

**An exploratory study of small-scale farmers' perceptions of land degradation in
Komatipoort and how it influences their livelihoods**

by

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ABSTRACT

An exploratory study of small-scale farmers' perceptions of land degradation in Komatipoort and how it influences their livelihoods

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Land degradation is a global challenge that affects natural resources and communities that derive their livelihoods from the land. Despite the prevalence of land degradation in South Africa and its impact on agricultural production and livelihoods, little is known about the status of land degradation and the influence it has on the livelihoods of small-scale farmers in Komatipoort. The goal of the study was to explore and describe the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods.

The study adopted a qualitative research approach. It was an applied study with exploratory and descriptive purposes. The research design was an instrumental case study, and a purposive sampling method was used to recruit twelve small-scale farmers in Komatipoort to participate in the study. Data was collected through face-to-face interviews, using a semi-structured interview guide. Research data was thematically analysed.

The study's findings indicate that land degradation in Komatipoort is in the form of water logging, soil salinity and soil erosion. Furthermore, livelihoods are influenced by small land sizes, water scarcity problems and damage to irrigation infrastructure which in turn reduces agriculture productivity and subsequently profits. Land degradation exacerbates small-scale farmers vulnerability because of socio-economic challenges related to lack of financial assistance, theft of produce and infrastructure and climate change. Small-scale farmers employ soil and slope management strategies to address land degradation, however efforts are limited by a lack of finances.

The study concludes that small-scale farmers lack safety buffers to cushion them from loss of livelihoods due to land degradation and other socio-economic challenges. Diversification of livelihood strategies is important for small-scale farmers to develop assets and sustainable livelihood outcomes. The study recommends intersectoral collaborations of natural and social sciences experts to address the socio-economic and environmental challenges faced by small-scale farmers. Furthermore, in addition to support from extension officers and soil experts, small-scale farmers can benefit from direct training in land management strategies to obtain sustainable livelihoods.

Key words

Komatipoort

Land degradation

Land management strategies

Small-scale farmer

Sustainable livelihoods

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CHAPTER 1: GENERAL INTRODUCTION

1.1 Introduction

Small-scale farming is a livelihood strategy for many people, especially those in poor countries. Globally, small-scale farming is considered a key sector in achieving the Sustainable Development Goals (SDGs) (Nwanze & Fan, 2016:16) of the 2030 Agenda for Sustainable Development (UN, 2015). It forms the foundation of livelihoods of nearly 70% of Africa's population (High Level Panel of Experts [HLPE], 2013; International Fund for Agriculture Development [IFAD] 2013; Tshuma, 2014:2411; Republic of South Africa [RSA], 2012:2). However, land degradation has undermined these significant contributions (United Nations Convention to Combat Desertification [UNCCD], 2017:8). Studies have found that agricultural land has changed. There have been changes in the physical and chemical composition of the soil, vegetation loss, and pollution (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES], 2018; Blair, Shackleton, Mograbi, Drimie, Fay, Hebinck, Hoffman, Maciejewski & Twine, 2018:3).

The South African agriculture sector is not exempted to the influence of land degradation. Despite the lack of land degradation assessments, several quantitative studies have shown that most of the country's productive lands are degraded (Bai & Dent, 2007:3; Gxasheka, Solomon, Mlisa & Lesoli, 2017; Wonga, Hamisai & Wiseman, 2021:11). Soil degradation, bush encroachment, and spread of invasive species are the most prevalent forms of degradation in South Africa, particularly in former homelands (Musakwa, Wang, Wei, Malapane, Thomas, Mavengahama, Zeng, Wu, Zhao, Nyathi, Mashimbye, Poona, Chakwizira, Gumbo, Mokoena, Kaitano, Fundisi & Yeni Letsoko, 2020:3; Hoffman, 2014:708; Department of Environmental Affairs [DEA], 2017:11). Despite numerous studies having been conducted to assess land degradation in South Africa, there is a dearth of information on the nature and extent of land degradation in Komatipoort, Mpumalanga.

Consequently, land degradation has implications for sustainability as it threatens the sustainability of small-scale farmers' livelihoods (Gashu & Muchie, 2018:2; Aseefa & Hans-Rudolf, 2016:1555). In addition, small-scale farmers' vulnerability is worsened by other challenges such as land policies and market regulations that restrict access to livelihood assets (Lombard, 2019:191), causing their livelihoods to be increasingly fragile and unsustainable. The 2030 Agenda for Sustainable Development calls for multi-sectoral collaborations and participation in addressing these challenges (UN, 2015). In this regard, the

social work profession is responsible for contributing meaningfully to sustainable development as it recognises human-natural environment interactions (Norton, 2012:301). Therefore, Dominelli (2018:10) and Mathende and Nhapi (2017:125) encourage social workers to understand the social impacts of the environmental crises and work towards restoring the relationship between people and their natural environment. Therefore, this study aimed to understand the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihood.

The following key words are relevant to the study and are conceptualised as follows:

Small-scale farmer

A small-scale farmer is a subsistence farmer who practices agriculture for household consumption and sells the surplus (Pienaar & Traub, 2015). A small-scale farmer is also categorised as an emerging farmer who practises agriculture mainly for commercial purposes (Zantsi, Greyling & Vink, 2019:81). In this study, small-scale farmers referred to both subsistence and emerging farmers (HLPE, 2013).

Land

Land refers to the earth's surface, which comprises the soil, vegetation, and hydrological processes (UNCCD, 2017:4). Land is also defined as a non-renewable resource that consists of soils, vegetation, water, and topography (Food and Agriculture Organisation [FAO], 2022), which are essential for sustaining human life in the present and future. In this context, the land resources form the foundation of small-scale farmers' livelihoods. Therefore, the soil, vegetation, and surface as well as underground water will be considered in this study.

Land degradation

Land degradation is defined as the depletion of soil quality, water resources, and vegetation cover as well as the ecosystem due to the over exploitation of land resources (UNCCD, 2017:42). According to Orchard, Stringer and Manyatsi (2017:46), land degradation is the reduction in land services for human beings resulting from a combination of human and bio-physical factors. Therefore, land degradation in Komatipoort was regarded as a situation whereby natural resources have deteriorated due to a combination of human and bio-physical factors, threatening human beings and biodiversity loss.

Livelihood

Livelihood is one's ability to meet one's basic needs such as adequate water, sanitation, nutrition, and healthcare in the present and future (Organisation for Economic Cooperation and Development [OECD], 2015:32). In addition, a livelihood is a means of living that is earned through a combination of assets, capabilities, and strategies (Serrat, 2017:21). In this study,

small-scale crop and livestock production were deemed to be means through which small-scale farmers earn a living.

Sustainable livelihood

A livelihood is sustainable when it can cope and adapt to the present stresses and those to come, maintain the existing capitals and activities, without undermining natural resources (Department for International Development [DFID], 1999). Therefore, a sustainable livelihood enables present and future generations to thrive while using natural resources, but not deplete them. For purposes of this study, a sustainable livelihood for small-scale farmers means that the financial, natural, physical, social, and human capitals in livelihood strategies provide for basic needs such as food and income, without exerting pressure on the land.

Komatipoort

Komatipoort is in the Lowveld of Mpumalanga province in South Africa. The town is located strategically on the borders of Swaziland and Mozambique at the confluence of the Lomati and Crocodile rivers (Cooperative Governance and Traditional Affairs (COGTA), 2021:21; Municipalities of South Africa, 2021).

1.2 Theoretical framework

A theoretical framework serves as a lens through which the researcher can understand the research problem and analyse the data obtained (Grant & Osanloo, 2014:15). In addition, it guides the researcher in planning and making methodological decisions. The theoretical framework for this study is the sustainable livelihood framework (SLF). The SLF seeks to understand and improve people's livelihoods by analysing five sets of assets or capitals namely, human, social, financial, natural, and physical, which individuals use to form livelihoods (Morse & McNamara, 2013:18). In addition, the framework investigates how institutional processes and structures transform the assets and livelihood strategies to enhance positive livelihood outcomes (Serrat, 2017:24). Therefore, guided by this framework, the researcher explored the small-scale farmer perceptions of land degradation and its influence on their livelihoods.

1.3 Rationale and problem statement

Land degradation is prevalent worldwide, affecting over 3 billion people, particularly small-scale farmers whose livelihoods depend solely on land resources (Nwanze & Fan, 2016:14). Although the small-scale farming sector has been heralded for its significant role in alleviating poverty and unemployment as well as ensuring food security (Tshuma, 2014:2411; DAFF, 2012:2), these benefits have declined due to the depletion of land resources. Despite being attributed to bio-physical factors, land degradation is largely a result of human activities and is exacerbated by poverty. The resources that small-scale farmers draw their livelihoods from

are depleted, resulting in low crop and livestock production and ultimately, low income and food insecurity (Barman et al., 2013:1099; Gashu & Muchie, 2018:5). To improve their livelihoods, small-scale farmers often exert pressure on the already degraded environment through deforestation, intensified farming, renting out their land, or totally abandoning their lands (Musakwa et al., 2020:6; Orchards, et al., 2017:54; Blair et al., 2018:11).

Therefore, there is a self-reinforcing downward spiral relationship between poverty and land degradation (Barrett & Bevis, 2015:907), making small-scale farmers highly vulnerable to immediate shocks and environmental threats such as droughts and climate change (Barret & Bevis, 2015:910; Nwanze & Fan, 2016:14). Given the adverse influence of degradation on livelihoods, little is known about the status of land degradation and the influence it has on the livelihoods of small-scale farmers in Komatipoort. Thus, this study explored and described the perceptions of small-scale farmers on land degradation in Komatipoort and the influence thereof on their livelihoods. It is envisaged that the findings of the study will help small-scale farmers and development practitioners to devise intervention strategies that integrate the natural environment and human needs to improve farmers' livelihoods. Furthermore, it will contribute to policy development to mitigate the socio-economic implications of land degradation for small-scale farmers.

The overarching research question is: *What are the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods?*

The research question was informed by the following sub-questions:

- What are the contributing factors to land degradation in Komatipoort?
- How is land degradation affecting small-scale farmers' livelihoods?
- What land management strategies do small-scale farmers use to mitigate land degradation in Komatipoort?
- What strategies do small-scale farmers suggest to secure a sustainable livelihood?

1.4 Goal and objectives of the study

The goal of the study was to explore and describe the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods.

The objectives of the study were as follows:

- To conceptualise and contextualise land degradation and small-scale farming in a sustainable livelihood framework.

- To explore and describe the contributing factors to land degradation in Komatipoort.
- To identify and describe the strategies used by small-scale farmers in Komatipoort to manage land degradation.
- To explore and describe how land degradation influences small-scale farmers' livelihoods in Komatipoort.
- To recommend strategies to manage land degradation for sustainable livelihood outcomes for small-scale farmers in Komatipoort.

1.5 Research methodology

This section presents an overview of the research methodology employed in the study; a more detailed overview will be given in Chapter three. The qualitative research approach was used to obtain linguistic data on land degradation rather than numerical data (Nieuwenhuis, 2019a:59; Merriam & Grenier, 2019:6). It is central to qualitative research to understand people's experiences and perspectives of a phenomenon in their natural living environment (Litchman, 2014:13). Thus, the qualitative approach enabled the researcher to obtain a holistic understanding of the influence of land degradation on small-scale farmers' livelihoods. The study served both exploratory and descriptive purposes. The study explored the perceptions of small-scale farmers on land degradation in Komatipoort and described the influence of land degradation on the farmers' livelihoods. The study was applied. A case study design – specifically instrumental case study – was utilised by particularly focusing on small-scale farmers to understand land degradation and its influence on livelihoods as they depend on land for a living (Nieuwenhuis, 2019:91). Purposive sampling was utilised to include small-scale farmers who provided rich information on their views on land degradation in Komatipoort and its influence on their livelihoods in the study (Creswell & Creswell, 2018:213). Semi structured, face-to-face interviews were used to obtain data, while the researcher's observations were used to supplement the data. The data was analysed using thematic analysis. Ethical considerations that were adhered to in this research are written informed consent and voluntary participation, confidentiality, avoidance of harm, no deception, publication of findings, competence of researcher, and permission to conduct study, and they are discussed in detail in Chapter three, Section 3.9.

1.6 Division of the research report

The research report is divided into five chapters. Chapter one gives a general introduction and orientation to the study. It briefly describes the theoretical framework, problem statement and rationale of the study, research question, goal, and objectives. The chapter also presents a brief description of the methodology adopted for the study.

Chapter two provides a literature review in which small-scale farming and land degradation are conceptualised. In addition, it provides an overview of small-scale farming worldwide generally and in South Africa as well as the challenges faced within the sector. Land degradation as a global and national problem is discussed, focusing on the forms it takes and then links are drawn between small-scale farming and land degradation as well as its influence on livelihoods. The chapter addresses the strategies farmers adopt to manage their land. International and national agreements related to sustainable resource use and management are also discussed.

Chapter three presents a detailed discussion on the research methods, which consists of the research approach, the type of study, research design, population and sampling method, data collection method, data analysis, and pilot study. Furthermore, the data trustworthiness, ethical considerations, and limitations of the study are discussed.

