuelled conflicts.

Land has been degraded while some heritage, traditional and cultural sites have been destroyed by illegal sand mining operations. This is explained by political ecology that does recognise cultural forces among other complex issues on environmental changes. Dawson (2021) noted that political ecology study the intersection of political, social and cultural forces on environment or ecological trends. Evidently, findings suggest that illegal sand mining is driven by, and has an impact on politics, economies and society. In explaining the political ecology, Bryant (1992) noted that the dynamic and complex human-environment interactions cannot be separated from global justice. This clearly supports findings of the study that observed a myriad of human rights violations among societies due to illegal sand mining, such as the right to education, right to security and right to health and a clean environment. Indeed, the socio-environmental issues that emerged as so connected to conflicts, demand justice, which can be achieved through stakeholder collaboration and socio-environmental sustainability as espoused by the stakeholder theory

Political ecology is a field within environmental studies focusing on power relations as well as the interaction between nature and society (Stott & Sullivan, 2000; Robertson, 2015). Findings of this study similarly revealed that existing power relations and political influence significantly resulted in persistent illegal sand mining. The dominance of politicians in the process of land access and control deprived the general populace of the economic benefits of sand and thereby created a hostile environment between those who benefitted and those who were disadvantaged. Thus, most illegal sand mining spots were characterised by violence and conflicts in the province. This is explained by theory that points at such inherent social dynamics of control over economic lives (Neumann, 2009). Indeed, the disparity of power and access to land and sand emerged a salient issue in this study.

According to Kervankiran et al. (2016), political ecology explains how the society interacts with nature and this is conceptualised according to three main theoretical frameworks, namely environmental/social dialect, the co-production of socio-nature, and environmental constructivism. Environmental sociology explains the interconnections of human societies with the natural environment while co-production of socio-nature encompasses developing of nature-based solutions by individuals or group of people. Lastly, environmental constructivism entails the extent to which human attitude and understanding of nature are socially constructed and culturally variable (Gray & Dowd-Urbe, 2013; Benjaminsen & Svarstad, 2018; Dawson, 2021). These three aspects or elements fit into the findings of the present study as results

indicated that societal interaction with nature in illegal sand mining was associated with a network of interconnected economic, social and political issues. However, the co-production of socio-nature contrast with findings made by the study as only a few initiatives for addressing illegal sand mining and conflicts were evident in the province. There was a general fragmentation and poorly coordinated system of governance and very limited stakeholder collaborations. This is also in contrast with the stakeholder theory that calls for active engagement of various stakeholders such as community, business and government in creating business that are socially sustainable (Fontaine et al., 2006).

All three frameworks stem from critiques of how nature-society relationships are theorized in explanations of diverse human-environmental problems and their solutions (Baba, 2014; Batterbury, 2018). In this study, various environmental problems such as land degradation, pollution and deforestation emerged as outcomes of illegal sand mining that had a subsequent effect on societal welfare and well-being resulting in a myriad of conflicts. Although most findings of the study, particularly on drivers of illegal sand mining and its impact and conflicts, as well as stakeholder collaborations, resonate with tenets of the political ecology theory, the diverse cultural aspects of environmental constructivism did not apply much in the present study. While illegal sand mining resulted in destruction of some cultural, traditional and heritage sites, the scope of the study fell within a uniform cultural background across the study sites. Thus, cultural diversity did not emerge as an issue in explaining the dynamics of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province.

However, as in other countries, the political ecology theory is relatively more connected to the study findings and clearly explains the interconnectedness of issues in illegal sand mining and socio-environmental conflicts in Zimbabwe at large. Zimbabwe is currently plagued with an economic meltdown, a high rate of unemployment and generally low standards of living for many; consequently, illegal sand mining is an economic option to sustain lives. According to ZIMSTAT (2022), the national *Employment to Population Ratio* (EPR) stood at 35%. This suggests that a substantial number of people are unemployed and searching for jobs. Furthermore, the same source indicates that the majority of employed population work in the informal sector (45%). This explains why illegal sand mining contributes as a socio-economic driver. In parallel, the socio-economic hardships associated with unemployment have made law enforcement a challenge due to corruption, limited resources and political obstacles. Co-production of socio-nature that proposes development and implementation of nature-based

solutions remain weak despite the existence of a legislative framework for addressing illegal sand mining in Zimbabwe. The political space created by the land reform policy facilitated illegal sand mining activities while creating a complicated regulatory space for state land by authorities.

Studies reported that popular participation in environmental governance links political ecology to institutional approaches that emphasize democratic institutions, transparency, and accountability in natural resource management (Chhatre & Saberwal, 2006; Forsyth 2011; Ribot, 2007; Bhatasara, 2013; Kamarulzaman et al., 2022). In contrast, the findings of the present study showed paltry application of accountability, transparency and democracy in sand mining governance. Regulation of illegal sand mining involves some and not all key stakeholders such as NGOs, CSOs, industry and local community. At the same time, weak institutional systems, corruption and ignorance restrain good governance (Nwoke et al., 2022).

Given that the drivers and impacts of illegal sand mining and the subsequent conflicts were related to prevailing social, economic and political issues in Harare Metropolitan Province, the political ecology framework is therefore the most relevant theory in explaining these findings. Even the issues of poor governance and reflexive governance gaps that were exposed as the social, political and economic obstacles or constraints that underpin the theory. This is unlike the land resource conflict theory that mainly justifies why and with what effect for land use conflict in Harare Metropolitan Province. Similarly, the observed governance gaps for sustainable sand mining reflects the relevance of the stakeholder theory. However, the dynamic political landscape in Zimbabwe is central, as economic and social drivers of sand mining were subsequent outcomes of government's policies. To improve its relevance in the Zimbabwean context, the use of political ecology should further examine the scale and level of relevance including relative weight among the political, economic and social factors affecting sand mining and conflicts, including other environmental issues.

7.3 Land resource conflict theory

The land resource conflict theory neatly resonates with findings of this study and is broadly more applicable in the Zimbabwean context. Homer-Dixon (1999) argued that natural resource scarcity can lead to conflicts induced by the social ramifications associated with scarcity. The author admits that when land is scarce, it is subject to excess demand resulting in conflicts among various interested parties. The theory supports findings of the study, which showed that land was a source of conflict due to demand for sand mining and diverse land uses in Zimbabwe. It emerged from the three case sites that politicians used the land reform policy as a tool to grab vast amounts of land that was turned into illegal sand mining sites. The scramble for such limited sand rich areas sparked conflicts between illegal sand miners and the landowners themselves and among the illegal sand miners themselves over access to sandy sites.

The land resource conflict theory places more emphasis on land scarcity as a fuel for conflicts (Ujoh, 2014). This supports findings of this study that indicate that illegal sand mining resulted in many social stresses particularly within affected areas. These include displacements or forced migration, social unrest, insecurity, safety and health threats as well as destruction of private spaces. Illegal sand miners interfered with other private land uses such as housing, cemeteries, religious sites and private water sources resulting in further conflict with affected people. The conflict of land use on the same landscape explains why sand mining-induced conflicts contributed to scarcity of sand-rich sites. Illegal sand miners exploited any spaces rich in sand irrespective of other existing land use, resulting in further land use conflict.

The study also noted that there is limited land designated for sand mining by local authorities, causing a scramble for undesignated, illegal sand mining sites by miners. The negative impact of indiscriminate sand mining on the environment and society resulted in a series of socio-environmental conflicts among miners, residents, authorities and the private sector. This agrees with the land resource conflict theory by Homer-Dixon whose conclusion was based on thorough and extensive research that points to natural resource scarcity as causing conflict indirectly through adverse social consequences Obioha (2005), in his study, identified human migration, decreased economic productivity and a weakened state as some examples of the social effects that trigger conflicts. In the present study, all these social ramifications emerged in the three case study sites, and resulted in various forms of socio-environmental conflicts.

However, the conflict was more direct as opposed to what Homer-Dixon stated. Illegal sand mining caused social impacts that had an immediate and direct effect on conflict. Confrontation of miners within mining sites over access to sites and mining of private spaces were identified as directly culminating in face-to-face conflicts among miners and local communities. In a few instances, conflicts were indirect in cases where local communities and the industry castigated responsible authorities for failure to enforce laws against the offenders effectively. In contrast, loss of land by some families due to illegal sand mining triggered both direct and indirect conflicts in the province.

The land resource conflict theory identified decreased economic productivity as one of the social ramifications of land scarcity that cause conflict (Percival & Homer-Dixon, 1998). This is in contrast with findings of the present study which rather revealed that the decline in the national economic performance was a socio-economic driver of illegal sand mining in Zimbabwe. Scarcity of jobs and business opportunities drove societies into various forms of illegal but income-generating activities such as illegal sand mining. The social impacts of indiscriminate and unregulated sand mining activities triggered socio-environmental conflicts in Harare Metropolitan Province. In contrast, the land resource conflict theory views decreased economic performance as an outcome of land scarcity rather than acting as a driver for land scarcity (Homer-Dixon, 1991). In the present study, land scarcity for sand mining was mainly induced by a high population concentration near sand mining opportunities in the face of a dwindling national economy and a high rate of unemployment.

While much theory applies in the Zimbabwean context, it does not fully recognise that land scarcity for large-scale economic developments in developing and underdeveloped countries such as Zimbabwe may not be a centre of conflict. This is because the local community struggles to meet the minimum standards of living due to poverty and resource scarcity. As a result, conflicts are more localised at the grassroot level where easily accessible natural resources such as sand are the only source of livelihoods. In the present study, land scarcity did not result in a decline in economic performance at local and national level as argued by the land resource conflict theory (Homer-Dixon et al., 2014). The socio-economic and political landscape in Zimbabwe contributed to illegal sand mining and the socio-environmental conflicts from a political ecology perspective. Land scarcity was just an outcome of the interconnected issues that drove so many local communities into resistant, non-compliant and dangerous illegal sand miners for living. Sand mining became an alternative income-generating

activity in a jobless economy – grassroot-level communities employed all sorts of resistance to retain their illegal sand mining activities in the province.

Explaining the land resource conflict theory, Ujoh (2014) noted that other negative consequences of natural resource scarcity may include human migration and expulsion, receptivity to insurgency, decreased economic productivity, and a weakened state. Indeed, some residents in Retreat Farm experienced forced migration due to illegal sand mining activities within their private land including backyard sand mining. Furthermore, indigenous communities viewed the land reform policy as an empowerment government initiative, and this restrained governance of sand by authorities.