Chapter four reports on the empirical findings of the study and Chapter five presents and discusses the key findings, conclusions, and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Land degradation is a sustainability concern given its adverse impacts on the ecosystem and human well-being (UNCCD, 2019:4). It is affecting most countries worldwide, particularly developing countries where most farmers are small-scale farmers who rely primarily on agriculture for income, food, and creation of jobs (Davis, Di Giuseppe & Zezza, 2017:154; UNCCD, 2019:8). The land degradation problem is also a concern in South Africa, where most rural populations depend on small-scale farming for a living (Mbatha & Masuku, 2018:36). It reduces land productivity, resulting in poor crop and animal production, which consequently reduces household income, food security, and increases poverty and inequality levels (DEA, 2017:3; Vetter, 2013:6).

The chapter starts by conceptualising small-scale farming and describing the nature of small-scale farming in South Africa specifically as well as the challenges that farmers face. Thereafter, land degradation will be described as a global concern while drawing on the South African context and discussing the different forms it takes. Next, the link between land degradation and small-scale farming will be discussed, exploring small-scale farmers' contributions to land degradation and the influence of land degradation on livelihoods. In the next section, farmers' responses to land degradation will be briefly explored. This will be followed by an exploration of the relevant international and national frameworks for sustainable land use. Thereafter, the role of social work in promoting sustainable land use will be discussed. The theoretical framework for the study will be the last focus of discussion before the chapter ends with a summary.

2.2 Conceptualisation of small-scale farming

Agriculture is critical for developing economies, particularly in Sub-Saharan Africa, where more than three-quarters of the population depend on rain-fed agriculture for their livelihood (Abeje, Tsunekiwa, Haregewetn, Nigassie, Ayalew, Elias, Molla & Berihum, 2019:2). Of the 570 million farms worldwide, 510 million are small-scale (Lowder, Sanchez & Bertini, 2021:4). Small-scale farming is practised as a source of livelihood and an essential tool for socio-economic development, through its contributions to food security and nutrition, incomes, and job creation potential (Tshuma, 2014:2412; Oluwatayo, 2019:486).

The definition of small-scale farming varies according to context operations, scale of production and farm size, and access to production resources. Broadly defined, small-scale farming is any farming activity that families practise on land between 0.5-5 ha (Lowder, Skoet & Raney, 2016:16). Using data from the 1990 world census on agriculture, Adamopoulos and

Restuccia (2014) affirm that small-scale farms, especially in low-income countries, were less than five ha. Fan and Rue (2020:13) are more specific, indicating that 85% of the world's small-scale farming is practised on land less than two ha, with the majority of these in African countries.

In terms of the scale of production, small-scale farming is practised mainly for subsistence purposes (Ricciardi, Ramankutty, Mehrabi, Jarvis & Chooklingo, 2018:70). It is responsible for staple crop production in developing countries (Samberg, Gerber, Ramankutty, Herrero, West, 2016:4). According to Ocran (2020:116), cash crops, vegetables, root, and tuber crops as well as livestock rearing are produced in African small-scale farms. In most developing countries small-scale farming is less productive, particularly in South Africa, where it makes insignificant contributions to national food production (Mathinya, Franke, Van De Ven & Giller, 2022:140). In summary, small-scale farming involves any agricultural activity practised in home food gardens, irrigated farms, or rain-fed farms for household consumption.

However, Hazell (2020:30) warns against using the land size and scale of production as the standards for classifying small-scale farming as studies have shown that despite small-scale farmers having small farms, small-scale farming is highly productive in other countries. In a study that covered fifty-five countries worldwide, Ricciardi et al. (2018:68) found that there was high productivity among small farms as they were found to be the largest contributors to global food production, despite farmers having small pieces of land. Similarly, Omotilewa, Jayne, Muyanga, Amorolran, Liverpool-Tasie and Awokuse (2021:7) report an inverse relationship between farm size and productivity in Nigeria. The authors found that small-scale farmers who use land less than five ha were more productive than medium-scale farmers who operated on land between five and forty ha. Therefore, in some countries, small-scale farming is more productive compared to others. The following section discusses small-scale farming in South Africa.

2.2.1 Small-scale farming in South Africa

In South Africa, small-scale farming is practised mostly in former homelands, which were created by the apartheid government (Mathinya et al., 2022:140). It has been estimated that there are four million small scale farmers in South Africa, 70% of these are found in the communal lands of the former homelands in KwaZulu Natal, Mpumalanga, and Limpopo (Pienaar & Traub, 2015). Small-scale farmers in South Africa practise mixed production: crop production and livestock rearing (Mbatha, Mnguni & Mabecua, 2021:56). Women mostly practise small-scale crop production, while livestock rearing is male-dominated (Mpanza & Mbatha, 2021:138).

Mathinya et al. (2022:139) describe the small-scale farming sector in South Africa as underdeveloped and under-resourced. Compared to their commercial counterparts, small-scale farmers experience poor productivity due to a lack of inputs, producing on small pieces of land, and selling the surplus in informal markets for a living (Zantsi et al., 2019:87). Apartheid has largely contributed to the underdevelopment of this farming sector. During apartheid, discriminatory laws and policies, such as the 1913 Native Land Act and 1936 Native Land and Trust Act were enacted and implemented. These laws restricted mainly Black people's access to land and as a result, impoverished Black communities during the apartheid era (Cochet, Anseeuw & Gresh, 2015:14). Land in these areas was severely degraded due to population pressure, shortage of land and lack of government investments (Cochet et al., 2015:15). The result was a dualistic agriculture sector consisting of successful, well-resourced white commercial farming and an unproductive Black, small-scale farming which lacked investment in infrastructure, access to financial assets, and undermined livelihoods of many (Delius & Beinart, 2018; Tshuma, 2014:2410).

However, the post-apartheid government has implemented, among others, agrarian reforms to redress these inequalities. For instance, the land reform programme was implemented to increase access to land and stimulate development through land redistribution, restitution, and by securing land tenure of previously white-owned land (Kloppers & Pienaar, 2015:277). In addition, the National Development Plan (NDP) considers small-scale farming as a driver of economic development and targets an integrated and inclusive agriculture and rural economy (National Planning Commission (NPC), 2012). Therefore, there have been increased government investments in the small-scale farming sector in the form of subsidies and land (Oluwatayo, 2019:493). These advancements in the agriculture sector have led to the development of two categories of small-scale farmers in South Africa, namely, subsistence and emerging farmers (Mathinya et al., 2020:141).

Subsistence farmers practise agriculture production for household consumption and selling the surplus in informal markets (Netshipale, Oosting, Mashiloane, Van Reneen, De Boer & Raidimi, 2020:8). On the one hand, subsistence farming generates money enough to meet household needs and not for investment in the farming endeavours (Mbatha et al., 2021:58). On the other hand, emerging farmers are small-scale farmers who produce mainly for commercial purposes and sell to local and informal markets, which include bakkie traders, sales at farm gates, vendors, fresh produce markets, retailers, and global markets (Khapayi & Celliers, 2018:35). Specifically, in Komatipoort, small-scale farming is largely irrigated since the town is at the confluence of the Komati and Crocodile rivers (Department of Agriculture, Rural Development, Land and Environmental Affairs, 2021:36). The sub-tropical climate conditions in the area are favourable for agricultural activities such as sugarcane, citrus fruits,

and vegetable farming (Botha, 2018). In Komatipoort, there are also market-oriented small-scale farmers. For example, a study by Woodhouse and James (2017:18) showed that some small-scale sugar cane farming is favourable in Komatipoort because there are ready markets, which are the Komati and Malelane sugar mills. In addition, small-scale farmers in the *Amaveg* project produced vegetables such as chillies, green beans, and brinjals both for local and export markets (Botha, 2018). Therefore, this highlights the diversity in the small-scale farming sector in South Africa and its potential to improve livelihoods by ensuring household food security and income (Khapayi, Van Niekerk & Celliers, 2018:200; Zantsi et al., 2019:86).

Nonetheless, the performance of small-scale farming in South Africa has been dismal, such that its potential to yield sustainable livelihoods has been criticised. Small-scale farmers are still disadvantaged and face numerous challenges such as the lack of government support and agricultural knowledge (Zantsi et al., 2019:88; Musakwa, Wang, Wei, Malapane, Thomas, Mavengahama, Zeng, Wu, Zhao, Nyathi, Mashimbye, Poona, Chakwizira, Gumbo, Mokoena, Kaitano, Fundisi & Letsoko, 2020:8). A discussion of these challenges follows next.

2.2.2 Challenges faced in the small-scale farming sector in South Africa

The small-scale farming sector faces numerous challenges such as lack of financial support, lack of market access, and low productivity, which inhibit sustainable livelihoods.

2.2.2.1 Lack of finances

Small-scale farmers lack finances to invest in their agricultural activities. Apart from incomes, the agriculture sector is mostly financed through formal and informal credit (Chisasa, 2019:2). However, small-scale farmers – particularly in South Africa – lack access to credit due to various individual and institutional factors (Luvhengo & Lekunze, 2017:602). Several studies have been conducted to highlight the factors that determine small-scale farmers' access to formal credit. It has been found that factors such as age, farm size, family income, and availability of collateral determine whether a farmer qualifies for a loan (Chisasa, 2019:2; Luvhengo & Lekunze, 2017; Mthombeni, Bove & Thibane, 2019:18). For instance, the findings of a study by Mthombeni et al. (2019) indicate that financial institutions preferred to lend money to economically farmers, have proof of reliable income, and have some form of collateral, for instance, privately owned land. Therefore, without land and reliable income, small-scale farmers are unable to access formal credit (Chisasa, 2019:3).

As such, some farmers resort to informal credit institutions. Moahid and Maharjin (2020:12) assert that informal credit is provided based on social networks and relationships. Informal credit institutions comprise co-operative societies, stokvels, moneylenders, and village community banks and may involve borrowing from family. Although informal credit is easily accessible, it is highly disadvantageous to small-scale farmers. Farmers in the Eastern Cape

were discouraged from accessing credit from informal credit institutions by the remarkably high interest rates levied by the lenders (Gwiriri, Bennett, Mapiye & Burbi, 2021:9). In other countries as well, informal credit has unfavourable conditions that hinder small-scale farmers from accessing credit. In Tanzania, Mmasa (2017:89) uncovered that informal credit was highly exploitative, lacked transparency, and had extremely high interest rates of up to 47%, which forced farmers to sell their produce at extremely low prices to repay loans. Therefore, such restrictive conditions result in farmers financing their farming activities with remittances and social grants, leading to low productivity (Mdiya, Mdoda & Ngarava, 2021:195).

2.2.2.2. Lack of access to markets

Markets provide farmers with opportunities to sell their crop produce and enable them to get an income (Mbatha & Masuku, 2018:38). However, small-scale farmers in South Africa face various constraints in accessing both local and export markets. Most small-scale farms are in remote areas that have poor transport systems. In addition, they lack transport infrastructure to connect them to markets (Chisasa, 2019:3). For instance, small-scale livestock farmers in Elliot, Eastern Cape travel an average distance of twenty-five kilometres to the nearest market (Gwiriri et al., 2021:11). While in OR Tambo Municipality, Eastern Cape, farmers travel at least eleven kilometres to the nearest local market (Mdiya et al., 2021:195). In some instances, they also hire transport at high cost to deliver their produce to markets, which subsequently makes small-scale farming highly unprofitable (Mdiya et al., 2021:199). However, small-scale farmers with access to formal markets face competition from commercial farmers. A study focusing on three major retailers in South Africa by Von Loeper, Drimie and Blignaut (2018:169) revealed that supermarkets found small-scale producers to be unreliable as they were inconsistent in supplying produce, produced out-of-season products, and their produce did not meet the market food safety and quality requirements, which made the retailers favour buying from commercial farmers.

However, contract farming has been introduced to link farmers with markets (Ncube, 2020:59). Contract farming is an agreement between a small-scale farmer and an agribusiness that has access to local and global markets (Khapayi et al., 2018:196). Other than market access, these firms also provide financial support and extension services (Khapayi et al., 2018:197). Empirical studies suggest that contract farming increases market access and income for the farmer. A survey conducted to explore the benefits of contract farming in six Sub-Saharan countries shows that farmers participating in contract farming have generated a 10% income increase compared to their non-participating counterparts (Meemken & Bellemare, 2020:261). However, in South Africa, tomato small-scale farmers in Eastern Cape indicated that despite having increased market access due to contract farming, they incurred numerous losses as they reported that the agribusinesses were manipulative and not transparent since there were

no formal written agreements (Khapayi et al., 2018:200-201). Therefore, while contract farming has the potential to improve small-scale farmers' livelihoods, it may not be fully beneficial considering the issues that mar the system.

2.2.2.3 Low productivity

As mentioned earlier, small-scale farming is characterised by low productivity resulting from farmers' lack of production inputs and slow adoption of new farming technologies (Tshuma, 2014:2414). In addition, small-scale farmers lack production knowledge and management skills, finance, and transport infrastructure, which has a direct impact on yields (Mathinya et al., 2021:141). For instance, the lack of funds and technical support to maintain irrigation infrastructure contributed to low productivity in small-scale sugar cane farms in Nkomazi (Woodhouse & James, 2017:33). Furthermore, environmental factors cause low productivity in small-scale farming (Oluwatayo, 2019:492). Small-scale farming is highly dependent on seasonal rain, therefore, weather fluctuations and climate change result in poor crop and livestock production (Matlakala, Nyahunda & Makhubele 2021:183). Low productivity is a characteristic of small-scale farming and results from a combination of human and natural factors. Land degradation is considered in this study as a factor that constrains small-scale farming from producing a livelihood. The depletion of land and water resources makes it difficult to sustain small-scale crop and livestock production, thereby intensifying livelihood vulnerability (Tun, Shrestha & Datta, 2015:1). The phenomenon of land degradation will be discussed next.

2.3 Land degradation as a phenomenon

Land degradation has been considered a global issue since the twentieth century. Almost 250 million of the world's population is living on degraded land while billions are in areas that are at risk of being degraded (United Nations Convention to Combat Desertification [UNCCD], 2018). Remote sensing assessments have revealed that globally, 25% of the land is degraded, 45% is moderately degraded with 10% of the land recovering, while 95% is projected to be degraded by 2050 if no action is taken to address this issue (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPPBES], 2018). This assessment highlights that land is degrading at varying rates depending on factors such as location and socio-economic factors. According to the World Atlas of Desertification, the most degraded areas are found in Asia, Africa, and North America (European Union, 2018:32). A study by Kirui, Mizarbev and Von Braun (2021) confirmed that in Africa, the East African region and Sub-Saharan Africa are among the world's most degraded regions.

Land degradation is a complex phenomenon which results from the interplay between bio-physical and human factors (Barret & Bevis, 2015:909; Kirui, 2016:3). The main human drivers

of land degradation in the United States of America are overgrazing, agriculture expansion, while in Asia, land degradation results from fires, overpopulation, and deforestation (Coppus, 2022:57; FAO, 2022:1). Climate change impacts such as droughts and intense rains exacerbate land degradation in Africa (Barman et al., 2013:1098; Rabumbulu & Badenhorst, 2018:223).

Land degradation affects more than six million hectares of land worldwide (Gibbs & Salmon, 2015). Globally, it has been estimated that 10 trillion USD a year is lost because of land degradation (UNCCD, 2022). In addition, land degradation has led to low agricultural yields, increased food insecurity, loss of incomes, and reduced water quality and quantity (Maslin, 2017:5). In Africa, the most notable impact is the loss of grazing and farming land as well as freshwater sources, which affects the health, food security, and livelihoods of over 1.5 billion people (United Nations Development Programme, 2017:3). Land degradation is a prevalent problem in South Africa as will be discussed in the following sub-section.

2.3.1 Land degradation in South Africa

South Africa is a relatively dry country, and this makes it highly susceptible to land degradation. In 2009, nearly 11 million people in South Africa lived in degraded areas (Bai & Dent, 2009:35). Research by Hoffman, Todd, Ntshona and Turner (1999) shows that land degradation is prominent in communal lands or former homelands. An earlier study assessing land degradation patterns in the country has shown that nearly 29% of South Africa's arable land, 33 % of forests, and 37% of rangelands were degraded (Bai & Dent, 2007:25). Although there is a lack of recent national assessments of land degradation in South Africa as mentioned in the previous chapter (see Section 1.1), evidence from available studies suggests that the degradation in these areas has worsened over the years (Gxasheka et al., 2017:225; DEA, 2017:11; Venter, Scott, Desmet & Hoffman, 2020:3). KwaZulu-Natal and Mpumalanga provinces have recently experienced more negative changes in the landscape (Venter et al., 2019:6). The most prominent form of land degradation that covers 70% of South Africa's total land is soil degradation (RSA, 2018:4). Specifically, in Nkomazi Municipality, soil erosion from agricultural activities, soil acidification, and soil compaction are prevalent (COGTA, 2019: 74).

Land degradation in South Africa has been primarily attributed to apartheid. The phenomenon has been primarily linked to the influence of apartheid laws such as the 1913 Native Land Act and the Native Land and Trust Act of 1936, which among others, limited Black South Africans' ability to control land and displaced them to homelands (Pienaar & von Fintel, 2013:3). Nearly 3.5 million people were forcibly moved from their land to homelands during the 1960s and 1980s (RSA, 2014:40), resulting in Black South Africans controlling only 7% of the land. These areas were under-resourced and densely populated since 80% of the Black population was

confined to these homelands and excluded from development. As a result, people overexploited resources through deforestation, overgrazing, and overstocking (Gxasheka et al., 2017:218; Hoffman et al., 1999). In post-apartheid South Africa, there is continued deterioration of the land, which results from the mismanagement of land due to high poverty rates and inappropriate policies (Vetter, 2013:6).

Land degradation threatens the development of a country like South Africa which is already experiencing high poverty rates, injustice, and unemployment. It undermines the government's pursuit of goals set out in the NDP to promote socio-economic development in a sustainable manner (NPC, 2012). Moreover, it directly influences the lives of people who derive a livelihood from agricultural activities. Land degradation manifests in different ways as will be discussed next.

2.3.2 Types of land degradation

The land degrades in various ways and the common types are soil degradation, bush encroachment, and water quality depletion.

2.3.2.1 Soil degradation

The soil degradation phenomenon consists of the displacement of the soil either by water or wind and the depletion of soil nutrients (Gray, 2014:421). In addition, soil degradation occurs through compaction, salinisation, soil sealing, and cracking (Gomiero, 2016:7; Stringer, 2014). Issaka and Ashraf (2017:1) aver that soil degradation is a slow process that happens unnoticed but leads to great losses. For instance, Borelli, Robinson, Panagos, Lugato, Yang, Allewel, Weuper, Montanarella and Ballabio (2020:21994) estimate that globally, nearly 35.9 million tonnes of soil are lost yearly. Significant losses are mostly experienced in densely populated areas and those that rely heavily on agriculture (Gomiero, 2016:4). However, Kiage (2013:676) postulates that in some areas, the steepness of slopes and soil properties facilitate soil erosion. It has been shown that in southern Ethiopia, steep slopes with little vegetation cover were more susceptible to soil erosion than gentle slopes in the event of heavy rains (Asseefa & Han-Rudolf, 2016:1555). In addition, massive soil erosion in Engcayini and KaBhudla, Swaziland, was attributed to intense rainfall (Orchard et al., 2017:50).

2.3.2.2 Bush encroachment

This phenomenon is characterised by an increase in woody vegetation in the semi-arid and Savanna biomes (DEA, 2019). It is a phenomenon that alters the natural ecosystem through the increase of woody plants and invasive species (Stafford, Birch, Etter, Blanchard, Mudavanhu, Angelstam, Blignaut, Ferreira & Marais, 2017:194). It is most prominent in arid and semi-arid regions in the Savanna grasslands, affecting nearly 40% of the world's pastures (Huang et al., 2018). In a comparative regional study conducted by Stevens, Lehman, Murphy

and Durigan (2017:240), it was found that Africa, followed by Australia, had an increase in bush encroachment. African countries that have been affected by bush encroachment are South Africa, Zimbabwe, Namibia, and Ethiopia (Ayelew & Muluaem, 2018). For example, rangelands in Boshof District in the Free State, South Africa, were severely encroached on by unpalatable species, which reduced grazing areas for cattle (Rabumbulu & Badenhorst, 2017:226). Likewise, a comparative remote sensing study on Namibia and South Africa showed that eight million hectares of South Africa's arid Savannah ecosystems were encroached (Stafford et al., 2017:196). Bush encroachment is a result of various factors. Most studies have pointed to high temperatures, overgrazing, high carbon concentrations, and the banning of fire regimes as major causes (Reed et al., 2015:476; Shikangalah & Mapanti, 2020:254; Stevens et al., 2017:241). Despite being beneficial to the environment, bush encroachment is considered a form of land degradation, because it results in the loss of ecosystem benefits (Stafford et al., 2017:194). It is a threat to rangelands as it undermines the growth of forages (Gxasheka et al., 2017:226) and reduces underground water supply (Luvuno, Biggs, Stevens & Esler, 2022; Stafford et al., 2017:196).

2.3.3.3 Water degradation

Water degradation includes the depletion of water quality and quantity of water bodies. Pollution through industrial waste disposal and farming practices are the main contributors to water degradation (Organisation for Economic Co-operation and Development & FAO, 2020). For instance, Borreti and Rosa (2019:2) assert that globally, agriculture accounts for more than 70% of water use and contributes to water degradation by disposing large quantities of toxic chemicals, fertilisers, and pesticides into water. Issaka and Ashraf (2017:2) assert that soil erosion also contributes to water degradation in that severe soil erosion causes excessive siltation of water bodies, thereby decreasing the river's water-holding capacity. Some water degradation problems identified in South Africa are salinisation, sedimentation of water sources, and eutrophication resulting from agricultural activities (Du Preez & Van Huyssteen, 2020:11). A study assessing the water quality at Komati, Crocodile, and Pongola River catchments found that Komati and Crocodile River catchments had increased salt content, which among other factors could be attributed to irrigation practices (Van der Laan, Van Antwerpen & Briston, 2012:94). The degradation of water quality is worrying for small-scale farmers as Murugani and Thamaga-Chitja (2020:226) revealed that water pollution by chemicals causes water scarcity and affects plant growth and yields. Therefore, the degradation of water in Komati and Crocodile River catchments may be a cause for concern among small-scale farmers in Komatipoort since they draw water from these catchments.

It is, therefore, important to understand the link between land degradation and small-scale farming.

2.4 The link between land degradation and small-scale farming

Empirical studies indicate a relationship between land degradation and land use. Land degradation is largely a result of anthropogenic activities such as poor farming methods adopted by farmers and in turn, influences people's livelihoods as it limits the benefits derived from water and land resources. This section reviews small-scale farmers' contribution to land degradation and the influences of land degradation on land productivity and small-scale farmers' livelihoods.

2.4.1 Small scale farmers' contribution to land degradation

Small-scale farmers rely on land resources for their livelihood. However, there are concerns over the human impact on land degradation, which results from factors such as increased poverty rates among small-scale farmers, population growth, and insecure land tenure. In this section, increased poverty rates among small-scale farmers and insecure land tenure will be discussed as contributory factors to land degradation.

2.4.1.1 Poverty

Poverty definitions vary according to context; however, poverty is not only lack of income but also refers to the deprivation of necessities such as education, health, nutrition, and a good environment which can have a positive influence on one's well-being (Ledwith, 2016:106; Ogutu & Qaim, 2018:281). Most of the poor in Sub-Saharan Africa are small-scale farmers (Ogutu & Qaim, 2018:281). As previously mentioned, these farmers have low incomes and lack access to resources such as markets and information (see Section 2.2.2). In addition, the small-scale farmers reside in marginal lands that are characterised by poor and shallow soils as well as unfavourable topography and poor rains and are more prone to degradation (Barbier & Horchard, 2016:16; Kirui, 2016:3). Together, these factors are driving forces of the land degradation problem. Small-scale farmers lack the necessary resources to invest in soil conservation practices and adopt sustainable agriculture practices (Barbier, Lopez & Horchard, 2015:416). For instance, it was found that in Ethiopia farmers with low livelihood assets practised monocultural farming, did not fallow land, and there was overgrazing in their land (Jendoubi, Hossain, Giger, Tomićević-Dubljević, Ouessar, Liniger & Speranza, 2020:12), which exacerbated land degradation in the area. Similarly, the lack of finances and knowledge among small-scale farmers in South-West Côte d'Ivoire, West Africa, contributed to land degradation as the farmers identified inappropriate fertilizer and chemical application as well as non-maintenance of irrigation equipment as contributory factors to land degradation in the area (Kouassi, Gyau, Diby, Bene & Kouame, 2021:13).

Poverty, coupled with the lack of livelihood opportunities, results in small-scale farmers' overreliance on natural resources as they strive to meet their needs (Musakwa et al., 2020:6;

Peprah, 2014:483). A study by Aseefa and Hans-Rudolf (2016:1555) revealed that the gullies in the lowland of the Rift Valley resulted from excessive deforestation by local farming communities for firewood and construction. Unless strategies to address poverty in an environmentally sustainable manner are in place and proper policies developed, small-scale farmers will continue to be trapped in unending poverty and land degradation cycle (Babier & Horchard, 2018:628).

2.4.1.2 Insecure land tenure

Land tenure includes rights relating to ownership and use of land and these can be communal, rental, state ownership, or private ownership (Cochet et al., 2020:34). Secure land rights are legally and socially recognised, and people or communities can defend their land in the event of rights violation (Wergeriff & Gueren, 2020:4). Tenure security has numerous benefits for small-scale farmers in that their land can be considered as collateral when obtaining resources such as credit, which can enable them to invest in their land (Rampa, Gadanakis & Rose, 2020:10).