The land resource conflict theory also states that social impacts of land scarcity may result in both simple scarcity conflicts and group identity conflicts (Homer-Dixon, 1995). Homer-Dixon described simple scarcity conflicts as ones caused by a scramble for the remaining share of resources after vast resources are exhausted, while group-identity conflicts are the ones that involve large-scale migration of populations due to an environmental change (Homer-Dixon, 1999). This supports findings of the present study, particularly as to simple scarcity conflicts. These conflicts were relatively more prevalent in Retreat Farm and Epworth due to depletion of water resources, fertile soils and land for day-to-day land uses such as agriculture and gardening, due to illegal sand mining. These more localised small-scale conflicts also emanated from illegal sand mining induced pollution of few water sources and land degradation.

However, the applicability of the theory in terms of large-scale conflicts described as group identity conflicts by Homer-Dixon is minimal in the present study. Displacement of communities from their traditional, agricultural and residential land was observed but the scale did not necessarily involve group-identity conflicts. Movements only occurred among individual families who resided in sandy areas. In contrast, the land resource-conflict theory views group-identity conflicts as large-scale movements of populations caused by environmental changes. Illegal sand mining only resulted in small-scale displacements among homogeneous populations in terms of cultures, tradition, origin and legal status. In areas such as Epworth and Retreat Farm, the present study rather observed a chain or cycle of illegality in terms of both residence and sand mining. Illegal settlements emerged one of the key drivers of illegal sand mining and a source of conflict. Neither sand mining nor settlements were legal, and this made governance complex. Homer-Dixon's theory was mainly based on

environmental changes that take place in a formal setting, which is in contrast to the present study that mainly focused on an informal society in Zimbabwe.

Despite limited large-scale movements observed in this study, the argument of the theory on group-identify conflicts as mainly triggered by discontent of the disadvantaged populations as to their development explains the conflicts that were observed between the formal sector and informal sector industry involved in sand mining business. The industry was discontent with interference of illegal sand mining in their businesses particularly competition for market by the informal sector or illegal sand miners. The informal sector does not contribute any tax to the government as the formal sector and, hence, conflicts existed between the two parties on the one hand and the industry with authorities on the other hand, over poor law enforcement and limited protection of the tax payers.

Homer-Dixon's model focused on the relationship between the scarcity of renewable resources such as water and soil on the one hand and the outbreak of violent conflict within countries on the other. In contrast, the present study was localised and involved cases within one province, Harare Metropolitan Province in Zimbabwe. Therefore, the scarcity of resources and the subsequent conflicts were centred on localised settings with generally uniform characteristics as opposed to countrywide cases and international conflicts. Although Homer-Dixon mainly related group conflicts to a global context, his theory was able to apply at similar but smaller scale to the illegal sand mining-induced conflicts in Zimbabwe.

Furthermore, the land resources conflict theory was particularly utilised because of its appreciation of environmental scarcity, as well as risks and conflicts in urban setting, unlike the political ecology that has been over-utilised in studies that were rural-based, as noted by Leonard (2012). According to Homer-Dixon (2001), the land resources conflict model views scarcities as leading drivers of social cleavage, conflicts and weakened institutions. Indeed, issues of land ownership and legitimacy emerged as a salient issue in sand resource conflict in Zimbabwe. The legal processes of land acquisition and use in terms of land reform policy are not clearly defined and, hence, weakened regulation and governance of state land that was dominated by illegal sand mining activities. This is clearly explained by the land resource conflict theory where Homer-Dixon states that the effects of environmental scarcity are indirect and act in combination with other social, political, and economic stresses (Ujoh, 2014). This is also supported by the political ecology theory that asserts that environmental changes can be attributed to complex economic, social and political systems (Miller, 2022). Indeed, illegal

sand mining in Zimbabwe is associated with an interconnected set of economic, social and political issues, as explained earlier in this chapter.

The land resource conflict theory also describes how environmental scarcity contributes to certain destabilizing social effects that make violent conflict more likely, especially in the absence of early intervention. According to Homer-Dixon (1995), conflicts arising from environmental change tend to become chronic and difficult to manage if no immediate intervention is taken. This supports findings of the present study where conflicts, violent cases and other social malpractices emerged more as a usual lifestyle due to illegal sand mining, within the three case sites studied. Existing legislative and institutional measures have traditionally failed to address the growing illegal sand mining activities in the province despite known socio-environmental ramifications caused over the years. This is clearly explained by Homer-Dixon who noted persistent conflicts caused by such environmental changes erode governments' ability to manage societies that worsen the situations (Homer-Dixon, 1991). In this study, existing government institutions such as EMA, councils and ZRP have generally failed to combat illegal sand mining and so conflicts have remained prevalent in sandy areas in Zimbabwe. This is despite existing regulation efforts such as on-site monitoring, blitz operations, education and awareness and law enforcement.

The theory also points at the complexity of issues behind such unwanted environmental changes. Homer-Dixon (1991) acknowledged that subsequent conflicts are also complex but that integrated response systems can address them. Sadly, findings of this study show contrasting evidence. There exists a disintegrated system of governance between government institutions and non-government institutions in addressing illegal sand mining and the subsequent socio-environmental conflicts in Zimbabwe. Existing legislative and institutional frameworks do not recognise the interconnectedness of social, economic and political issues towards illegal sand mining and conflicts. Sector specific laws and regulations are more independent and only address a component of entire set of problems that require integrated governance systems. Rahman (2010) noted that policies should be inclusive, reflexive and all-encompassing in order to adequately solve problems affecting societies. Teinberger (2010) also asserted that non-governmental stakeholders such as NGOs should be engaged in addressing broader socio-environmental issues emanating from natural resource scarcities. In contrast, there was very limited NGO engagement in matters of illegal sand mining and the socio-environmental conflicts in Zimbabwe, as the study established. Most of the stakeholder

collaborations rather occur between government institutions, thereby marginalising the NGO sector, CSOs, industry and the grassroot communities. This is in conflict with the component of the stakeholder theory that call for such stakeholders to collaborate in creating social sustainability.

Given the government's emphasis of land reform and empowerment of indigenous Zimbabweans contributed to illegal sand mining and land use conflict, the land resource conflict theory therefore significantly applies well in this study. Indeed, private sector/ industry, local community and government had various forms of land use conflicts with illegal sand miners. Politicians were so instrumental to observed environmental ramifications and conflicts in all the three case studies in Harare Metropolitan Province. However, the theory did not explain how land conflict was part of the broader national socio-economic problems faced by the country, as explained by the political ecology framework.

7.4 Stakeholder theory

The present study was also premised on the stakeholder theory. According to Freeman et al. (2010), the stakeholder theory suggests that analysing the relationship between any business and its stakeholders presents a better chance of addressing common problems. The stakeholder theory traditionally related sustainability to adverse impacts of environmental changes on human health and societal harmony (Laura et al., 2014). However, the concept now includes a broader set of economic, social and environmental aspects (Boström, 2012; Ehnert & Harry, 2012; Shani & Mohrman, 2011). Key aspects that underpin the foregoing conceptual development include people, planet, and profit. This is in line with the main variables that also underpinned this study. In fact, most local communities in Epworth, Retreat Farm, Zengeza and other parts of Harare were engaged in the illegal extraction of sand in order to generate income to meet their family needs. Other sand miners sought to achieve profitability. Indeed, sand mining emerged as a growing business for both the formal and informal sector in Harare Metropolitan Province. This was particularly driven by a set of social, economic and political factors and that complex network of issues made the sand mining business more informal than formal and associated with socio-environmental conflicts among different stakeholders. The environmental impacts caused by illegal sand mining were massive and created hostile relations between illegal sand miners, local communities and authorities. Clearly, all these findings reflect the tenets of the stakeholder theory on the conceptualisation of sustainability. Illegal sand mining was characterised by environmental pollution, land degradation, forced

migration, social malpractices and human rights violations. These ramifications observed in this study clearly represent the traditional and modern conceptualisation of sustainability in terms of stakeholder theory.

The stakeholder theory further acknowledges the existing network of relations between business and its stakeholders such as customers, employees, suppliers and community (Clement, 2005; Fontaine et al., 2006). The focus on the theory was mainly on creating value for all these stakeholders as a whole to address common problems (Ibid). This resonates with one of the objectives of this study and the subsequent findings on determining the level of stakeholder collaborations in addressing illegal sand mining in Zimbabwe. Sand mining business has drawn the attention of several stakeholders that include the private sector, informal sector, local community and government. While reasons for interest may differ politically, economically and socially, whether beneficial or deleterious, illegal sand mining has been characterised by different activities of various stakeholders. The stakeholder theory highlights the need for ethical contact and social responsibility for corporations to grow and promote social wealth (Freeman et al., 2010). Results showed that most sand mining companies were socially responsible in their operational territories.

However, there emerged an imbalance of fairness, ethics and social responsibility from other stakeholders such as illegal sand miners. Illegal sand miners adversely altered the social landscape of societies through force, thus violating fairness, peace and societal welfare. Mining was done in private spaces without consent while local communities were subject to attack while violence characterised much of the illegal sand mining sites. Resources owned by private companies, such as dams, were polluted and abused while the market was manipulated to the disadvantage of registered sand miners. The focus of the theory on corporations excludes other stakeholders such as illegal sand miners from the good practice of social responsibility and social sustainability (Garvare & Johansson, 2010). In the present study, illegal sand miners emerged as the main concern rather than corporations themselves. The theory seems more applicable in developed countries where investment is high and demands much focus on business entities regarding their stakeholders such as customers, employees and investors. In Zimbabwe, the same application is farfetched given that the informal sector constitutes the greater stake of business community. Rather, small-scale and informal business activities dominate the industry. Therefore, issues of ethical contact and social responsibility that underpin the stakeholder theory apply more on the informal sector than the formal sector. In

fact, findings suggest that activities of the illegal sand miners affect operations of most registered sand mining companies economically, socially and politically. Some politicians abuse their offices to pursue illegal sand mining operations and land claims at the expense of registered business entities and grassroots communities. These findings conflict with arguments put forward by the stakeholder theory focusing on the need for corporations to practice good ethical and social contact with other stakeholders.

However, the idea of stakeholder collaboration in addressing common problems as raised by the theory clearly supports findings made by the study. Roloff (2006) asserted that there is need to bring together various stakeholders from business, civil society, governmental and international institutions to find common solution/s towards problems. Other scholars support the view that multi-stakeholder engagement is indeed a necessary tool for building social sustainability (Leonard, 2008; Roloff, 2008; Lifvergren et al., 2009; Laszlo et al., 2010). Although much must be done collaboratively to address illegal sand mining in Zimbabwe, there was evidence of institutional engagements to this end. Most government institutions such as EMA, local authorities and the police had significant collaborations in combating illegal sand mining in Harare Metropolitan Province. These include education and awareness campaigns, monitoring exercises and prosecution processes. This was commendable and clearly represented the main argument of the stakeholder theory of finding solutions through a multi-stakeholder approach.

However, the involvement of other key stakeholders such as NGOs, CSOs and industry in addressing illegal sand mining was generally low in Zimbabwe. Most collaborations relatively occurred among government institutions despite the utility of existing non-government stakeholders in sand mining and resolving conflict. The inclusivity aspect of the theory was not quite evident in this study. There was limited consultation and engagement of the above stakeholders in planning, implementation, monitoring and evaluation of programs and policies for addressing illegal sand mining. Yet, the stakeholder theory calls for engagement of all stakeholders with interests and/or are concerned with any business operations with the aim of achieving social sustainability (Roloff, 2008; Lifvergren et al., 2009; Laszlo et al., 2010). The marginalisation of some grassroots level communities eliminates giving value to every stakeholder as advocated for by the stakeholder theory. Mohrman and Worley (2010) noted that giving value to every business stakeholder in a key element in the stakeholder theory.

The stakeholder theory further points at fairness to everyone in business. While this is a key element of business ethics (Freeman et al., 2010), this emerged as a major gap in the sand mining sector in Zimbabwe. The prevailing economic situation in the country has created a self-centred behaviour and unfair business practice among the privileged persons and those in power. The acquisition of land claims, access, control and regulation of illegal sand mining was marred by corruption, political injustice and abuse of power. Natural resource governance that aims to achieve social and environmental sustainability was rather characterised by political manipulations and corruption by and among authorities. Bribery of officials in authority emerged as one of the unfair institutional practices in the three case studies in Harare Metropolitan Province. Thus, the fairness aspect of the stakeholder theory, despite focusing on corporations, cannot explain the above findings. The political, economic and social landscape in Zimbabwe has reshaped ethical practices to the loss of fairness among societies that renders fairness aspect of the stakeholder theory void and irrelevant.

This has also been attributed to weak collaboration systems in Zimbabwe's sand mining sector. This diverges from the idea of stakeholder collaboration of the stakeholder theory. Roloff (2008) noted that social sustainability demands that both formal and informal networks, partnerships, alliances, platforms and initiatives are activated in order to generate meaningful collaborative outcomes. Similarly, Russo (2010) highlighted that the achievement of economic objectives of any organisation requires analysis and optimisation of organisational processes through stakeholder engagement. The few existing partnerships for addressing illegal sand mining and socio-environmental conflicts failed due to resource scarcity and weak law enforcement. All these issues were exacerbated by lack of accountability, transparency and corruption along the processes of planning, implementation and evaluation of stakeholder engagements towards sustainable sand mining.

The stakeholder theory also appreciates the role of legislation in augmenting stakeholder collaborations for addressing socio-environmental problems. Mohrman and Worley (2010) argued that stakeholder perspective is insufficient in achieving social sustainability through abstract guidelines or description of practices without a sufficient legal basis. The authors highlight the importance of legal binding of any business in promoting value for other surrounding stakeholders and to help address common problems. In contrast, the present study findings revealed that the Zimbabwean legislative framework is comprehensive in providing institutional direction towards sand mining issues but loose on stakeholder engagements. Thus,

existing institutions despite having a similar mandate to promote social and environmental sustainability remains fragmented in terms of common engagements towards illegal sand mining. This concurs with arguments by Clement (2005) who noted that achieving social sustainability through multistakeholder collaborative engagements and processes is complex and requires more than a regulatory approach. In view of this, Shani and Mohrman (2011) proposed combining the attitude of building theoretical models and the need for a practitioner-rooted approach into a renewed methodological perspective. Similarly, Kira and van Eijnatten (2008) attested that social sustainability is more dynamic and complex in stakeholder perspective and argue that it can be achieved depending on the nature of the stakeholders involved, the ability to meet their concerns and needs as well as addressing peculiar tensions that arise during collaboration efforts. Against this backdrop, the present study proposes that addressing illegal sand mining and the socio-environmental issues in Zimbabwe should take a more than critical application of some and not all elements of the stakeholder theory. Nevertheless, the stakeholder theory clearly resonates with findings made on poor governance among local authorities and other state institutions towards sustainable sand mining in Zimbabwe

7.5 Reflexive governance framework

Findings from the present study also exposed the urgent need for reflexive governance of sand mining in Zimbabwe. Despite the existence of wide legislative and institutional framework system that is responsible for addressing illegal sand mining and conflict, there remains poor enforcement of legislation on mining, environmental management and conflict among other interrelated socio-economic issues. In practice, however, the law is generally quiet. Practices and programs adopted to address illegal sand mining are not holistic, as evident in limited stakeholder engagement in planning, implementation and review processes. This confirms the empirical evidence that reveals that flawed strategies and policies towards environmental management (Moore et al., 2021); stakeholder participation (Enemy & Newig, 2005) and environmental policy integration (Lenschow, 2002) are weak points in addressing resource depletion and biodiversity losses. Findings of this study showed that environmental laws and mining laws such the Environmental Management Act and the Mines and Minerals Act can address illegal sand mining if well enforced in a reflexive governance system.

As noted by Feindt and Weiland (2018), reflexive governance is characterised by reflexive adaptation of regulations or policies by governments. In contrast, findings of this study exposed

the inadequacy of government laws and regulations to integrate and deal with illegal sand mining and associated socio-environmental conflicts in Zimbabwe. Legislation such as the EMA, MMA and UCA are silent on addressing social and environmental conflicts, which characterise illegal sand mining in the country. While there are legislation and provisions on sand mining, there remains a gap in terms of promoting stakeholder participation, stakeholder harmony and transparency in enforcement processes. As to the latter, the present study noted a worrisome trend of corrupt practices among responsible authorities. This compromises the efficacy of good governance. Reports have confirmed that corruption is one of the obstacles to good governance (Cooray & Schneider, 2018; Méon & Sekkat, 2005; Hellman & Schankerman, 2000). The local community most affected by illegal sand mining and the socio-environmental ramifications are not capacitated to deal with such malpractices due to limited engagement. Few engagement programs allow local community and other stakeholders to play significant roles in addressing illegal sand mining in Harare Metropolitan Province. This clearly conflicts with views by Haas & Jasanoff who conceptualised reflexive governance as the design problem that involves formulating rules for reflexive learning for reflexive capacity building and new design rules implementation. Findings from the present study revealed that capacity building for stakeholders and particularly local community towards sustainable sand mining is limited. A document review of existing programs and policies on environmental governance also showed that there is limited stakeholder participation and capacity building.

As noted by Hendriks et al. (2007), reflexive capacity building is the ultimate goal for reflexive governance and is the means by which underlying assumptions, practices and institutional practices are scrutinized and reconsidered. In contrast, results from Retreat Farm, Epworth and Zengeza all exposed that there are legislative and institutional gaps towards sand mining in Zimbabwe. For example, blitz operations used to monitor illegal sand mining exercises are no longer effective, as offenders have adopted a better system of counteracting such approaches. This has seriously affected the efficacy of enforcement efforts. Indeed, implementation of environmental and mining laws requires adoption of more effective programs and policies if reflexive governance is to materialise (Wilkes, 2022; Widanti, 2022). In the present study, institutional practices from various government institutions that include EMA, Ministry of Mines, ZRP and local authorities mainly include education and awareness, and blitz operations that are proving archaic due to the economic situation in the country. A high unemployment rate and poverty levels are key drivers to illegal sand mining in Harare Metropolitan Province; hence, enforcement of law against illegal sand mining is faced with high tension and resistance.

Existing practices and laws do not match the current needs of societies in Zimbabwe, thus, it is a conflict of economic hardships and socio-environmental concerns. Politicians are also using the powers to override the law thus compromising effective governance. Clearly, such circumstances cannot address the socio-ecological vulnerabilities of societies, fragmented governance regimes and conditions of sustainability transition as noted by Vadrot et al. (2022).

According to Leonard (2012), reflexive governance involves transition management, and deliberative democracy for environmental governance and sustainability governance. In contrast, the transition management of natural resources, democracy in program and policy implementation and sustainable sand mining remains weak in Zimbabwe's governance system. Existing institutions including environmental authorities, mining authorities, local authorities, police and political leadership remain fragmented in both policy and practice for reflexive governance. This explains why despite an existing set of policies that regulate sand mining, illegal sand mining and conflicts remain rampant in Harare Metropolitan Province. Table 7.1 summarizes the relationship between theoretical frameworks and study findings.

Table 7.1: Relationships between theoretical frameworks and study findings

Theoretical framework	Drivers of illegal sand mining	Impacts and socio-environmental conflicts	Stakeholder collaborations in combating illegal sand mining	Legislative framework that addresses illegal sand mining
Political ecology framework	Strong connection: Illegal sand mining emerged as an outcome of a complex set of social, economic and political drivers.	Strong connection: Social, economic and environmental impacts observed as all connected to prevailing conflicts.	Weak connection: The study observed a generally limited stakeholder collaboration particularly between government and non-government stakeholders. The theory does not explain the roles of stakeholders in addressing a problem.	Strong connection: Utility of existing legislation strongly linked to politics, economy and societal experiences.
Land resource conflict theory	Strong connection: Observed conflicts were attributed to pressure over land.	Strong connection: Impacts of illegal sand mining on environment, business and society were a source of conflicts.	Fair connection: Conflicts were caused by land use conflict by various stakeholders. However, the theory does not dwell on combating environmental issues.	Weak connection: The theory does not explain the legal side of land resource conflict.
Stakeholder theory	Weak connection: The theory focuses more on stakeholder collaboration. Drivers of illegal sand mining are not clearly explained by the theory.	Fair connection: Poor stakeholder collaboration was attributed to persistent illegal sand mining, conflicts and environmental impacts. There is need for improved stakeholder collaboration.	Strong connection: The theory calls for stakeholder collaboration. Notable collaborations were observed though not adequate to address illegal sand mining and achieve social sustainability.	Fair connection: Coherence of legislations and institutional key result areas on environmental issues were observed. However, illegal sand mining in particular is relatively still marginalised.
Reflexive governance framework	Weak connection	Weak connection	Strong connection: The theory exposes lack of adequate stakeholder engagement including capacity building for various key players towards sustainable sand mining.	Strong connection: The theory exposes lack of integration on existing laws and institutions that should address illegal sand mining.