However, despite the efforts to increase land tenure through the land reform programmes, most small-scale farmers in South Africa are tenure insecure (Akiyemi & Mushunje, 2019:9). They practise farming on land rented from the state or that is communally owned (Mathinya et al., 2020:141). Lack of tenure security is a disincentive to sustainable resource use (Kirui, 2016:25). Barbier and Hochard (2018:626) opine that tenure insecurity undermines small-scale farmers' efforts to invest in conservation as they do not own the land. In Burkina Faso, insecure land tenure prevented both non-poor and poor farmers as well as migrants who borrowed land from making long-term investments such as fallowing and assisted tree regeneration (Etongo, Djenontin & Kanninen, 2016:14). In South Africa, it was found that there is intense land use in communally owned areas which is likely to lead to increased land degradation than in the case of privately owned lands (Li, Wang, Song, Wang & Musakwa, 2021:8). Therefore, tenure insecure small-scale farmers would rather focus on meeting their short-term goals since they do not own the land on which they farm.

Contrary to the common assumption that insecure tenure contributes to degradation, a study by Leonhardt, Penker and Salhofer (2020:235) found that in Austria, farmers who rented land considered that their tenure was more secure given that they were renting for long periods and had good relationships with landowners, which encouraged them to invest in soil conservation on the farms. In addition, a study by Moreda (2018:77) shows an indirect relationship between tenure insecurity and land degradation. The study found that farmers who were tenure insecure such as migrants made efforts to control land degradation in their area. In South Africa, a study conducted by Mawere, Mutshidzi, Kugara and Madzivhandila

(2022:322) in the Vhembe District, Limpopo, established that despite lack of tenure security, farmers on communally owned lands invested in their land without any assistance from the government. Therefore, a farmer's perception of their land tenure influences how they utilise land.

2.4.2 Influences of land degradation on farmers' livelihoods

As mentioned earlier (see Chapter one, Section 1.1), the influence of land degradation is felt in environmental and socio-economic spheres. Land degradation lowers land productivity and undermines small-scale farmers' livelihood strategies (Kirui, 2018:22). It reduces vegetation cover, exposing the soil to the wind and rain, which makes it more susceptible to erosion (Ruano et al., 2016:88). In addition, surface and underground water sources are lost due to excessive extraction (Orchard et al., 2017:50). Furthermore, water quality is depleted through pollution by agrochemicals and river siltation, which reduces storage capacity of water sources (Issaka & Ashraf, 2017:5). For instance, farmers in Nzhelele Catchment, Limpopo, reported water scarcity caused by water pollution by pesticides in the catchment area (Musakwa et al., 2020:14). These environmental consequences, in turn, have a detrimental influence on the socio-economic dimension.

The socio-economic impact of land degradation has been felt worldwide as it disproportionately affects the poor, who are already vulnerable (Kemp & Palinkas, 2015:4). Land degradation reduces farmers' capacity to generate an income, improve nutrition, and overall well-being through its negative influences on agricultural production. Soil fertility loss in areas in southern Ethiopia was found to lead to poor crop yields, thus contributing to food insecurity among small-scale farmers' households (Assefa & Han-Rudolf, 2016:1555). Mergessa and Bekere (2019:1954) showed that rangeland degradation reduced the quality and quantity of livestock due to the loss of grazing land and water unavailability in Ethiopia. Similarly, numerous studies in South Africa have documented the negative socio-economic influence land degradation has on the country. The total losses incurred due to soil degradation in Mpumalanga Province were estimated to be R1.5 billion. Adding on, land degradation poses a food security challenge for households that rely on agriculture. In addition, a study in the Eastern Cape by Wonga et al. (2021) found that land degradation reduces grazing lands, which leads to reduced livestock numbers. A study by Rabumbulu and Badenhorst (2017:218) found that gully erosion and bush encroachment in Abrahamskraal-Boshof District in Free State reduce the grazing area for cattle, thus negatively affecting livestock production which forms a livelihood for farmers. Therefore, land degradation leads to a decline in the quality of land, thereby increasing small-scale farmers' vulnerability because it reduces their incomes and heightens the food insecurity risk. Overall, land degradation disrupts small-scale farmers' livelihoods and increases the demand for resources, which in

some areas leads to conflict (UNCCD, 2017:11). Some farmers end up migrating to other areas or completely abandoning crop cultivation and livestock production (Blair, Shackleton & Mograbi, 2018), but some adopt farming practices that have a positive influence on their livelihood and the environment as will be discussed next.

2.5 Farmers' responses to land degradation

Land management is directed at addressing land degradation either through rehabilitation or prevention. Farmers use sustainable land management practices that are a combination of indigenous knowledge systems and scientific methods as well as technology to rehabilitate land and prevent land degradation (FAO, 2022:204). Sustainable land practices aim to protect natural resources and sustainable use thereof to meet social and economic needs.

The most common method of increasing soil fertility and crop yields is the use of commercial fertilisers. These are highly effective in enhancing soil fertility as they instantly dissolve in the soil upon application (Bhatt, Labanya & Joshi, 2019:179). In addition, farmers particularly in Africa use organic fertilisers and intercropping methods to enhance soil fertility. In the Teso community, Kenya, farmers apply manure from composts and livestock dung (Ayaa & Kipterer, 2018:385). Similarly, farmers in Swaziland practise crop rotation, fallowing, intercropping, and use organic matter as fertiliser to control land degradation (Orchard et al., 2017:51–52). Intercropping with leguminous crops increases soil fertility through nitrogen fixation levels. In China, intercropping maize with peas improved nitrogen content in the soil, which lowered nitrogen fertiliser application and increased grain yields (Yang, Fan & Chai, 2018:10). Nortje and Laker (2021:250) emphasise that the combined use of organic and inorganic fertilisers has proven to be a sustainable and an effective method to enhance soil organic content and improve soil fertility. Furthermore, in South Africa, a study in Mpumalanga's seventeen local municipalities revealed that small-scale farmers engaged in mulching, intercropping, fallowing, and agroforestry. However, this was dependent on numerous factors such as availability of funds, access to extension services, and farming experience (Oduniyi, Ojo & Nam, 2022:7).

Furthermore, farmers adopt sustainable methods to increase rangeland vegetation through grass reseeding and by practising grazing rotation (Megerssa & Bekere, 2019:1955; Musakwa et al., 2020:10). For instance, farmers in Gwanda, Zimbabwe, practise grazing rotation, which increases the growth of palatable plants and combats rangeland degradation (Chitongo, 2019:16). However, there have been challenges in implementing rotational practices due to a growing demand for land resulting from population increase (Assefa & Hans-Rudolf, 2016:1556; Orchard et al., 2017:52).

Farmers can control the growth of invasive plants either mechanically, chemically or by fire to improve rangeland vegetation (Reed et al., 2015:476; Stafford et al., 2017:194; Wonga et al.,

2021:10). However, invasive plant removal is deemed labour-intensive and a costly method which requires experience (Hoffman, 2014:724; Reed et al., 2015:476). Therefore, some farmers resort to other methods such as practising mixed grazing, whereby cattle and other browsers such as goats and sheep graze together for the improvement of grazing lands (Reed et al., 2015:476). Others employ agroforestry to reverse land degradation and improve livelihoods (Moreda, 2018:79). The common types of agroforestry practised are home-garden agroforestry, alley-cropping, windbreak, rink banks, and cropland trees (Gifawesen, Tola & Duguma, 2020:135). Agroforestry is important for biodiversity conservation; it improves soil water retention and soil fertility, and minimises soil erosion (Gifasawen et al., 2020:139). In Dera Woreda, Ethiopia agroforestry practice of indigenous tree species protects the soil and improves livelihoods of small-scale farmers (Amare, Wondie, Mekuria & Darr, 2019:45). Therefore, the adoption of sustainable land management practices by small-scale farmers depends on their knowledge, access to experts, and finances.

However, the UNCCD (2019:4) warns that actions to combat land degradation should be integrated to meet people's socio-economic needs, while at the same time maintaining the integrity of the environment. The efforts towards managing land degradation sustainably require collective action at global and local levels. Therefore, the next section will discuss the international and national agreements that guide sustainable land use and management.

2.6 Agreements for sustainable resource use and management

Land degradation continues to be a development problem which increases inequality and poverty levels and, therefore, needs to be controlled and managed. There are international and national mandates that give guidance on how land degradation must be addressed to ensure sustainable use of natural resources, and these will be discussed below.

2.6.1 International agreements on sustainable natural resource use and management

Land degradation has been recognised as a development issue due to its adverse influence on the social, economic, and environmental dimensions of sustainability. Therefore, a collective, global effort to restore and manage resources is required. Hence, in 1977 the United Nations Conference on Desertification adopted the Plan of Action to Combat Desertification. It aims to address desertification by rehabilitating desertified and degraded lands, encouraging improved and integrated land use and enhanced the livelihoods of those in areas affected by desertification (United Nations Environmental Programme [UNEP], 1992). However, the plan of action had a weak implementation and did not yield the expected results (Ambalam, 2014:3). As such, the Brundtland Commission prioritised land degradation after recognising the interlink between social, economic, and environmental problems and thus called for development that is environmentally conscious to ensure sustainability (United Nations, 1987).

Over the years, it was realised that arid and semi-arid regions, particularly those in Africa, experienced increasing desertification. Therefore, a more effective approach to dealing with land degradation in a sustainable manner was required. As such, the Convention to Combat Desertification was agreed upon in 1994 by UNEP aiming to improve livelihoods and ensure sustainable development in areas affected by desertification in Africa. Currently, SDG 15 calls for combating land degradation in an integrated manner, aiming at “natural resource conservation, restoration of degraded lands and sustainable use of natural resources” (UN, 2015:18).

2.6.2 South African agreements on sustainable natural resource use and management

Since independence in 1994, South Africa has adopted and implemented laws and policies directed at regulating international commitments to addressing land degradation and sustainable use of resources. Chapter two, Section 24 of the South Africa Constitution, Act 108 of 1996, enshrines the environmental right, which grants everyone the right to a healthy environment. In addition, Section 24(b) endows people with the responsibility to protect the environment for current and future generations through preventing pollution and degradation, employing conservation practices, and using resources sustainably. Therefore, while a clean and healthy environment is a basic human right, South Africans have the responsibility to protect and conserve the environment to ensure sustainable development.

To fully enforce this commitment, the South African government has adopted several laws that regulate land use and planning as well as environmental protection. For instance, the National Environmental Management Act 107 of 1998 was implemented to guide programmes and efforts that ensure sustainable environmental management. The Act aims to manage the environment by focusing on issues such as the identification and mitigation of environmental problems and ensuring that everyone complies with the law. In addition, the law accentuates that environmental management must be performed in an integrated manner, taking into consideration the participation of all government, non-governmental, private and public sectors, the vulnerable groups in preventing biodiversity loss and degradation.

Moreover, the Spatial Planning and Land Use Management Act 16 of 2013 provides regulations for land use and spatial planning. The goal of the Act is to ensure inclusive development and sustainable use of land agricultural or settlement purposes. Chapter Five of the Act provides for sustainable and efficient land use and seeks to redress past injustices to ensure that there is equality in spatial and land use management systems.

Another policy that guides sustainable development is the NDP, which aims to sustainably address poverty and inequality in South Africa by 2030 (NPC, 2012:198). The NDP acknowledges that the well-being of South Africans comes from a healthy natural environment

and the NDP envisions integrated social, economic, and environmental dimensions of sustainable development by 2030. Hence, all forms of development in South Africa should conserve and restore natural resources to strengthen community resilience, through public participation and multi-sectoral collaborations (NPC, 2012:198).

In summary, these mandates give guidance to efforts towards sustainable resource use. The goal for development would be to ensure that the international and national mandates are integrated to create sustainable livelihoods by ensuring that natural resources are used sustainably. However, enhancing land management and achieving sustainable livelihoods requires collaborative action across sectors such as government, voluntary, and private sectors, and this includes the social work profession. In the next section, the role of social work in promoting sustainable natural resource use to achieve sustainable livelihoods will be briefly explored.

2.7 Role of social work

It has been widely recognised that environmental issues give rise to social problems and widen the socio-economic inequality gap (UNCCD, 2019:8). Historically, the social work profession has been concerned with the interaction between people and their environment (Miller, Hayward & Shaw, 2012:271), which largely excluded the natural environment. However, as mentioned earlier (see Chapter one, Section 1.1), social workers have started to explore the interconnectedness of people and their natural environment, and the need to maintain a mutual relationship (O' Leary & Tsui, 2021:159).

The Global Agenda for Social Work and Social Development positions social workers around the world to engage in environmental issues and contribute to sustainable development (Tasse, 2015:283). In the first decade (2010–2020), one of the Global Agenda's themes was to promote community and environmental sustainability (International Federation of Social Work, 2012). This pillar focused on expanding social workers' person-in-environment perspective to explore the interlinkages between people and their physical environment (Jones, 2018:471). It challenged social workers to shift their paradigms in tackling social injustices. As such, Alston (2015:315) urges social workers to adopt transformative and interdisciplinary approaches to enable them to successfully integrate the social, economic, and environmental dimensions in pursuit of sustainable development.