7.6 Summary

The chapter related theoretical frameworks adopted by the study, the political ecology, stakeholder theory, land resource conflict theory and reflexive governance framework to findings of the study. This included deriving conclusions on the relevance of theories to results and applicability within the Zimbabwean context. The four theoretical frameworks generally well supported findings as to the broad dynamics of illegal sand mining and conflicts in Zimbabwe. However, the geographical scope upon which these theories were proposed does not fully represent the prevailing social, economic and political landscape in Zimbabwe. The following chapter presents the conclusions and recommendations based on findings of the study.

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

The final chapter includes an evaluation of the research, through the presentation of a summary of key findings and themes emanating from the results, a reflection on the theoretical and conceptual framework employed, as well as a discussion of the contribution made by the study. As a final point, recommendations of the study are presented.

Chapter 6 presents the findings of the study based on four emerging themes that include:

- the drivers for illegal land mining.
- impacts of illegal sand mining and associated socio-environmental conflict.
- stakeholder collaboration in addressing illegal sand mining.
- analysis of legislative framework and reflexive governance of illegal sand mining.

In this way, the study examined a political ecology of illegal sand mining and the associated socio-environmental conflicts. Chapter 6 was therefore an articulation of how the research problem and research questions of the study were addressed. Thus, the conclusions of the study and proffered recommendations stem from findings of the study presented in Chapter 6. Methodological and practical recommendations contributed to improving the body of knowledge on the political ecology of illegal sand mining and socio-environmental conflicts in Harare Metropolitan Province and Zimbabwe at large. The chapter also presents recommendations for future research and concludes by outlining the limitations of the study.

8.2 Conclusions based on major findings

As highlighted in Chapters 1, 2 and 3, the study employed the approach of utilising political ecology to examine illegal sand mining and associated socio-environmental conflicts. The study results should contribute to strengthening the body of knowledge on the interconnectivity of social, economic and political issues on the subject. All the research objectives or questions were addressed based on the qualitative analysis of data. The current section presents theme-specific conclusions based on research questions.

8.2.1 The primary research question

Considering that environmental issues are regulated under the Environmental Management Act and other legislative instruments in Zimbabwe, but illegal sand mining continues to be a challenge, the primary research questions was:

What are the underlying social, economic and political issues on illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province?

To address this primary question, four subsidiary research questions were generated, and these include:

8.2.2 Research Question 1 (RQ1):

What are the social, political and economic drivers of illegal land mining?

To answer this research question, drivers of illegal sand mining were classified into three classes that include social drivers, economic drivers and political drivers. Observed social drivers of illegal sand mining include a high rate of unemployment, poverty, influx of informal settlements and urbanisation. Economic drivers revolved around the general declining economic performance ultimately creating other social problems. Political drivers include government policies that directly and indirectly perpetuated illegal sand mining, for example through perceived socio-economic benefits from mining activities and investments in the country. The government's FTLR program and the Indigenization and Empowerment Policy contributed to the illicit sand mining activities in Harare Metropolitan Province and other parts of the country. Due to the interconnectedness between social and economic drivers, this section makes an integrated conclusion on this research question.

Socio-economic drivers of illegal sand mining

Urbanisation: Findings of this study shows that the increasing in-migration into Harare has resulted in overpopulation. The existing sources of livelihoods and jobs cannot adequately address the needs of society. Therefore, illegal sand mining, among other illegal activities, have become alternative sources of both employment and livelihood. At the same time, the demand for housing has increased the demand for sand, ultimately creating sand businesses in most urban and peri-urban spaces. The study concluded that urbanisation has resulted in a myriad of other socio-economic drivers of illegal sand mining, and is discussed later in this section.

Unemployment: The study also noted that illegal sand mining is driven by a high rate of unemployment in the province and in Zimbabwe at large. The majority of study participants indicated that the job market has dwindled and cannot absorb them despite their work experience and qualifications. Given the economic meltdown the country is experiencing, the study concludes that illegal sand mining has become an essential, alternative source of employment for jobless Zimbabweans. It emerged that youthful individuals eligible for better jobs, if available, dominate in illegal sand mining. Results of the study also indicate that the relative increase in illegal mining was worsened by loss of employment due to COVID-19 government lockdown measures. Hence, most youths and men who dominate the share of people engaged in illegal sand mining were involved in various direct and indirect employment activities linked to illegal sand mining. Direct activities included extraction of sand, selling of sand and transporting of sand. Indirect activities associated with sand mining included people who were employed through vending and provision of support services such as catering, mainly targeting illegal sand miners at mining sites.

Poverty: Linked to unemployment was poverty as a driver of illegal sand mining. Results of the study indicate that the economic hardships of the country have generally deteriorated the quality of living standards for most Zimbabweans. As a result, communities are no longer able to feed their families, send their children to school and meet other basic needs. In response, most families including men, women and children are all engaged in self-employed income-generating activities, and in the face of an unwelcoming job market, these are mostly illegal. Sand, gravel and stones are among the natural, indigenous local resources that can generate some income for them to meet their needs. Illegal sand mining is one means of generating income despite communities being aware that it is an environmentally unfriendly activity and contributes towards a social disaster. Compared to the formal sector, sand obtained via illegal mining is sold at a cheaper price as a way to make quick money in the face of socio-economic hardships.

Increase in informal settlements: Results of the study also reveal that informal settlements significantly contribute to illegal activities. Illegal sand mining activities are more prevalent in sandy areas in and around informal settlements in Harare Metropolitan Province. Poverty-stricken families prefer to settle in informal settlements associated with a relatively lower cost of living. Most families in informal settlements are not formally employed and rely on informal activities for a living, including illegal sand mining. Sand has become a lucrative livelihood

option and source of employment in the face of low industrial performance and an unhealthy job market in the country. Clearly, the rate of illegal sand mining would be relatively low if better regulations existed towards informal settlements.

Political drivers of sand mining

Politically, there are two main government initiatives that indirectly propagate illegal sand mining - the Indigenization and Empowerment Policy, and the Fast Track Land Reform (FTLR) program.

Indigenisation and Economic Empowerment Policy: This policy was politically driven to promote community share ownership from private mining investments in the country and was interpreted by society as an empowerment and a privilege to access and utilise natural resources by local communities. As a consequence, communities felt that they should not be limited in harnessing indigenous resource in their localities, including sand. The regulatory efforts by authorities to control illegal activities by community members is rather viewed by citizens as a violation of that policy and, hence, is a source of direct conflict for the two parties. The study also concludes that some communities feel embittered by the government for failing to fulfil the provisions of the Indigenization and Empowerment policy. Local community viewed private mining of sand as flawed in terms of their local socio-economic development. As a result, illegal sand mining emerged as a fair response and of direct benefit to their families. Thus, society's high anticipation of the implementation of this policy coupled by ignorance of the policy itself explains the establishment and some of the attitudes surrounding the rampant illegal sand mining activities and the associated socio-environmental conflicts.

Fast track land reform program: Findings of this study also show that the FTLR program made a significant, although indirect, contribution to illegal sand mining. The FTLR program was a politically-driven government land reform program that involved land acquisition from white settlers and its transfer to indigenous Zimbabweans. As a result, most politicians, and particularly war veterans, seized vast areas of land used for various purposes. Unfortunately, some landowners then leased their land to individuals who engaged in illegal sanding. The same politicians used political powers to resist authorities and regulations while others perpetrate illegal sand mining into private territories. Thus, land use conflict was also common between these stakeholders.

The researcher therefore concluded that illegal sand mining was driven by a multiplicity of social, economic and political factors that all contribute to conflicts among various stakeholders. These include urbanisation, unemployment, poverty, influx of illegal settlements and the results of government policies and corruption.

The above response to research question 1 supports the assertion that study objective 1, which was **to; determine the social, political and economic drivers for illegal land mining**, was suitably addressed in this study.

8.2.3 Research Question 2 (RQ 2):

What are the impacts of illegal sand mining and associated socio-environmental conflicts?

To answer this research question, the impacts of illegal sand mining were classified into three categories, that is, social impacts and conflicts, environmental impacts and conflicts, and economic impacts and conflicts. An analysis of the nexus between the impacts of illegal sand mining and associated socio-environmental conflicts presented a myriad of findings.

Social impacts and conflict

Notable social adverse impacts included displacement of communities, an increase in social malpractices and criminal acts, destruction of heritage and traditional sites, and human rights violations such as the right to education and the right to safety and health. These social impacts created conflicts between traditional leadership, local community members, religious groups and government authorities. Environmental impacts observed include environmental pollution, land degradation and loss of biodiversity. These impacts triggered conflicts between illegal sand miners and environmental authorities. Similarly, local community viewed these developments as threats to their health and safety, and security, thus becoming a source of conflict, particularly between community members and the illegal sand miners. Economically, illegal sand mining resulted in stiff competition for market share, loss of revenue by the formal sand mining sector, while also interfering with other economic sectors in the country. Notwithstanding conflicts induced by the adverse impacts of illegal sand mining within communities, results indicated that other conflicts were driven by the positive impacts of illegal sand mining to local community, being employment, income generation and availability of cheap building materials. However, conflicts emerged as local community members defied laws in order to harness the economic benefits endowed in the sand, despite such activities being illegal.

Environmental impacts and associated conflicts

Environmental pollution: Study results indicated that illegal sand mining was directly and indirectly responsible for various forms of pollution involving water, land, air and noise. On land, sources of pollution included littering of paper and plastic and deposition of human waste because of open defecation especially in peri-urban spaces. The influx of vendors into illegal sand mining hotspot areas generated more solid waste. Similarly, solid waste and activities such as sand segregation or filtration process caused serious pollution. Illegal sand mining activities contaminated water from dams, wells and streams used by the community for other domestic purposes. In addition, the initial slash and burn process of land clearance for sand mining caused air pollution while rock blasting and old trucks used for transporting sand resulted in smoke and vehicular gas emissions as well as noise pollution. Pollution-induced conflicts centred on common resources such as water, used by both miners and other communities. Unsustainable water utilization from private sources also created conflicts with the private sector.

Land degradation: It emerged from the study that illegal sand mining also causes massive land degradation in and around sand-endowed communities. The rudimentary methodologies used in sand extraction, processing and transport has left gullies and pits, and caused soil erosion. Numerous emerging water courses and streams point to a changed physical landscape resulting from illegal sand mining. This land degradation is largely ignored by illegal miners who are not interested in reclaiming or rehabilitating the extraction sites. Unfortunately, of direct concern to community members is that the open pits left at illegals sand mining sites act directly as death traps for people and animals and when filled with water become habitats for mosquitoes. Land clearance to prepare illegal sand mining sites involves cutting down trees and this practice has resulted in environmental degradation and loss of indigenous flora as well as fauna. In addition, unroadworthy vehicles that transport sand from the illegal sand mining sites destroy grass, shrubs and trees. In the latter case, deforestation is performed to create roads for the trucks. Sadly, there was no environmental rehabilitation done by these miners once the sand supply is deplete. This environmental damage is a source of conflict between local community members and the miners as children and animals are trapped in the open pits especially during rainy season. Stagnant water collected in the open pits during the rainy season was also a public health concern. Similarly, all the illegal sand mining activities were a direct

defiance of law, hence cat-rat relations characterise the nature of inherent conflict between both parties.

Loss of biodiversity: Findings of this study showed that illegal sand mining is a clear threat to biodiversity. The processes of illegal sand mining include land clearance, mining and transporting of sand. In each case, there is destruction of land, grass and trees to allow for sand mining and transport. For example, destruction of vegetation leads to land degradation and alteration of hydrological cycle in the long run. Similarly, transporting of sand involves creating undesignated roads through other private spaces, causing conflicts with land owners. Land clearance also triggers conflicts with both land authorities and local community as their traditional and heritage value is jeopardised by illegal sand mining activities.

Social impacts and conflicts

Displacement of communities: Results of the study indicate that illegal sand mining has displaced some families from their homesteads caused by loss of land and degraded backyards due to illicit sand mining that exposed families to the risk of landslides. Other communities lost their agricultural land which was their only source of livelihoods through subsistence gardening and farming. Loss of land due to illegal sand mining therefore emerged as the main cause of community displacement. However, the illegality of both settlements and sand mining has resulted in unjustifiable conflicts in terms of land use laws and regulations. The communities or residents were identified as the main losers in the conflicts as most chose to relocate to other areas.

Results of the study indicated that illegal sand mining has resulted in a series of conflicts among various stakeholders including local authorities who administer urban land use, as well as environmental management and mining authorities and even the private sector. Most key study participants from these institutions were concerned with lack of respect shown by the illegal sand miners towards the local community, private sand miners and responsible government authorities, thus creating conflicts. Communities lose land, industries face intrusion while authorities face stiff resistance from illegal sand miners. Local communities argue that sand is an indigenous resource to which they are entitled. This emerged as one of the main sources of conflicts. The community members also pointed out weak governance by responsible authorities while corruption also emerged as a fuel to poor law enforcement. Political stakeholders also clash with industry as they use their political powers to outmanoeuvre the

latter on land use and its control within their land. Similarly, the private sector views responsible authorities such as the EMA as not performing its duty to protect the environment and societies against rampant illicit sand mining activities. The differing interests and conflict among these stakeholders reflect the interlinking of social, economic and political issues.

Loss of lives: As indicated by earlier findings (on land degradation), the gullies and open pits created by illegal sand miners have trapped children and even animals especially during the rainy season. Besides deaths directly resulting from land degradation, the study observed that activities at and around mining sites have attracted people with various motives, including robbers and thieves. Results show that lives have been lost from, in some cases, conflict among the illegal sand miners themselves resulted in injury or death, assault between miners and community members and, at the least, aggression exhibited by the miners to perceived threats from the community. This is further to other environmental-related fatalities mentioned earlier. The study concludes that loss of lives as a social impact of illegal sand mining created both internal and external conflicts among the various stakeholders.

Increase in criminal acts: Results indicated that there was a general rise in social and criminal malpractices due to illegal sand mining. These include prostitution, robbery, violence and thievery, among others. These social ramifications created a hostile environment between general local community members and illegal sand miners as the latter were instigators of malpractice. There was indeed a security threat as the rate of criminality increased in and around sand mining sites and surrounding communities. Conflicts among illegal sand miners themselves were common resulting in serious injuries while conflicts emerged between authorities and local community members and the illegal sand miners over unethical practices by the latter.

Economic impacts and conflicts

Competition and loss of market: Results of the study indicate that from an economic point of view, illegal sand mining resulted in stiff competition and loss of market by the formal sector, in this case, the registered sand mining companies. Locating within the same geophysical space due to proximity to sand, illegal sand miners forcibly operate within spaces owned by companies, including mining companies and compete for markets meant for these companies. This is the main source of conflict between the illegal sand miners and industry as competition for market has subsequently impacted their revenue. And this has a knock-on effect as loss of

revenue by industry leads to a reduction in taxation and so the income by government. Their illegal mining counterparts are not affected by this. Hence, industry accuses the government for failure to protect them as taxpayers against non-taxpayers who do not have any significant contribution towards the government income. In response, industry employs various directly and indirect methods to drive away illegal sand miners in and around their premises, including upscaling security systems, and covering mining land with trees – measures contributing to conflict.

Interference with other economic sectors: Findings of this study also showed that illegal sand mining has serious implications on the performance of other key economic sectors such as agriculture, mining and transport. Illegal sand miners do not respect land boundaries and thus they are capable of mining within agricultural land privately owned by cooperatives, entities or individuals. Similarly, the transport sector is heavily affected by illegal sand mining as sand business has attracted unlicensed transport service providers in and around sand mining areas. This is a blow to the formal sector performance as registered transport operators face competition in service delivery. As explained earlier, registered sand miners also lose market to illegal sand miners who illegally operate within the vicinity of private companies and sell sand at a relatively cheaper cost taking away a substantial number of customers meant for private companies. This is a clear area of conflict between the industry and illegal sand mining sector.

The above response to research question 2 supports the assertion that study objective 2, which was; **to examine the impacts and the associated conflicts of illegal sand mining**, was suitably addressed in this study.

8.2.4 Research Question 3 (RQ 3):

How are the various social stakeholders (i.e. community, government, industry and civil society) working collectively to combat illegal sand mining?

In answering this question, the researcher identified the roles of community, government, industry and civil society and followed this by an analysis of how they collaborate in addressing illegal sand mining and conflicts in Zimbabwe's Harare Metropolitan Province. Study results indicated that all the above stakeholders play important roles in the regulation of illegal sand mining. However, the government plays a relatively leading role in illegal sand mining regulation and governance as compared to other stakeholders. While community collaborations are notable in programs that seek to curtail illegal sand mining, collaborations on programs

such as blitz operations mainly involve government institutions such as EMA and ZRP. There is marginalisation of other key stakeholders such as community members as their participation is not even part of prescribed organisational plans for either government or non-government sectors. Rather, community members mainly collaborate more as mouthpieces describing how illegal sand mining issues affect them, and they do report to authorities, especially the police.

The local authorities include the Harare City Council, Chitungwiza Municipality and the ELB and these have clear structures and functionality concerning environmental matters in their areas of jurisdictions. However, their governance is affected by poor stakeholder engagement. Formal programs to collaborate with community members were generally invisible in this study. Similarly, the industry, despite reporting matters to the ZRP and responsible authorities, has very limited collaborations with other stakeholders. Like the community, they mainly work with police in dealing with illegal sand miners who interfere with their activities. Similarly, civil society and NGOs have the least participation in illegal sand mining matters in the province. Their collaboration in and towards curbing illegal sand mining was close to zero.

While engagement of all stakeholders in addressing environmental issues is key, as explained by the stakeholder theory, sadly, such collaboration was weak between and among key stakeholders such as local community members, community leadership, politicians, local authorities, mining and environmental organisations including enforcement agencies. Few collaborations observed between state institutions were driven by mandate rather than inclusivity for sustainability, as one of the key principles underpinning the stakeholder theory. This is why industry and NGOs felt marginalised despite industry being victims of illegal sand mining and conflicts while NGOs were open to government engagements. Unfortunately, there was very limited stakeholder consultation in programs and policies to do with sand mining. The same applies to implementation, review and evaluation of such. In fact, observed stakeholder engagements were only related to legal compliance to legislation on sand mining and environmental management and, particularly, as a requirement for mining licensing/permit or penalty systems. In practice, and outside legal compliance, stakeholder collaboration was mainly government to government, and not across all processes of illegal sand mining governance. In contrast, engagements between community and organisations were mainly limited to education and awareness programs.

The study concludes that significant collaboration only takes place between and among government institutions, particularly the EMA and ZRP. These are the key players. The

significance of other stakeholders, although evident in environmental issues, was generally silent regarding illegal sand mining. Thus, there is indeed a high stakeholder engagement gap, one of the reasons explaining the poor adoption of reflexive governance in illegal sand mining.

The above response to research question 3 supports the assertion that study objective 3, which was; to evaluate how affected communities, government, industry and civil society work collectively to combat illegal sand mining, was suitably addressed in this study.

8.2.5 Research Question 4 (RQ 4):

What is the efficacy of existing legislative framework and reflexive governance in addressing illegal sand mining in Zimbabwe?

Utility of legislative framework underpinning illegal sand Mining

Research results indicated that the following legal frameworks regulate sand mining directly and indirectly in Zimbabwe:

- the 2013 Constitution of Zimbabwe.
- the Environmental Management Act.
- the Urban Councils Act.
- the Mines and Minerals Act.

Results of the study indicate that the 2013 Constitution and the Urban Councils Act provide for sand governance from a general environmental perspective while the Environmental Management Act and the Mines and Minerals Act have specific provisions or sections on sand mining. This section summarizes the observed strengths and weaknesses of each instrument in addressing illegal sand mining.

Environmental Management Act: This Act provides for the management and protection of natural resources. Results of the study shows that the Act is relatively more comprehensive on sand mining and particularly illegal sand mining. It provides for institutional structures for dealing with environmental issues including establishment and functionality guidelines of the Environmental Management Agency and its Board. Specifically, illegal sand mining is provided for by statutory instrument 7, 2007: *Environmental Impact Assessments (EIA) and Ecosystems Protection Regulations*. This regulation recognizes the need for EIA in sand abstractions and sets clear penalties for non-compliance and illegal sand mining. *Part II: Extraction of Clay and Sand Deposits* of the Act restricts or prohibits the extraction of sand for commercial purposes without permit. However, the focus of the Act on sand for commercial

purposes exonerates the substantial contribution of the non-commercial sector on illegal sand mining. For example, some communities illegally mine sand for the purpose of informal settlement development.

Overall, the study concludes that the Environmental Management Act is the main legislation that governs and regulates illegal sand mining in Zimbabwe. The contribution of the Act on illegal sand mining is recognizable, but there remains the need to re-define the functionality of sand for compliance and standard purposes and incorporate illegal sand mining as related to non-commercial uses.