Land degradation is a social work concern as it gives rise to social problems that adversely affect vulnerable and marginalised people, including small-scale farmers. Through approaches such as green social work and developmental social work, social workers can address poverty and injustices sustainably manner. Dominelli (2018:3) defines green social work as a "transdisciplinary, holistic approach to environmental crises that have challenged

the social work profession to incorporate its principles, values, and concern over environmental degradation and the disasters associated with this into daily, routine, mainstream practice.” It is a holistic approach that urges innovation in social work responses to social issues. Green social work aims to promote social and economic justice by examining the interlinkages between people and the physical environment and challenging structural barriers or institutions that restrict people (Dominelli & Ku, 2017:10). Therefore, Dominelli (2018) has proposed various ways in which social workers can be involved, such as assisting families affected by environmental crises through coordinating relief services, building family and community resilience, advocating for and raising awareness about environmental protection and sustainable resource use (Dominelli, 2018:13). Hence, through green social work, practitioners can uplift the livelihoods of those affected while ensuring the integrity of the natural environment.

The strategies proposed by Dominelli (2018) are in line with the developmental approach to social work, which directs social work practice in South Africa (Republic of South Africa [RSA], 1997). This approach is embedded in human rights and enables social workers to implement initiatives that meet human needs while protecting the natural environment (Lombard, 2015:486). In addition, the developmental approach commits to promoting socio-economic development, ensuring multisectoral collaborations, enhancing participation and bridging the micro-macro practice divide (Patel, 2015:82). Developmental social workers can develop alternative innovative socio-economic strategies that regenerate natural resources by collaborating with various stakeholders across all sectors and ensuring the participation of the affected (Patel, 2015:93). In addition, social workers can advocate for access to livelihood assets by challenging institutional structures that restrict vulnerable groups such as small-scale farmers’ access to livelihood assets to strengthen livelihoods (Androff, 2016:29; Lombard, 2019:194). However, to work towards this goal, social workers have the responsibility to understand the effects of environmental crises by engaging those affected as they are experts in their own lives (Dominelli, 2018:10,14; Chiwara & Lombard, 2018:301). Hence, this study sought to obtain an in-depth understanding of land degradation from the perspective of small-scale farmers and its influence on livelihoods in Komatipoort through the theoretical lens of the sustainable livelihood framework (SLF).

2.8 Theoretical framework

The SLF was developed by the DFID in 1999 as a holistic analytical framework on how livelihood assets and capabilities are used to produce livelihoods. The framework is used in development interventions directed at improving the livelihoods of poor people in specific contexts (McLean, 2015:380). The SLF is based on the analyses of the livelihood assets or capitals, namely natural, financial, human, social and physical capitals, which will be described

in detail below (see Section 2.8.2). These assets play a critical role in ensuring that small-scale farmers attain a livelihood and can maintain better livelihood outcomes in the face of shocks or trends (McClean, 2015:380). In addition, the framework examines how institutions, processes and organisational structures determine people's access to livelihood assets and their ability to transform livelihoods (DFID,1999). Therefore, the SLF examines the relationships between the various factors that affect livelihoods from multiple perspectives to address poverty and social inequality in a sustainable manner (Lombard, 2019:179, 187; Mani, Osborne & Cleaver, 2021:986). Therefore, in this study, the SLF enabled the researcher to understand the land degradation phenomenon and uncover the influence it has on small-scale farmers' livelihoods. The SLF consists of five elements, namely vulnerability context, livelihood capitals, institutional processes and livelihood strategies and outcomes. These will be discussed further.

2.8.1 Vulnerability context

The sustainable livelihood framework starts with a vulnerability context. The vulnerability context describes a condition where people's livelihoods are endangered due to changes in the external environment. It is characterised by external forces such as shocks, trends, and seasonality, including an inability to cope with these factors (Serrat, 2017:23). Shocks include pests, diseases, and conflict; trends such as market price fluctuations and seasonality such as unemployment can undermine small-scale farmers' livelihood and push them into poverty (Serrat, 2017:23). The vulnerability context of small-scale farmers is characterised by climate change, land degradation, household poverty, market price fluctuations, and remoteness from markets (Apine, Turner, Rodwell & Bhatta, 2019:25; Orhon, Akcakaya & Dalkilic, 2020:21). For instance, small-scale farmers in Africa are highly vulnerable due to climate change, droughts, fluctuating market prices, and limited resources (Hazell, 2020:39). Specifically in South Africa, small-scale farmers are food insecure because of climate change (Mbatha & Masuku, 2018:37) and are at high risk of market failure and price fluctuations (Gwiriri et al., 2021:13). The consequence of increased vulnerability is that it accelerates small-scale farmers' use of natural capital to cushion themselves from the shocks. Mbiba, Collison, Hunter and Twine (2019) concur as their study in Bushbuckridge Municipality, Mpumalanga, revealed that negative shocks such as livestock loss and theft resulted in increased reliance on natural resources as farmers tried to make a living. Therefore, the vulnerability context influences small farmers' use of assets at their disposal (Karki, 2021:268).

2.8.2 Livelihood capitals

Central to the SLF are five groups of capitals or assets that people can use to build livelihoods, namely human, natural, social, financial, and physical capital (Serrat, 2017:23; UNDP, 2017:3). These assets are interrelated, although they will be presented separately. These

assets influence farmers' ability to cope with shocks and overcome them in a sustainable manner (Udoh, Akpan & Uko, 2017:3).

2.8.2.1 Human capital

Human capital includes knowledge and skills people possess, their experience, and ability to work (Serrat, 2017:23). In farming households, human capital is characterised by household labour, farming experience, level of education obtained, and creativity (Davis, Gammelgaard, Preissing, Gilbert & Ngwenya, 2021:6). As such, human capital is concerned with abilities, skills and knowledge that small-scale farmers possess, which they can use to foster a sustainable livelihood. In the context of this study, human capital may influence farmers' perception of land degradation on their farms as well as their response to the influence land degradation has on their livelihoods.

Human capital offers numerous benefits for small-scale farmers. Firstly, access to human capital enables people to pursue various livelihood strategies by using the assets they have (DFID, 1999). In addition, human capital such as a higher level of education and training enables farmers to understand and adopt new sustainable farming methods. In their study in Ingwe Local Municipality, Kwazulu-Natal, Ntshangase et al. (2018:11) identified that highly educated farmers and those trained in agricultural production understood and adopted no-till conservation compared to those who had low education levels and were not trained. In addition, Mthethwa and Wale (2021:10) highlight that a higher education level facilitates sustainable livelihoods as it enables farmers to obtain jobs outside farming, which can cushion them in the event of shocks. Furthermore, human capital such as how many years of experience a small-scale farmer has is essential in achieving a sustainable livelihood. Werner (2021:13) asserts that more experienced farmers adapt much easier to environmental changes compared to those who are inexperienced. In addition, many years of experience in farming enhance the skills that can enable farmers to improve agriculture productivity (Maziya, Mudhara & Chitja, 2017:48).

However, numerous studies have uncovered that small-scale farmers in some parts of South Africa, particularly Nkomazi Municipality, lack human capital. These studies revealed that small-scale farmers were illiterate, lack technological, financial and marketing skills, production knowledge, and had a high level of household poverty (Gininda, Antwi & Oladele, 2014:1035; Gwebu & Matthews, 2018:59; Woodhouse & James, 2017:10). Likewise, a study in Elliot, Eastern Cape, found that small-scale livestock farmers lacked human capital in the form of knowledge about commercial agriculture, which hindered them from transitioning to commercial production (Gwiriri et al., 2021:15). Lack of human capital constrains small-scale farmers' livelihood by limiting their use of new technologies and application of new knowledge

in their agricultural activities. Therefore, the present study explored whether small-scale farmers in Komatipoort were vulnerable and negatively influenced by land degradation.

2.8.2.2 Natural capital

Natural capital refers to the natural resources and services from which livelihoods are derived (Serrat, 2017:24). Natural capital includes access to land, availability of water, biodiversity, and other environmental resources (Mbatha et al., 2021:64). Land and water form the basis for small-scale farmers livelihood (Satu, 2017). In the event of shocks and trends, farmers turn to the land for cushioning, which leads to an increased reliance on natural capitals (Mbiba et al., 2019:19). Adding on, in areas where water is available and easily accessible, farmers can practice irrigation and be cushioned from droughts and climate variability (Fanadzo & Ncube, 2018:436). Therefore, with adequate natural capital, small-scale farmers can engage in agricultural production and sustain themselves. However, small-scale farmers in South Africa struggle with lack of access to land and water. As earlier mentioned (see Section 2.4.1.2), the land used for small-scale farming is under communal ownership and farmers have land less than two hectares in size to sustain their livelihoods through crop and livestock production. The land size and water availability are further diminished by land degradation since there is soil erosion. Therefore, the depletion of natural capitals affects the sustainability of small-scale farming in South Africa and increases poverty levels among the farmers. However, in Komatipoort, small-scale agricultural production is irrigated as the area draws water from Komati and Crocodile rivers (COGTA, 2019:74). For instance, the availability of water in Nkomazi has enabled small-scale farmers in Komatipoort to engage in small-scale sugarcane production, which has improved their livelihood through increased incomes (James & Woodhouse, 2015:20). In addition, the study's findings presented in Chapter four, Section 4.3, sub-theme 1.1 also confirm that small-scale farming in Komatipoort is mostly irrigated. Therefore, increasing access to natural capitals and encouraging their sustainable use has the potential to improve small-scale farmers' livelihoods.

2.3.2.3 Social capital

Social capital refers to networks, social relations, affiliations, and associations (Serrat, 2017:24). These relations are characterised by trust, norms and values that enable participation and cooperation to achieve common interests for mutual benefit (Hunecke, Engler, Rojas & Poortvliet, 2017). Social capital for small-scale farmers includes relationships with other farmers, relatives, and friends, participation in farmers' unions and associations as well as support from extension workers (Lienert & Burger, 2015). The level of trust that exists in these relationships is important for livelihoods as it enables reciprocity and provides numerous benefits (Huneke et al., 2017:223). These social networks play an important role in cushioning farmers in the event of shocks (Mthethwa & Wale, 2020:7). Furthermore, Nel

(2015) asserts that social capital enables access to other essential assets such as finance, farming equipment and agricultural production information. This is confirmed by Ng'ang'a, Bulte, Giller, Ndiwa, Kifugo, McIntire, Herrero and Rufino (2016) who found that social capital enabled farmers in Samburu County, Kenya, to cope with climate shocks. The study found that social capital reduced financial constraints among pastoralists and that participation in farmers' meetings minimised the climate risks (Ng'ang'a et al., 2016:49). Social capital has the potential to enhance farmer knowledge and skills as well as increase the adoption of new sustainable farming practices (Chitja & Tamako, 2017:19). In China, social capital was found to encourage the adoption of green control techniques by increasing access to accurate technological information, exchange of technology with other farmers, and increased financial resources (Gao, Liu, Yu, Yang & Yin, 2019:7). Similarly, access to extension services was found to increase small-scale farmers' access to information on new technologies and more sustainable agricultural practices in Chinyanja Triangle, Southern Africa (Mango, Makate, Tamene, Mponela & Ndengu, 2017:127). Likewise, a study among maize small-scale farmers in Mpumalanga, South Africa, revealed that farmers with frequent extension services had enhanced awareness of sustainable land management as they adopted practices such as mulching, agroforestry, and land enclosure (Oduniyi et al., 2022:7). As such, small-scale farmers with wider social networks are less vulnerable to the influence of land degradation and can access other essential capitals and diversify livelihood options. Hence, it is important to strengthen small-scale farmers' social capital as it is a channel through which they can access other capitals.

2.8.2.4 Financial capital

Financial capital consists of sources of income available to ensure a livelihood (Sati & Vangchhia, 2017:96). It includes savings, income, credit, and loans that people use to support their livelihoods (Scoones, 1998:8). For small-scale farmers, financial capital is a combination of agricultural and non-agricultural income (Li et al., 2020:413), which among others includes savings, remittances, credit, and loans. Financial investments and savings reduce households' vulnerabilities by enabling farmers to access other capitals and invest in other income-generating projects (Mthethwa & Wale, 2021:7). It enables farmers to access experts, production inputs, and adopt advanced technologies for agricultural production (Shakhovsky, Colina & Clason, 2019:8). In addition, Oduniyi et al. (2022:8) postulate that the more access to financial capital a farmer has, the more likely he or she is to implement the knowledge and skills acquired from their social networks. The benefits also extend to the improvement of farmers' livelihoods by enabling farmers to meet their household needs (Oluwamayokun, 2018:373). Various studies have highlighted that financial capital for small-scale farmers in South Africa is from social grants, remittances, pensions, and leasing land to others (Gwiriri

et al., 2021:17; Mbatha et al., 2021:63). Thus, this confirms that small-scale farmers in South Africa lack financial capital to invest in agricultural activities. The lack of financial resources has been identified as one of the factors that hinder the development and growth of the small-scale sector in South Africa (Carelsen, Ncube & Fanadzo, 2021:101; Mbatha et al., 2021:61). For instance, subsistence-oriented cattle farmers in the Eastern Cape were found to lack finances, which prevented them from improving their farm infrastructure; this subsequently hindered them from transitioning to a commercial scale (Gwiriri et al., 2021:12). In addition, small-scale farmers are unable to purchase farm inputs and maintain irrigation infrastructure due to lack of financial services (Mbatha & Masuku, 2018:31). Therefore, with the lack of financial resources, small-scale farmers' livelihoods are likely to be vulnerable due to land degradation. Hence, it is important to increase access to financial resources as it enables farmers to access knowledge and technologies that enable them to sustainably manage the land and strengthen their livelihood (Barret & Bevis, 2015:908).