2013 Constitution: Section 73 of the Constitution provides for environmental rights. The study commends the cognisance and commitment by government or policy makers in promoting socio-environmental sustainability. Illegal sand mining, given its human rights violations observed in the study, is thus encompassed under environmental rights. However, the Constitution only takes a human rights approach and does not highlight the specific environmental concerns emanating from the illegal mining sector. The human rights viewpoint leaves the sustainability aspect of illegal sand mining subject to limited recognition from an environmental perspective.

The Mines and Minerals Act: Analysis of this instrument showed that the Act provides for the protection, conservation and sustainable utilization of alluvial deposits including. The Act also provides for institutional frameworks for governing sand mining, sand as a natural resource that falls under the extractive sector. Specifically, it provides a section that covers sand, that is, *Part XII: Working on Alluvial, Eluvial and Certain Other Deposits*. Based on this provision, the Act thus attempts to address illegal sand mining indirectly as one of the listed minerals under the foregoing section. However, study results indicated that the Mines and Minerals Act does not place emphasis on sand as it does on other minerals such as diamonds, gold etc. Furthermore, community engagement which is key in effective governance of sand mining is silent in the Act.

Urban Councils Act: Study results indicate that this Act is vital in regulating illegal sand mining in Zimbabwe. The Act institutionalizes urban local authorities such as the HCC to deal with matters in their jurisdiction, including environmental issues. The Urban Councils Act also provides an autonomy of local authorities to develop and implement by-laws (*Part VIII Section 129: By-Laws by Local Government Board*). All local authorities have by-law that provide for

governance of environmental issues including illegal sand mining. Specifically, *Part III (14, 15 and 16)* of the Act highlights the need for preservation and conservation of natural resources in council land. Section *17 (1) (2)* also prohibits and regulates activities that interfere with council property, thus all illegal sand mining activities taking place in council land are regulated in terms of this Act. However, the Act is not legally binding on local authorities setting up their by-laws. That means that local authorities may implement by-laws at their discretion.

The study analysis of legislation pertaining to sand mining concludes that the Act is important in the regulation of illegal sand mining but not cognisant of the impact or contribution of non-commercial sector on illegal sand mining. Generally, Zimbabwe is rich in instruments that govern sand mining issues. However, except for the Environmental Management Act, other instruments take a generic approach to addressing illegal sand mining. The aspect of stakeholder engagement in illegal sand mining is muted in all the legislation instruments.

Governance of illegal sand mining: Results of the study reveal that despite the existence of comprehensive legislative framework for regulating illegal sand mining in Zimbabwe as discussed above, there remains reflexive governance gaps. Legislation such as the Environmental Management Act and the Mines and Minerals Act provide for the establishment of institutional frameworks for managing all environmental issues and mining. However, the enforcement and or implementation of the above laws remains weak.

The study reveals that current programs and policies do not reflect the current environmental and mining sustainability issues. The permit system is weak while implementation is fragmented. More so, implementation of reflexive governance in sand mining in general is hampered by corruption, a limited stakeholder engagement system, limited resources and a syndicated system of communication by illegal sand miners against any on-site exercises by authorities. Some government officials are corrupt during the course of enforcement execution. Other obstacles include limited resources such as funds, vehicles, and other equipment for use during planning, implementation and evaluation of programs and policies that seek to curtail illegal sand mining and associated conflicts. However, the main concern that hinders effective governance is the lack of adequate stakeholder consultation and engagement in planning, enforcement and assessment processes of sand governance. The study concludes that various obstacles compromise the implementation of reflexive governance in Zimbabwe's sand mining sector.

The above response to research question 4 supports the assertion that study objective 4, which was; **to analyse the legislative framework and governance of illegal sand mining in Zimbabwe**, was suitably addressed in this study.

8.3 Practical recommendations

Conclusion 1: The study concludes that illegal sand mining is not driven by a single factor but rather a series of complex social, economic and political factors supporting the rationale of using political ecology in explaining such socio-environmental issues. These include urbanisation, rise in informal settlements, poverty and unemployment and government policies such as the FTLR and the Community Empowerment and Indigenization policy.

8.3.1 Recommendation 1

Conclusion 1: The study recommends that the government shift its focus from enforcement to sustainable ways of harnessing the illegal sand mining sector. This can involve re-designing mining policies in a participatory approach to regularize the informal sand mining sector in a manner that is acceptable and flexible to marginalized communities. The policies will encompass how the grassroot community can formally own land claims or mining claims so that they can get a greater share of return at the same time being environmentally accountable and responsible. This is particularly important in addressing the legitimacy issue of land and conflict as well as poverty and unemployment of the indigenous societies. More so, the existing government policies on land and community share ownership in the mining sector should be clearly communicated to all stakeholders especially the community so that they are well understood.

Conclusion 2: The findings of this study also indicate that illegal sand mining has had various socio-environmental impacts that include displacement of communities, loss of lives, land degradation, pollution among others subsequently causing multistakeholder conflicts. Economically, illegal sand mining has interfered with other economic sectors and formal sector performance in the sand mining sector. This has raised stakeholder conflict. Similarly, the processes of displacement have been associated with conflict over land use and violent acts. Pollution and environmental degradation and the social problems caused by illegal sand mining compounded to a highly conflict environment among various stakeholders that include local community, industrialists, government and illegal sand miners.

8.3.2 Recommendation 2

The study recommends that the government upscale its environmental education and awareness interventions as to the implications of illegal sand mining on the environment and society. However, this should follow a holistic approach to involve all the key stakeholders such as the local community, traditional leadership, political leadership and the industrialists in such interventions. Such programs require the establishment of environmental committees and clubs at grassroot levels, funded and supported by government and non-government stakeholders. This promotes accountability, transparency and a sense of responsibility at all levels. To augment this measure, a more integrated legislative framework informed by the political ecology concept is essential in order to address the existing fragmented policy frameworks on environment, mining and conflicts.

Conclusion 3: Results of the study showed that Zimbabwe's legal framework on sand mining includes the Environmental Management Act, the Urban Councils Act, the Mines and Minerals Act, and the 2013 Constitution of Zimbabwe. While the laws provide for environmental management in some ways, only the Environmental Management Act is more specific regarding illegal sand mining issues. However, sand mining is not explicit and mainly regulated from the perspective of registered miners and particularly EIA. Generally, the study concludes that although institutional frameworks are comprehensive to deal with illegal sand mining matters, the legislative framework is non-explicit, non-comprehensive and fragmented. The holistic aspect of policy content is also lacking.

More so, enforcement of these laws is weak suggesting a reflexive governance gap in Zimbabwe's sand mining sector. This is mainly caused by limited resources, weak monitoring systems, corruption and poor stakeholder collaboration in planning, implementation and evaluation of programs and policies for addressing illegal sand mining.

8.3.3 Recommendation 3

The study recommends that the legislation clearly provide for collaborative roles of various stakeholders such as the councils, community, private sector, civil society organisations and politicians in dealing with environmental matters. The fragmented nature of existing legislation on similar issues suggest a fragmented institutional governance of illegal sand mining.

The Environmental Management Act should, in particular, include a section on stakeholder roles - sustainability performance and reporting, and attach incentives and penalties on

stakeholder activities. Similarly, all the other instruments should focus on stakeholder inclusion in environmental sustainability beyond human rights (Constitution of Zimbabwe), non-compliance and penalty system (Urban Councils Act; Mines and Minerals Act) against violations related to land use and sand mining, respectively.

With regards to reflexive governance, there is a need to create a system of review of policies and programs that address sand mining issues so that they are kept abreast of sand mining issues. This ensures that only relevant and valid actions are taken to address sand mining and conflict issues.

Conclusion 4: Findings of the study indicate that various stakeholders directly and indirectly control illegal sand mining in the province. The government institutions such as the EMA, ZRP and local authorities have specific functions to deal with environmental matters including illegal sand mining. The roles of civil society organisations, community members, NGOs and industry is, however, minimal. In all cases, the study established that there are weak collaborations between these stakeholders. Better collaborations are only witnessed between the government institutions themselves particularly the ZRP and EMA on blitz operations. Despite the utility of these stakeholders in the regulation of illegal sand mining, there remains a generally fragmented system of engagement.

8.3.4 Recommendation 4

The government should implement a mandatory stakeholder engagement initiative that brings together the industry, community, civil society and the government to deal with prescribed disciplines or sectoral issues. Currently, there is a lack of legally binding collaborative programs explaining the existing fragmented governance system in dealing with illegal sand mining. The EMA as a government agency with an oversight of all environmental issues can be used as the centre of stakeholder engagement.

8.4 Theoretical contributions

The findings of this study indicate that illegal sand mining may be explained from a single perspective. It emerged that illegal sand mining and associated socio-environmental conflicts as an integrated issue is linked to social, environmental, economic and political issues. This clearly speaks to the political ecology framework. Building on that framework, results indicated that indeed, economic meltdown (economic), urbanisation, poverty and unemployment and housing problems (social) and government policies (political) share

significant contributions to illegal sand mining in Zimbabwe. The application of the political ecology framework on illegal sand mining and socio-environmental conflicts is fair. In this study, a political ecology of illegal sand mining and associated conflicts revealed its utility in explaining mining-induced conflicts as well. Previous studies used the political ecology framework to explain environmental issues from a physical perspective, but did not relate to its interactions with human beings. Thus, existing literature cannot clearly explain environment-human interactions in the context of conflicts.

The present study confirms that political ecology can be used to further relate social, economic and political circumstances to explain illegal sand mining-induced conflicts. The study contributes to new knowledge on how conflict over resources in the mining sector is a result of complex economic, social and political pull and push factors. Much of the conflicts observed emanated from land use by various stakeholders such as industry, local authorities and community. Industry sees illegal sand miners as a resource and economic threat while illegal sand miners view authorities as impediments to their source of livelihoods in the face of economic hardships in Zimbabwe.

In this study, political ecology exposed the interconnectedness of social, political and economic issues surrounding illegal sand mining. The study generates new knowledge on which component is mainly responsible for the complex issues underpinning illegal sand mining and socio-environmental conflicts. It concluded that while illegal sand mining is a combination of various issues, the contribution of politics and society on illegal sand mining and conflicts emanate from the scramble for economic gains. The greediness and abuse of power of politicians and the social problems that explain the prevalence of illegal sand mining and conflicts all revolve around the country's economy that cascades to the lowest person in the society. Variation in power among different stakeholders is utilized by those in power to legitimize land ownership and control to the economic advantage of a few elites. In this study, illegal sand mining and socio-environmental conflicts emerged as an outcome of social, political and economic issues but all as subsequent of the national economic status and drive for economic gains.

The study was also premised on the multistakeholder theory that presents an opportunity to address diverse business problems through multi-stakeholder collaboration. Indeed, the study confirmed that the roles of government, community, industry and other non-government sectors are key to potentially address illegal sand mining. Published studies also indicate that

stakeholder collaboration is essential in achieving social sustainability (Leonard, 2008; Roloff, 2008; Lifvergren et al., 2009; Laszlo et al., 2010). These studies also applied the stakeholder theory to justify their studies. Similarly, the present study established that lack of stakeholder engagement towards solving common problems explains the persistence of socio-environmental problems. The fragmented system of governance, despite existing key sectors and institutions, is responsible for persistent indiscriminate sand mining and conflicts in Harare Metropolitan Province, Zimbabwe. This justifies the utility of arguments put forward by the stakeholder theory.

However, the theory was limited to practical collaborations that can help achieve social and corporate sustainability. This study further generates new knowledge building on the foregoing theory indicating that collaborations that are pragmatic but not bound by holistic and integrated policy frameworks may not fully address socio-environmental issues. In Zimbabwe, existing stakeholder collaborations are generally futile towards addressing illegal sand mining and socio-environmental conflicts more adequately, due to the fragmented legislative frameworks designed to address similar thematic areas.

Findings of the study also confirm the tenets of the land-resource-conflict theory that identifies land as a source of conflict. Empirical evidence from this study shows that lack of clear land use policy, interference by politicians, and legitimacy and accountability flaws were responsible for massive stakeholder conflicts over sand mining in Harare Metropolitan Province.

State land was subject to abuse and considered an open access resource. This was an obstacle to governance of sand in such areas. On the other hand, several arguments were put forward over legitimacy and use of sand including wrongly perceived open access by communities, based on government politically-driven policies. Conflict of land use among local communities themselves remains a battlefield of illegality and informality as both miners and residents use land against government policy and legal jurisdiction. Conflicts therefore revolve around such issues and this confirms the land-resource-conflict theory. The theory emphasizes the linear effect of environmental changes or phenomenon on social problems.

Indeed, findings of this study indicate that illegal sand mining caused a myriad of social problems, especially involving local communities, and these subsequently triggered stakeholder conflicts. However, basing on empirical evidence from this study, the researcher

argues that environment-social linkages are a two-way relationship where social problems can either cause environmental problems or are caused by environmental problems. The influx of informal settlements, poverty, urbanisation and other social problems emerged among the drivers of illegal sand mining in the province. While land is a natural resource, and this is the main aspect underpinning environmental problems such as illegal sand mining, the subsequent relationship between environment and society should be viewed as a two-way rather than a one-way linear relationship that causes conflicts.

Lastly, findings of this study expose the reflexive governance gap in Zimbabwe's sand mining sector. Corruption, limited resources, weak monitoring systems and limited stakeholder consultation all conflict with tenets of reflexive governance. Existing laws and programs do not adequately address underlying illegal sand mining and associated conflicts. More so, the applicability of some laws in modern Zimbabwe's socio-economic system remains limited, yet the national legislative system goes unreviewed for extended lengths of time.

8.5 Theoretical recommendations

The study recommends that the political approach further analyses environmental issues beyond just social, economic and political relationships to how one component feeds into the other components as the root cause of a phenomenon in question.

Furthermore, the stakeholder theory, although it was used to explain the roles in and potential conflict of interests among different stakeholders in this study, can integrate policy and legislative frameworks on the concept of collaboration as its absence emerged as a major obstacle to effective engagement in addressing illegal sand mining in Harare Metropolitan Province. While social sustainability that underpins this theory can be achieved through institutional engagements, which may not materialize if the legislative framework is fragmented and not well coordinated. The researcher therefore proposes theoretical foundations that examine environmental issues from an institutional and legislative perspective as a package to achieve social sustainability and addressing conflicts of interest.

Thirdly, the study proposes that the land-resource-conflict theory adopts a much wider approach in analysing land conflicts to include a two-sided approach to the relationship between environmental change and social problems. In this study, this can be related to how illegal sand mining as an environmental issue has resulted in conflicts and other social problems, and on the other hand, how the latter have influenced the former.

Lastly, the study utilises reflexive governance to recommend that the government of Zimbabwe adopts a system of reviewing its policies and regulations in order to match societal needs. The whole process of planning, implementing and reviewing programs and policies should be holistic and consultative, and provides a balance of both a top-down and a bottom-up approach. This promotes accountability, transparency, sense of ownership and participation in sand mining governance as espoused by reflexive governance framework.

Overall, this study challenges for further research on how political settlement and sand mining interact since the political elites are important in the governance of other resources.

8.6 Methodological recommendations

Methodologically, the study utilized a qualitative approach to generate evidence on the political ecology of illegal sand mining and the socio-environmental conflicts in Zimbabwe. This approach unearthed the need for other methodological approaches particularly mixed approach to have an explicit understanding of illegal sand mining and conflicts. The study observed the need for quantification of land used for illegal sand mining, the geographical extent of environmental damage that could be measured using GIS and remote sensing techniques. Secondary data from organisations such as EMA and HCC were not comprehensive and adequate to estimate such ramifications. Environmental authorities and similar studies in future are thus challenged to be more quantitative. The period during which data were collected coincided with the COVID-19 pandemic and so was non-permissive for face-to-face, physical interactions. The study recommends for a shift in methodologies from physical instruments to more virtual instruments for both qualitative and quantitative inquiries. Remote methodologies are highly recommended in the face of uncertainties hence should be part of methodological propositions in studies of this nature in future.

8.7 Limitations of the study

The focus of the study on illegal sand miners means that the participation of illegal sand miners in the study was key. This group of population is known for its high volatility to violent acts particularly with regards to mining interferences. The participation of illegal sand miners was not an easy one as a careful approach was required to interact with them and gather adequate data. Some of the illegal sand miners were not willing to participate despite the researcher explaining the purpose of the study, and doing so in a polite manner. They felt threatened and

insecure as they knew their activities were illegal. As a result, the research team had to spend relatively more time collecting data from illegal sand miners alone.

Furthermore, a non-permissive environment during the COVID-19 era delayed the data collection process. The approval for data collection from the HCC and EMA took more than the anticipated time. Some study participants were no longer accessible physically due to organisational policies that restricted visitors during that period. Thus, the researcher had to make use of telephone interviews to reach out to some of these EMA officials. However, there remained a balance with face-to-face physical interviews as interviews were conducted with officials from industry and NGOs according to COVID-19 protocols.

Secondary data from the organisational records were no longer physically accessible, and the researcher alternatively used on-line data from organisational sites and soft copies sent via emails upon request, particularly in the case of the policy documents.

8.8 Recommendations for future research

Future studies should aim to involve politicians who emerged in this study as influential in land use and legitimacy issues related to illegal sand mining. The politicians are not part of the formal institutional frameworks for governing sand mining or land use, but they have influence over environment-human relations in Zimbabwe. The study therefore recommends for the inclusion of such key but undefined stakeholders - in a Zimbabwean context - in study populations of future research.

The study also recommends that future studies employ quantitative approaches to measure the extent of environmental damages of illegal sand mining using GIS and remote system technologies, and explore the possibility of both institutional and legislative connectivity and integration to address illegal sand mining and conflicts from a multistakeholder perspective.

8.9 Conclusion

The study concludes that illegal sand mining is not only an environmental issue but also an economic, social and political issue in Zimbabwe. The economic meltdown of the country is the root cause of urbanisation, influx of informal settlements, poverty and unemployment, which have culminated in rapid illegal sand mining and socio-environmental conflicts. With various stakeholders aiming to gain economic advantage over others from sand as a resource, the regulation of illegal sand mining has become a challenge. Politicians misuse power to own

and control land use to their advantage. Industries face market competition while experiencing territorial interferences and threats from illegal sand miners, often supported by politicians. Community members are the main victims of illegal sand mining as they are displaced from their land, their livelihoods, faced with threats, robbery and thievery, as well as safety and health impacts such as pollution of their environment and water systems. Illegal sand miners do not rehabilitate mining sites. Regulation efforts by different stakeholders including the government, community and industry is not adequate to curb illegal sand mining. Collaborations remain minimal except for EMA and ZRP that often conduct integrated blitz programs. The role of NGOs, industry and community is insignificant. There are systematic and formal programs for multistakeholder engagements to address illegal sand mining and even the environment at large. Besides institutional fragmentation, the study also concludes that the existing legislation attempts to regulate illegal sand mining from an environmental perspective but remains silent on the conflict aspect. The Environmental Management Act focuses more on EIA and within the formal sector while the 2013 Constitution, Urban Councils Act and Mines and Minerals Act takes a generic approach to dealing with sand mining issues. More so, a legislative silence surrounds environment-human interactions, and particularly how various stakeholders can influence natural resource management. In all cases, policies are not holistic and do not provide for specific roles of community members in environmental management. However, the contribution of regulatory institutions in enforcing illegal sand mining laws cannot be undermined. Effective governance is mainly riddled by the broader national economic-induced poverty that construct law defiance, corruption, resource scarcity, non-compliance and various malpractices among communities.

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Annexures

Annexure A: Permission Letter



To: Whom it may concern

Date: 24 February 2020

Requesting permission for PhD student (Mr Ernest Mando) to conduct research data collection

Dear Sir /Madam


This letter serves to confirm that Mr. Ernest Mando (Student number: 66328942) is a PhD Environmental Science candidate at the Department of Environmental Sciences, UNISA under my supervision. The research is entitled, '*A political ecology of illegal sand mining and socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe.*' As part of the qualification, the student will be conducting fieldwork with various key stakeholders to inform the research. All informants interviewed will be strictly confidential and no persons will be identified in the study. Interviews will entail semi-structured interviews and are voluntary. The final research recommendations will be shared with interviewees and will be useful for all stakeholders involved in the study. It will be appreciated if you can support the student in his work and as you see fit.

If you have any queries or reservations, please do not hesitate to contact me. The following are my contact details:

Tel: 011 4312311

Email: llewel@unisa.ac.za

Sincerely Yours,


Signed:
Prof L. Leonard - Supervisor, Environmental Sciences



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Annexure B: Participant Consent Form

Qualitative semi-structured interviews with Government Officials (EMA & Local Authorities), Local Community (Residents), Illegal Sand Miners, Industrialists and NGO & CSO Officials

Preller St, Muckleneuk,
Pretoria, 0002,
South Africa

Examining A Political Ecology of Illegal Sand Mining and the Socio-Environmental Conflicts in Harare Metropolitan Province, Zimbabwe

.....