2.8.2.5 Physical capital

Physical capital is the infrastructure, tools, and technologies that are used to ensure livelihoods (DFID, 1999). It includes access to roads, safe buildings, water, clean energy, information, and land tenure (UNDP, 2017:8). For small-scale farmers, physical assets include production tools and equipment, transport, and communication (Mbatha et al., 2021:64). Physical capital is critical for small-scale farmers' livelihoods in that it enhances farmers' access to income-generating opportunities (Li, Babu & Zander, 2016:642). They can sell or rent out their equipment for an income. Li et al. (2020:413) emphasise that land is an important physical capital in sustaining small-scale farmers' livelihoods. Large farm sizes have been shown to enable sustainable land use as it enables farmers to practice crop rotation, grazing rotation, and fallowing (Mbatha et al., 2021:63). In addition, farmers with large tracts of land can diversify to income-generating projects, plant more and have more income after harvest. Hence, they can cope with the influence of land degradation on their livelihoods.

However, small-scale farmers in South Africa lack productive technologies and infrastructure. Kamara, Conteh, Rhodes, and Cooke (2019:14048) assert that most small-scale farmers in South Africa rely on low technology and tools such as hoes. In particular, small-scale tomato farmers in Nkomazi used buckets or cans to water their tomato farms due to lack of irrigation infrastructure, which affected tomato production as farmers would either underwater or excessively water the tomatoes (Gwebu & Matthews, 2018:58). Similarly, tomato small-scale farmers in the Eastern Cape lacked tomato washing machines and packaging boxes, which resulted in agribusinesses rejecting their produce for not meeting the market standards, resulting in huge losses for the farmers (Khapayi et al., 2018:200). Furthermore, small-scale farmers are unable to practise sustainable land practices such as fallowing and crop rotation

since their land is less than two hectares as mentioned earlier (see Section 2.2.1 and 2.3.1). In addition, small-scale farms in South Africa are in marginal lands, which restricts farmer participation in markets. Khapayi and Celliers (2016) uncovered that small-scale farmers in South Africa could not improve their livelihoods due to poor roads and farm infrastructure and this restricted them from entering competitive markets. Therefore, the lack of physical assets constrains small-scale farmers' livelihood, which could increase their vulnerability to land degradation.

However, organisational structures and institutional processes influence the use of these assets (Serrat, 2017:24) and this will be discussed next.

2.8.3 Organisational structures and institutional processes

Structures include governmental and private organisations that implement policies and control the rendering of services to improve livelihoods while processes include laws, regulations, and social norms that direct how institutions operate (Mbatha et al., 2021:66; Serrat, 2017:5). These structures and processes are found in the micro, meso, and macro levels, and they determine the extent to which small-scale farmers have access to the livelihood assets (Masukujjaman, Siwar & Alam, 2015:719). Some of these structures include farmer organisations, extension services, and the Department of Agriculture. For instance, Morse and McNamara (2013:36) highlight the importance of small-scale farmer organisations in agricultural production and enhancing farmers' livelihoods. These organisations include extension services, farmer co-operatives and farmers' associations. Farmer membership in group organisations increases farmers' access to finance, markets, easy access to agricultural inputs and knowledge on sustainable farming, which can improve farmers' livelihoods through increased agricultural production. In South Africa, small-scale farmers are members of associations such as the African Farmers' Association of South Africa, the SA Cane Growers Association, the South Africa Grain Farmers' Association, and community-based co-operatives (Zantsi, Hlakanyani & Nkunjana, 2022:156). Several studies have highlighted the numerous benefits small-scale farmers receive from these organisations (Phakathi, Sinyolo, Fraser & Marire, 2021:24; Zantsi et al, 2022:162). However, membership in these organisations depends on factors such as the type of crop the farmers grow and access to assets, but high group membership fees are levied on members (Phakhathi et al., 2021:34), which restricts other farmers from accessing membership. Thus, some small-scale farmers are excluded from certain organisations, which implies that non-member farmers will be limited from accessing certain livelihood assets. This exclusion would render their livelihoods vulnerable in the event of shocks or seasonality, as mentioned in Chapter one, Section 1.2.

In addition, the government and non-governmental organisations are crucial in supporting small-scale farmers to increase productivity and improve their well-being. Therefore, government programmes such as the Micro-Agricultural Financial Institutions of South Africa, Siyakhula Programmes, and Masibuyele Emasimini (RSA, 2022) have been implemented to improve small-scale farmer livelihoods. For instance, a study by Sambo, Oguttu and Mbombo-Dweba (2022) assessed the effectiveness of the government programme Phezukomkhono Mlimi among small-scale farmers in Nkomazi Municipality. The study uncovered that small scale farmers in the area had improved food security and infrastructure and encouraged the adoption of sustainable farming methods (Sambo et al., 2022:7). In addition, the land reform programmes have increased access to land among small-scale sugar cane farmers in the Nkomazi Municipality (Woodhouse & Paul, 2017:4). Nevertheless, Ncube (2017:2) notes that the successes of some government initiatives have been short-lived because of numerous factors such as lack of stakeholder collaborations, adopting a top-down approach in programme implementation and lack of funds. In a study by Nyawo and Mubangizi (2021:7) in eThekweni Municipality, it was highlighted that the lack of integration between government institutions responsible for implementing small-scale farmer programmes and the lack of farmers' participation in planning processes within these programmes has resulted in the failure of government interventions to improve farmers' welfare. Likewise, the New Forest Irrigation Co-operative in Mpumalanga has seen the deterioration of irrigation infrastructure due to lack of financial support from the government under the irrigation revitalisation programmes (Ncube, 2017:9). As such, small-scale farmers have inadequate government support, which has resulted in some farmers abandoning their farming activities (Mbatha et al., 2021:65). Therefore, for institutions to transform small-scale farmers' livelihoods, there need to be effective partnerships between the various organisational structures. In addition, structures and institutional processes need to foster inclusivity and small-scale farmer participation in decision-making processes to ensure sustainable livelihoods.

2.8.4 Livelihood strategies and outcomes

Livelihood outcomes are determined by the livelihood strategies that small-scale farmers engage in which reflect a better livelihood (Karki, 2021:268). According to the DFID (1999), livelihood outcomes include more income, reduced vulnerability, improved food security, more sustainable resource use and improved well-being. However, Mbatha et al. (2021:67) highlight that small-scale farming in South Africa has been shown to produce negative livelihood outcomes. Small-scale farmers in South Africa experience negative outcomes such as low incomes and high debt (Chisasa, 2019; Ncube, 2018:15, Woodhouse & James, 2017:542). These negative outcomes can be attributed to reasons mentioned earlier, such as lack of finances, lack of markets, and land degradation (see Section 2.2.2), which hinder farmers from

achieving positive livelihood outcomes. However, other small-scale farmers can obtain positive outcomes because they diversify their farming activities. For instance, some farmers in the New Forest Irrigation Scheme in Mpumalanga Province were able to produce both subsistence and cash crops, which enabled them to improve household food security and increased incomes which they could save and invest in their land (Ncube, 2018:13). Some farmers in Limpopo and Mpumalanga provinces, who were involved in both livestock and crop enterprises, adapted better to climate change as they had multiple streams of income and improved sustainability as the crops produce food for animals and the animals, in turn, produce manure for the crops (Nesavumi, Tshikolomo, Lekalala, Petja & Van Niekerk, 2022:746). Therefore, access to livelihood assets and favourable policies will enable small-scale farmers to pursue various livelihood strategies such as agriculture intensification and irrigation agriculture, which can improve household food security, income, and reduced vulnerability. However, these outcomes may be achieved at the expense of natural resources, thus sustainable livelihood outcomes should balance the social, economic, and environmental achievements (Serrat, 2017:22).

2.9 Summary

Chapter two has reviewed studies on small-scale farming as a livelihood strategy and the challenges that farmers encounter. Challenges such as lack of finances, lack of access to markets, and low productivity were discussed as factors that make small-scale farming in South Africa less productive and increase small-scale farmers' vulnerability. In particular, land degradation was identified as a challenge faced by small-scale farmers as land forms the foundation of their livelihoods. The contributory factors of land degradation and its influences on small-scale agriculture were presented. In addition, the land management strategies small-scale farmers adopt to tackle this problem and secure their livelihoods were discussed. It has been uncovered that small-scale farmers lack the livelihood assets to cushion them from the influences of land degradation. In addition, there is lack of stakeholder participation and inclusivity for institutions to transform small-scale farming so that it produces sustainable positive outcomes. However, the social work profession through approaches such as green social work and developmental social work has the potential to effect change on individual, community, and policy levels and contribute to small-scale farmers' attainment of sustainable livelihood outcomes.

The next chapter (chapter three) will discuss the research methodology.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Chapter three presents the research methodology that was applied in the present study to answer the research questions. The research methodology, inclusive of the research approach, type of research and the research design, population sampling, data collection and data analysis, will be discussed. Furthermore, the strategies taken to ensure data trustworthiness, the ethical considerations adhered to throughout the research, and the limitations of the study will be provided. The chapter ends with a summary.

3.2 Research approach

The researcher was more interested in obtaining linguistic data and producing thick descriptions of small-scale farmers' perceptions of land degradation and its influence on their livelihood hence the qualitative research approach was utilised in this study (Merriam & Grenier, 2019:6; Nieuwenhuis, 2019a:59). The qualitative research approach is concerned with people's subjective experiences of the phenomenon under study (Leavy, 2017:9), which allowed the researcher to obtain small-scale farmers' different views and observations (Rahman, 2016:104) on land degradation. The advantage of using the qualitative approach in this study is that it is flexible; the design can be adapted (Rahman, 2017:104). Furthermore, the qualitative approach enabled the researcher to obtain a holistic understanding of the phenomenon within the specific context within which it occurs (Leavy, 2017:104) to explore the land degradation phenomenon in Komatipoort and its influence on small-scale farmers' livelihoods.

The study had both exploratory and descriptive purposes. A study with an exploratory focus is concerned with addressing a knowledge gap (Leavy, 2017:5). In the case of this study, the purpose was to explore the perspective of small-scale farmers on land degradation and how it influences their livelihoods. Thus, it was revealed during the literature review stage that few studies on the perceptions of small-scale farmers on land degradation in Komatipoort were conducted and the present study provided some information on it. In addition, the preliminary findings on the topic may result in further research at a later stage (Leavy, 2017:5). The study had a descriptive purpose in that the how questions (Nieuwenhuis, 2019a:60) were used to produce thick descriptions of the influences of land degradation on small-scale farmer livelihoods.

3.3 Type of research

The type of study was applied research, which is concerned with investigating a practice problem and providing solutions (Hansen, 2017:538). In this study, the problem was the

researcher's lack of knowledge on small-scale farmers' perceptions of land degradation in Komatipoort and its influence on their livelihoods. The study intended to understand the views of small-scale farmers on how land degradation influences their livelihoods, and based on the findings, propose sustainable land management strategies.

3.4 Research design

The study adopted a case study design, which focuses on detailed descriptions of a phenomenon based on the views of a small group of participants (Rahi, 2017:3). Thus, a case which consisted of small-scale farmers in Komatipoort was selected to provide their views of land degradation and its influence on livelihoods as their production depends on the quality of the land. A case study design focuses on answering what, how, and why questions (Crowe, Creswell, Robertson, Huby, Avery & Sheikh, 2011:4). The researcher specifically asked what and how questions that yielded rich and detailed descriptions of the influences that land degradation has on small-scale farmers' livelihoods. In particular, the study adopted an instrumental case study to understand the broader land degradation phenomenon and its influence on livelihoods (Crowe et al., 2011:2). Instrumental case study considers the influence of external factors on the case (Starman, 2013:32), therefore, in addition to participants' perception of land degradation in Komatipoort, the researcher explored – through observation – the social-economic and environmental context in which these farmers are living and how it influences their livelihoods.

The case study research design facilitated close collaborations between the researcher and participants, which enabled participants to share their views on land degradation and the influence it has on their livelihoods (Nieuwenhuis, 2019b:91). In addition, the researcher was able to conduct observations and obtain a holistic understanding of land degradation and its influence since the study was conducted within the participants' natural environment (Nieuwenhuis, 2019b:91). However, the shortcoming of a case study design is that the findings cannot be generalised because the sample is small and thus not representative of the whole population of small-scale farmers in Komatipoort (Merriam & Tisdell, 2016:96). The sample comprised twelve participants; hence their views cannot be generalised as representative of the whole population of small-scale farmers in South Africa.