This is a research study for my Doctor of Philosophy in Environmental Management being undertaken at the University of South Africa, College of Agriculture and Environmental Science. The study focuses on understanding broader issues underpinning illegal sand mining and conflicts. My mentor is:

Prof. Leonard Llewellyn

College of Agriculture and Environmental Science (CAES)
University of South Africa
Email: llewel@unisa.ac.za

Your participation and all data collected during the interview will be retained in a confidential manner both in my thesis and in any discussions around the data. Your anonymity will be ensured and only my mentors and I will know your name. Your name will not appear in any articles or the thesis. Please feel free to indicate if you do not wish to participate. You may leave the interview at any point. Your involvement should take approximately 30 to 60 minutes. However, the final decision about participation is yours. The interview will be recorded through a voice recorder, and I will then transcribe and analyse the data gathered. I thank you for your time and contribution to this study. Your help is highly appreciated.

I have been asked to participate in the above study.

I have been informed about my involvement in the research, and what is required of me. I understand that:

- ❖ My participation in the research study is voluntary.
- ❖ My answers will not be used if I do not provide this written, informed consent.
- ❖ I may withdraw from the research at any time with no negative consequences for myself.
- ❖ The interview will be audiotaped and transcribed during which process confidentiality will be maintained.
- ❖ The transcription will contain no personal identifying information.

- ❖ The original recording will be securely stored for five years, after which it will be destroyed.
- ❖ My answers will be kept confidential, and my anonymity assured in the reporting.
- ❖ The data and results may be used for a PhD in Environmental Management thesis, journal publications and/or conference presentations, and, in the University library in the public e-files.
- ❖ The raw data (the questionnaires) will be stored in a secure location on the University of South Africa campus and the data will be safely stored on password protected computers.
- ❖ The data may also be used in related studies in future.
- ❖ Other researchers may have access to the data, but my name will not appear on any of the data base that is sent to other researchers.
- ❖ I will not receive any reports on individual results, but I can request feedback on the overall findings of the study.
- ❖ I can contact the researchers, whose details have been provided above, if I have any uncertainties or concerns that relate to the study and/or the items in the questionnaire.

I have received the contact details of the researcher on the participant information sheet. All my questions about the research have been answered and I agree that my responses from the questionnaires can be used for the research.

I have read the abovementioned information and agree to participate as per the above conditions. I understand everything and consent voluntarily to participate in this study.

Signature: _____ Name _____

Date: _____

.....

Researcher Information:

Principal Researcher & Interviewer: Ernest Mando (National ID No. 04-129689R04)

Contact Details: 66328942@myunisa.ac.za. Cell +263772244193

.....

Annexure C: Interview Guide for government officials (EMA and Local Authorities)

1. What regulations and frameworks exist to govern sand mining in Zimbabwe?
2. We have these policies in place, but we continue to witness illegal sand mining, what are your comments on this?
3. What are the social, political and economic drivers for illegal land mining in these areas?
4. How are the communities and miners themselves benefiting from the extracted sand?
5. Besides the benefits, is the environment and society being affected, and how?
6. We hear cases of conflicts sparking between various stakeholders that include the miners themselves, the residents and authorities. What are the specific sources of conflicts?
7. What is your comment/s on the governance system of illegal sand mining in Zimbabwe in general with specific reference to responsible authorities?
8. How are the various social actors (i.e., government, industry and civil society) working collectively to combat illegal sand mining?
9. How can illegal sand mining be combated to address the afore-said socio-environmental conflicts and impacts?

Annexure D: Interview Guide for local community (residents)

1. We are witnessing illegal sand mining activities within your community. What are your comments in terms of governance, control and management of illegal sand mining?
2. Which actors do you see having an active role in combating illegal sand mining, and which one do you feel they are not playing their part effectively?
3. What do you think is missing in terms of effective management and control of illegal sand mining activities in your community?
3. How is illegal sand mining affecting you as a community socially, what are your issues?
4. How are the communities or the miners themselves benefiting from illegal sand miners?
5. How is illegal sand mining affecting the environment?
6. In your view, how can illegal sand mining be addressed?

Annexure E: Interview Guide for illegal sand miners

1. Why are involved in the mining of sand?
2. How much sand do you approximately extract in a single day?
3. Are there any authorities who hunt for you or instruct you to stop your mining activities?
State them
4. How often do they come for you say in a month?
5. Why and how do you continue to mine if the authorities are advising you to stop the mining?
6. So how are the surrounding communities responding to your activities?
7. How are your activities affecting the environment and community?
8. In what ways are you benefiting from sand mining?
9. How can sand mining promoted without compromising the communities' social lives and the environment?

Annexure F: Interview Guide for mine managers (industrialists)

1. What is the importance of sand in your operations?
2. How do you acquire sand for your operations?
3. As a licensed company, how does illegal sand mining affect you?
4. If illegal sand mining is well regulated, how would this benefit you?
5. What regulations and frameworks exist to govern illegal sand mining in Zimbabwe if you aware?
6. We have these policies in place, but we continue to witness illegal sand mining, what are your comments on this?
7. What do you think are the social, political and economic drivers for illegal land mining in Harare?
8. What efforts are you taking towards combating illegal sand mining activities, and what other players do you engage with towards this cause?
9. What are the specific conflicts between you and the illegal sand miners?
10. In your view, how can illegal sand mining combated to address the afore-said socio-environmental conflicts and impacts?

Annexure G: Interview Guide for NGO and CSO officials

1. Illegal sand mining has become one of the topical issues in Zimbabwe. What could be driving this?
2. What are the socio-economic and environmental impacts that could be caused by illegal sand mining in the province?
3. In what ways is illegal sand mining triggering conflicts among various actors?
4. What is your contribution to addressing illegal sand mining and conflicts in Zimbabwe?
5. What forms of engagement do you do, and with which stakeholders in attempt to curb illegal sand mining and mitigate its impacts?
6. We have environmental legislations on environment and mining, but we continue to witness plunderous illegal sand mining activities across the country. What is your comment with regards to utility of these laws?
7. Any other comments you feel can be discussed on illegal sand mining and conflicts? Share.

Annexure H: Observation checklist

Impact and nature of illegal sand mining	Study Site		
	<i>Epworth</i>	<i>Retreat Farm</i>	<i>Zengeza</i>
Environmental degradation			
Water Pollution			
Air Pollution			
Land pollution			
Alteration of river systems			
Deforestation and loss of biodiversity			
Mining in private and undesignated spaces			
Rudimentary mining methodologies			
Wide scope of mining sites			
Illegal selling and transporting activity			

Key

√	<i>Observed</i>
X	<i>Not observed</i>

Annexure I: Secondary data analysis template

Secondary Data	Findings			
	Research Questions			
	1	2	3	4
Documentaries				
Newspaper Reports				
Organisations' Reports				
Legislations: 1. <i>Environmental Management Act</i> 2. <i>Mines and Minerals Act</i> 3. <i>Urban Councils Act and by-laws</i> 4. <i>Constitution</i>				

Annexure J: Ethics Clearance Letter



UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE

Date: 12/05/2020

Dear Mr Mando

NHREC Registration # : REC-170616-051
REC Reference # : 2020/CAES_HREC/088
Name : Mr EK Mando
Student # : 66328942

**Decision: Ethics Approval from
07/05/2020 to completion**

Researcher(s): Mr EK Mando
66328942@mylife.unisa.ac.za

Supervisor (s): Prof L Leonard
llewel@unisa.ac.za; 011-471-2311

Working title of research:

A political ecology of illegal sand mining and socio-environmental conflicts in Harare metropolitan province, Zimbabwe

Qualification: PhD Environmental Management

Thank you for the application for research ethics clearance by the Unisa-CAES Health Research Ethics Committee for the above mentioned research. Ethics approval is granted until the completion of the project, **subject to submission of yearly progress reports. Failure to submit the progress report will lead to withdrawal of the ethics clearance until the report has been submitted.**

The researcher is cautioned that fieldwork may not commence until such time as the COVID-19 lockdown has been lifted.

Due date for progress report: 30 April 2021

Please note the points below for further action:

1. The researcher will interview illegal sand miners. Does this pose any risk to the safety of the researcher, as they may feel threatened and become aggressive? What will be put in place to mitigate this risk?



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2. It is unclear whether the researcher has permission from the Environmental Management Agency or not – there is a stamp from the Agency on the permission request letter, but no indication whether the request has been approved.
3. Section 6.5 in the application form that pertains to data sharing was not completed. The researcher must complete this section and resubmit the form to the committee.
4. The researcher should align the ethics application form with the proposal in terms of the sample size. As this is qualitative research the sample size will be determined by data saturation, and this should be reflected in the application form.
5. More detail is required on the data analysis. The researcher must indicate how the data for each objective will be analysed.

The low risk application was reviewed by the UNISA-CAES Health Research Ethics Committee on 07 May 2020 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original

UREC 25.04.17 - Decision template (V2) - Approve

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research. Secondary use of identifiable human research data require additional ethics clearance.

8. No field work activities may continue after the expiry date. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2020/CAES_HREC/088** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Yours sincerely,



Prof MA Antwi
Chair of UNISA-CAES Health REC
E-mail: antwima@unisa.ac.za
Tel: (011) 670-9391



Prof SR Magano
Acting Executive Dean : CAES
E-mail: magansr@unisa.ac.za
Tel: (011) 471-3649

Annexure K: Editing Letter

John Dewar Tel: +27833210844
PhD, DAHM Email: johndewar65@gmail.com

Dear Professor Leonard,

This letter is to confirm that I completed a language and content edit of a thesis entitled: **Examining a political ecology of illegal sand mining and the socio-environmental conflicts in Harare Metropolitan Province, Zimbabwe**

This thesis describes a research study under your supervision and will be presented to the Department of Environmental Sciences, University of South Africa in fulfilment for the requirements for the degree Doctor of Philosophy in Environmental Management. The thesis was prepared by Ernest Mando.

My edit included the following:

- Correcting errors in spelling and sentence structure.
- Removing some repetition of text for inclusion in the discussion or conclusion chapters.
- Simplifying the heading numbering to generate a more straightforward table of contents.

Text formatting included:

- Cross checking the inclusion in the reference list of in-text references.
- Suggesting that each study objective be linked to a corresponding study conclusion.
- Suggesting some titles of research articles from the study.

Yours sincerely,



John Dewar
5th November 2023