3.5 Research methods

In this section, the research methods that were used in the study will be discussed concerning the study population and sampling, data collection, data analysis, data trustworthiness, and ethical considerations adhered to.

3.5.1 Study population and sampling

A study population is a group of individuals who have one or more areas of interest from which the study participants will be derived (Asiahmah, Mensah & Abayie, 2017:1607). The population for this study comprised small-scale farmers in Komatipoort. Sampling is concerned with identifying and selecting participants for the study (Creswell & Creswell, 2018:212). Non-probability sampling was used to recruit the study participants (Maree & Pietersen, 2019:214). In particular, purposeful sampling was employed to only include participants who would provide relevant information to the research questions and aid the researcher in understanding the phenomenon (Bradshaw, Atkison & Doody, 2017:3, Nieuwenhuis, 2019b:93). The researcher was granted access to participants by the Komati Small Scale Growers Association (see Appendix A). The organisation assigned the small-scale farmers' advisor to assist with planning the fieldwork and recruiting participants as he works closely with the small-scale farmers. The researcher made a request for a list and contact details of the small-scale farmers so that she could contact them and explain the research purpose telephonically. However, the small-scale farmer advisor was of the view that the potential participants would not be comfortable speaking directly with the researcher because they had never met with her. Hence, he suggested that he recruits participants. Therefore, a copy of the participant informed consent was sent via email to the advisor, and he was prepared to recruit only small-scale farmers who fit the following criteria:

- They must have been a farmer in Komatipoort for at least one year;
- aged above 18; and
- must be able to converse in English or Siswati.

To recruit participants, the farmer advisor indicated that he had a list of small-scale growers who are affiliated with the Komati Small Scale Growers Association. From that list, he contacted some of those who fit the criteria and he explained the research goal and purpose. He recruited twelve participants who expressed their interest in voluntarily participating in the study and confirmed their availability. In addition, the sample excluded vulnerable populations such as pregnant women, prisoners, and children as requested by the Komati Small Scale Grower's Association. This information is highlighted in the permission letter (see Appendix A). The farmer advisor was present during interviews; he accompanied the research team to the participants' residences or fields. In every interview, he would first introduce himself and the researcher to the participant and hand over the session to the researcher. The participants signed the informed consent (see Appendix B) form during the data collection period.

3.5.2 Data collection

The data was collected through face-to-face interviews using a semi-structured interview guide (Nieuwenhuis, 2019b:108). In a face-to-face interview, the participant is the main source

of information as the researcher is concerned with the former's views and opinions about a phenomenon (De la Croix, Barret & Stenfors, 2018:2). A semi-structured interview schedule consists of open lines of inquiry developed prior to the interviews and serves to guide the researcher during the interviews (Maree, 2019:147). The interview guide for this study consisted of three sections (see Appendix D). Section A focused on the biographical data of the participants, while Section B focused on the perceptions on land degradation and Section C on the influence of land degradation on farmers' livelihoods. The interviews took between thirty to sixty minutes depending on the setting where the interviews were conducted and the farmer's availability. Interviews which took place on the sugarcane farms and the ones where farmers were in a hurry to go elsewhere after the interviews were shorter compared to those that were done at the homesteads. The interviews were audio recorded with a cell phone after permission was granted by the participants, and the recordings were immediately backed up on the researcher's Onedrive and Huawei cloud accounts. As the interviews progressed, the researcher took some handwritten notes on the interview schedule, for example, noting down the information she needed to follow up on or where she needed clarification from the participant. Since there was a language barrier between the participants and the researcher, a Siswati interpreter was used during interviews to facilitate communication between the researcher and participants (Eklöf, Hupli & Kilpi, 2017:4). The interpreter was an Eswatini national, which was advantageous as SiSwati is the spoken language in Komatipoort. Furthermore, he has a background in environmental studies and understands land degradation as a phenomenon. Prior to the fieldwork, the interpreter also translated the participant informed consent form and the interview schedule (see Appendix D and E). Through the translation of the documents, the interpreter was able to familiarise himself with the goal and objectives of the study. Before commencing with the interviews, the interpreter signed an informed consent in which he agreed to adhere to confidentiality and interpret as close as possible participants' responses (see Appendix F). The use of an interpreter was challenging for the first interview because the interviews were less spontaneous, which made it difficult for the researcher to probe further. For instance, the interpreter would simultaneously translate while the participant was speaking, which interrupted the participant and made it difficult for the researcher to follow through the interview. However, in the post-interview meeting with the interpreter, it was agreed to have an interpretation only after the participant had finished responding to a question. In addition, before every interview, the interpreter clearly explained to the participant that the researcher's role was to ask the questions, while his was to interpret them. This adaption improved the spontaneous flow of the interviews. It made it easier for both the researcher and interpreter to probe and for the researcher to take an active role in the interviews, which led to her obtaining in-depth information on relevant questions. However, the downside of translating consecutively was that in instances where

the participant gave a long response, the interpreter would paraphrase the responses, and this made him miss some of the details shared. In later interviews, the researcher was familiar with some Siswati words, and this prompted her to ask him to interpret on identified gaps to cover all that had been said by the participants.

The advantages of using semi-structured interviews in this study included that they afforded the participants flexibility in responding to questions and encouraged digressions and elaboration (McIntosh & Morse, 2015:4; Haenssger, 2019:27). For instance, one participant recounted a story of how she acquired the land and her initial experiences in small-scale farming as part of small-scale grower projects that were initiated by the sugar milling company. Although there was a risk of digressing from the interview focus, the flexibility enabled the researcher to obtain detailed information on the contribution of small-scale farming to farmers' lives and how these have been diminished due to changes in the quality of the soil. In addition, the researcher could seek clarification and probe (Merriam & Grenier, 2019:6). Another advantage was that the researcher would have brief discussions with the interpreter on some interviews. For instance, post-interview discussions between the researcher and the interpreter about the interviews led to the realisation that in Section B Question three and four were repetitive as they elicited the same response from the participants, therefore, the researcher deleted Question four.

Data was also collected through structured observations of the sugarcane farms or the homesteads. An observation checklist focusing on the physical setting, for example, the state of the forms of land degradation and livelihood assets visible on the farm was used (Merriam & Tisdell, 2016:139). The researcher was a non-participating observer, whereby she observed but interacted with participants mainly through interviews which were the primary data source (Bryman, 2016:349). Observations enabled the researcher to understand land degradation as she could see and take photos of the different forms of the phenomenon on the farms. In addition, observations of the participants' farms or homesteads enabled the researcher to triangulate the interview findings. Some post observation notes were written which aided the data analysis and with the permission of the farmer, some pictures of the farms and farm assets were captured.

3.6 Data analysis

Once data has been collected, it must be analysed to elicit the patterns and themes that emerged during interviews. Therefore, data was thematically analysed to uncover patterns in the interviews and observational data (Clarke & Braun, 2017:297). Thematic analysis is appropriate for qualitative studies because it is highly flexible (Braun & Clarke, 2019:10; Nowell, Norris, White & Moules, 2017:2). In addition, thematic analysis is more descriptive and

gives voice to participants as the researcher incorporates participants' verbatim in these discussions.

It is important to note that data analysis was done simultaneously with data collection, to allow the researcher to refine the interview schedule and improve subsequent interviews to gain an in-depth understanding of small-scale farmers' perceptions on land degradation and its influence on their livelihoods (Merriam & Grenier, 2019:15). In addition, the analysis followed a cyclic process (Braun & Clarke, 2021:331), whereby the researcher continually referred to previous stages to ensure that there were no deviations from the data analysis process.

Although thematic analysis involves six steps, it is important to note that data analysis is a cyclical process and can be simultaneous with data collection (Creswell & Creswell, 2018:267). The data analysis process followed six phases discussed below:

Stage 1: Familiarisation

The first stage of thematic analysis is becoming acquainted with the research data (Bryman, 2016:457). It is a stage that involves immersion in the data through reading repeatedly (Braun & Clarke, 2022:35). The first instance of familiarising with the data was through transcription of the audio-recorded interviews (Terry, Hayfield, Clarke & Braun, 2017:23). Although it was a time-consuming task, the researcher familiarised herself by actively listening to the interviews and transcribing the voices of the participants as presented by the interpreter. While transcribing, the researcher could identify variations in participants' accounts. In addition, the researcher wrote notes on observations made after some farm visits and these were written in a readable format on the observation checklist. Thereafter, the researcher organised and backed up the transcripts together with the field notes, photos, and audio recordings on Onedrive and Huawei Cloud to ensure that no information was lost. To become more familiar with the data set, the researcher read the transcripts and the field notes repeatedly to identify patterns and to understand the entire data set (Nowell, Norris, White & Moules, 2017:5). While reading the transcripts, the researcher noted down similarities and differences in the interview data and observational notes.

Stage 2: Generating initial codes

After familiarising herself with the raw data, the researcher had to generate codes. Coding is a process of attaching labels to information that is relevant to the research questions (Braun & Clarke, 2022:52). Therefore, the researcher engaged with data in a more meaningful manner by specifically focusing on the transcript excerpts that provide answers on the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods (Nowell et al., 2017:6). Labels were attached to information that is relevant to the research objectives. The researcher copied each participant's response to the research

questions from the transcript and the field notes that represent groups of data and pasted it on an Excel spreadsheet. Thereafter, one word or phrase that captured the essence of each excerpt, for example, “soil salinity” was written on the right column. After coding appropriately, the researcher searched for themes. The coding process was continually evolving, therefore, codes continued to be expanded on.

Stage 3: Generating initial themes

A theme captures the data that has a shared idea (Braun & Clarke, 2022:2). It is an active process whereby the researcher explores codes that capture the same meaning across the dataset. The researcher actively generated themes by sorting and combining similar codes to identify the themes that are relevant to understanding the influence of land degradation on farmer’s livelihoods (Nowell et al., 2017:8). The researcher colour-coded similar codes for easier identification (Cartwright, 2020:9). For example, codes such as salinity, water puddles were colour coded with red and the theme was named “forms of land degradation in Komatipoort.” The themes were further substantiated by the physical observations made during data collection. A thematic map, which consisted of overarching themes and sub-themes, was developed to help the researcher in identifying the relationship between the themes and the data (Labra et al., 2019:10).

Stage 4: Reviewing themes

In this phase, the themes were refined by reviewing them against the codes and the entire data set (Nowell et al., 2017:10). In addition, the boundaries of each theme were clearly defined to ensure that they captured relevant data (Clarke & Braun, 2017:297). Therefore, the researcher assessed the themes generated against the data from observations and interviews whether they enrich the understanding of small-scale farmers’ perceptions on land degradation and its influence on livelihoods. Themes that lack supporting evidence were broken down while themes that overlap were merged (Cartwright, 2020:9).

Stage 5: Defining and naming themes

The researcher wrote a detailed analysis of each theme and sub-theme about the raw data set and the research questions (Nowell et al., 2017:10). A description of each theme and sub-theme was given to ensure that there was no overlap of themes (Nowell et al., 2017:10). In addition, each theme was examined in relation to the other themes to determine how they all link with one another (Javadi & Zarea, 2016:38). Thereafter, a concise name was given for each theme.

Stage 6: Producing the report

In this final phase, the researcher presents the data logically and coherently (Nowell et al., 2017:11) as reflected in this research report. The data has to be presented from the

participants' views. The discussion of the findings was supported by direct quotations from participants and compared with existing literature for a plausible account (Austin & Sutton, 2015:229; Makofane & Shirindi, 2018:48).

3.7 Data trustworthiness

Since qualitative studies are subjective and based on participants' perspectives, the findings must reflect these participants' views and not be influenced by researcher bias (Polit & Beck, 2017). The trustworthiness of qualitative research studies is determined through credibility, transferability, confirmability, and dependability (Nowell et al., 2017:3). The trustworthiness criteria are to be ensured throughout the research process to ensure that findings are of good quality such that they are beneficial to academia and practice (Polit & Beck, 2017:240). A discussion of the effort to enhance the data trustworthiness of the present study is detailed below.

3.7.1 Credibility

Credibility determines whether the findings are congruent with reality (Nieuwenhuis, 2019b:144). In addition, credibility is concerned with ensuring that the research findings are generated from the participants' data and are interpreted accurately (Anney, 2015:215). To enhance credibility, the study must follow appropriate methodological procedures and findings be reported truthfully (Polit & Beck, 2017:786). To enhance the credibility of this study, data collection was done in a systematic manner and according to a case study design and consisted of purposefully sampled participants. The interview schedule and the participant informed consent were translated into Siswati and then back translated to English (see Appendix: G and H) as a measure to ensure quality translations. Furthermore, three transcripts were sent to the interpreter so that he could confirm if the researcher had recorded all the translations correctly. In addition, the researcher employed debriefing by submitting theme discussions to her supervisor to check if the data has been correctly presented and analysed as well as to ensure that conclusions are based on the data to eliminate researcher bias before moving on to the next theme. Furthermore, the findings of interviews were triangulated with the observations made on the farm (Anney, 2015:278). The in-depth discussion of land degradation in Komatipoort and its influence on livelihoods thereof were further supported by pictures and notes from observations. In addition, the findings are reported and interpreted from the SLF to understand the different strategies employed by poor people to protect their livelihoods in the face of land degradation and other shocks and trends to have better outcomes (Polit & Beck, 2017:787).

3.7.2 Transferability

Although qualitative findings are not generalisable, they can be transferred to other contexts. Transferability has to do with whether the research findings can be replicated in other contexts with other participants (Merriam & Grenier, 2019:29). To achieve transferability, participants were purposefully sampled to include only the small-scale farmers in Komatipoort. The organisation already works with small-scale farmers and the researcher was further linked with a person who works closely with small-scale farmers. As such, he recruited willing participants who met the criteria and provided their perceptions of land degradation and its influence on their livelihoods. The small-scale farmer input enabled the researcher to provide thick descriptions of their perceptions of land degradation in Komatipoort (see Chapter four). In addition, detailed descriptions of the research process and procedures in this chapter seek to ensure that this study is transferable (Yin, 2016:93). Therefore, through thick descriptions and purposive sampling, the reader can decide if the present study can be transferred to another case of small-scale farmers who are in a context similar to Komatipoort.

3.7.3 Confirmability

Confirmability refers to the extent to which the research findings can be confirmed by others (Conelly, 2016:435). Qualitative studies are subjective; thus, the data must represent participants' responses and be free from researcher bias (Cope, 2014:18). To ensure confirmability, the researcher employed reflexivity (Bryman, 2016:303), where she documented her reflections on the research process and fieldwork. In addition, in the reporting of findings, quotations from the data were provided to illustrate a theme, thereafter it was interpreted and verified by relevant literature and the theoretical framework of the study. Furthermore, the researcher had an opportunity to communicate the key findings to the participants through member checking. For instance, P6 agreed with the findings and further reiterated that soil salinity was the main land degradation problem on her farm and she needed assistance with that. In addition, P7 clarified that the high fertiliser prices were a result of the Russia-Ukraine War, but those prices were now lower.

3.7.4 Dependability

Dependability is concerned with ensuring the consistency of the research process to ensure the repeatability of the research in another context (Johnson & Rasulova, 2016:22). Therefore, if the present study is repeated with small-scale farmers in a context similar to Komatipoort, it has to yield similar findings (Polit & Beck, 2017:787). Therefore, detailed descriptions of the study context, a systematic literature review of land degradation and small-scale farming, research methodology, data analytical steps, research findings and conclusions are published so that other scholars can see and understand how the research was carried out and how the conclusions were drawn (Carcary, 2020:168). In addition, dependability is achieved when

other objective people concur with the research decisions at every stage of the research process (Cope, 2014:89). Hence the researcher employed peer examination by discussing the research process and the findings with a doctoral student doing qualitative research to evaluate if the present study was according to the qualitative methodology and the findings were sufficiently substantiated by literature and in the framework of sustainable livelihoods.

3.8 Pilot study

Pilot studies are small-scale studies done prior to the main study to determine whether the methodology chosen is appropriate and effective in producing the relevant answers for the research questions (Makofane & Shirindi, 2018:41). They are beneficial for the researcher in that the researcher can modify the research procedures and instruments to ensure that they are clear and unambiguous (Muresherwa & Jita, 2022:224). In addition, the researcher practices interviewing techniques and modifies them if needed (Majid, Othman, Fatimah, Lim & Yusof, 2017:1078). Furthermore, the researcher can evaluate if the study sample is representative and familiarise themselves with the study site. Therefore, conducting pilot studies helps in preventing challenges during primary research.

In this study, the first two interviews conducted during the primary research served as pilots. The interviews indicated that the methodology chosen for the study was appropriate. The interview schedule had appropriate questions that yielded in-depth information. However, the researcher realised that she would need to probe further. Nevertheless, qualitative studies are flexible and allow for the modification of methodology, if needed, as the research progresses (Ismail, Kinchin & Edwards, 2018:3). During interviews, the researcher made side notes on the schedule to document how participants answered questions and wrote follow-up questions. For instance, when participants remarked having many expenses is a challenge faced in small-scale farming, the probing question was: "Would you please give me a breakdown of all the costs you incur in growing sugarcane?" In addition, after the eighth interview, the researcher realised that there were some farmers with more than twenty years of experience in farming on the same piece of land and thought that it would be suitable to explore the changes they had noticed on their land from the time they started farming until the time of the interviews. Therefore, the researcher incorporated the question: "How has the land you farm on changed since the time you started farming?" The participants identified the changes in the soil from the time they started farming the land, allowing the researcher to have an in-depth understanding of the land degradation on their specific farms. Thus, the pilot findings are included in the main study as there was a continuous refinement of the methodology in the study.

3.9 Ethical considerations

Ethics are norms that are designed to guide the researcher's conduct during a research process and are to be maintained throughout the research process (Gronme, 2020). It is important to adhere to ethical principles to ensure the protection of participants throughout the study (Bradshaw et al., 2017:4). The researcher was granted permission to conduct research by the University of Pretoria's Faculty of Humanities research committee: HUM006/0722 (see Appendix I). The ethical principles that were adhered to in this study will be discussed below.

3.9.1 Written informed consent and voluntary participation

In research studies involving human beings, participants must be provided with adequate information about the study and the procedures, risks, and benefits of the study, so that they can decide whether to participate (Polit & Beck, 2017:217). In addition, informed consent also involves informing participants about confidentiality and how their data will be handled and communicated to them and the public (Polit & Beck, 2017:218). This information is provided on the informed consent form and is explained such that the participant understands the implication of their involvement in the study. Once the participant has understood, they can provide their signature to indicate they are voluntarily participating in the study.

All participants in this study signed the informed consent form. Upon meeting the participants, the researcher gave each participant a copy of the informed consent form written in Siswati, so they would follow through as it was being explained. The researcher explained to the participants the informed consent form, the research purpose, and the study procedure. Participants were also informed that there were no risks and no benefits to participating in the study. Furthermore, participants were told that their participation was voluntary and that they had a right to withdraw from the study at any moment without any fear of being prejudiced (Bradshaw et al., 2017:4; Maree, 2019:48). In addition, participants were informed that they were not obliged to respond to questions that made them feel uncomfortable and they could terminate their participation at any stage without any consequences (Carpenter, 2018:47). This was explained to them in a language at their level, with the help of an interpreter, so that they could make informed decisions to participate in the study (Maree, 2019:48).

3.9.2 Confidentiality

Confidentiality has to do with protecting the participant's identity throughout the research process (Creswell & Creswell, 2018:153). This ethical principle encourages participation as participants are assured that their identifying information will not be revealed (Coffelt, 2017:228).

Since in qualitative studies, the researcher can identify particular participant responses, he or she has to ensure that the identifying information and responses are not revealed publicly

(Maree, 2019:48). The researcher was aware that the small-scale farmers were affiliated with the Komati Small Scale Growers Association, therefore, participants were assured that their data would not be made available to any unauthorised organisation or person. In addition, participants were also informed that their inputs were to be used for research purposes and publications as such no unauthorised persons would have access to it. Furthermore, during data transcription, pseudonyms were used for each participant and the presentation of findings (see Chapter four), such that there are no links between participants' responses and the identifying information (Shaw & Holland, 2014:116). In addition, pseudonyms were given in the case where the participant referred to other people by name. The interpreter also signed a consent form, which among things, confirmed that he would maintain the confidentiality of the interviews. The raw data and informed consent forms will be securely stored for ten years in the Department of Social Work and Criminology to ensure confidentiality, thereafter they will be destroyed.

3.9.3 Avoidance of harm

Research should avoid the infliction of harm on participants (Leavy, 2017:32). Harm is multifaceted as it can either be emotional, social, financial, or physical (Polit & Beck, 2017:211). Therefore, it is the researcher's responsibility to minimise the risk of inflicting harm on participants. The present study had no intended physical harm to the participants. However, the researcher anticipated emotional discomfort as they shared their views on negative influences of land degradation on their livelihoods such as income loss. One participant became emotional as he recalled the fruitless efforts of managing land degradation at his farm. After the interview, the researcher debriefed the participant about the impact of the research on him. He indicated that he would not need counselling; he was just hurt that all his efforts had been fruitless and would appreciate the support from other stakeholders. Furthermore, the data collection adhered to COVID-19 protocols to ensure the safety of the researcher and the participants as the study was conducted at the end of the fifth wave in South Africa. Health protocols included maintaining personal distance and proper ventilation.

3.9.4 No deception

This principle is concerned with not withholding information from participants (Doyle & Buckley, 2017:100). The researcher's identifying information was written on the informed consent form that participants read. Moreover, the participants were informed of the nature and aim of the study, which is to explore the perceptions of small-scale farmers on land degradation and how it influences their livelihood as well as research procedures that will be followed to obtain the data. Furthermore, the researcher clarified all aspects where there were misunderstandings about the research. For example, one participant wanted to know how his input would benefit the researcher. The researcher clarified that the study was part of a

broader project which assesses land degradation in South Africa and their input would be included in reports and inform policy.

3.9.5 Publication of findings

Research findings must be published to raise readers' awareness of the study topic and build on existing knowledge (Singhal & Kalra, 2021:66). Findings are shared at conferences or journals. The study findings are compiled in the format of this research report that will be published in the University of Pretoria's Repository. In addition, a manuscript is to be prepared for publication in a scientific journal, and conference papers may be published from this study. Feedback on the research study is to be made available to the gatekeeper, who agreed to share it with participants in a language they understand.

3.9.6 Competence of the researcher

Researchers need to have appropriate knowledge, skills, and competence to conduct qualitative studies (Mooney-Somers, 2017:129). The researcher's competence has an influence of the research process and the quality of the data they obtain. Therefore, this study was implemented with the knowledge and skills the researcher has acquired from her master's research methodology module. In addition, the researcher was guided by her supervisors, who are experienced in qualitative research, until the completion of the study (Mooney-Somers & Oslon, 2017:132). The researcher also upheld the social work principles such as respect for human dignity, worth and respect for persons, respect for participants' autonomy, and concern for the well-being of others (South African Council for Social Service Professions, 2005:6).

3.9.7 Permission to conduct research

Before conducting research, the researcher must obtain ethical clearance from institutional review boards. The purpose of these boards is to review research proposals and consent forms to determine whether the proposed study is ethically acceptable (Maxwell, 2019:59). Since qualitative research involves human participants, research ethics committees aim to protect the rights of research participants (Creswell & Creswell, 2018:261). The board reviews documents and the ethics approval is granted if the proposed study is appropriate or the board can request to have the study modified.

Before the study, the researcher drafted a research proposal and filed an ethics application to the ethics review committee in the Faculty of Humanities. Other documents that were included in the application were the data collection instruments, participant informed consent, translator informed consent, letter from the psychologist and the letter from the gatekeeper. These documents were uploaded onto the researcher's University of Pretoria portal and were reviewed by the committee, which approved the research to proceed (see Appendix I).

Since the study was focused on a population of small-scale farmers, it was important to obtain access to them. Therefore, the researcher had to obtain permission from the gatekeeper to have access to the participants. A permission letter stating the research purpose, dates for the fieldwork, inclusion criteria potential impact of the research and the outcomes of the study was sent to the Chairman of the Komati Small Scale Growers Association, who upon review, granted permission and assigned a small-scale farmer advisor, to assist with linking the researcher to the farmers. The organisation granted permission (see Appendix A). The informed consent form and the interview schedule were also sent via email to the farmer advisor so that he could have a better understanding of the research and recruiting criteria beforehand.

3.10 Limitations of the study

As previously mentioned, the farmer advisor was present during some interviews. His presence may have led to participants giving biased information because they might have felt compelled to give only positive information. In some instances, the participants wanted the farmer advisor to help them answer some of the questions. However, the participants were assured that their input was valuable in the present research and the farmer advisor encouraged the participants to be honest in their responses and not let his presence influence their responses.

In addition, since an interpreter was used during interviews, the meanings of some participants' responses may have been lost in translation. To avert this limitation, the researcher reminded the interpreter to translate as closely as possible what the participant had said during interviews. In addition, in instances where participants gave long responses, the researcher asked the participant to pause to allow for interpretation so that no information was lost.

The other limitation is that the study consisted of a small sample size, which means that the findings of this study cannot be generalised to the wider population of small-scale farmers in South Africa (Creswell & Poth, 2018:157). Including other key informants, such as agricultural advisors in the study to understand their contributions in strengthening small-scale farmer livelihoods, would have been beneficial.

3.11 Researcher's reflection¹

Reflexivity involves self-evaluation of the researcher's position during the research process (Lees, Walters & Godbold, 2022:3). In addition, reflection is concerned with analysing the research process and drawing out lessons for improving future research (McFayden & Rankin,

¹ Because the reflection is based on the researcher's experience, it will be written in the first person.

2016:83). It allows the researcher to have a critical stance on her/his own work and some of the decisions made during research. Therefore, in this section, I will reflect on my research journey and learning experiences as a researcher, from prior to starting fieldwork until completion of the research report. This reflexive report on the study of the perceptions of small-scale farmers on land degradation in Komatipoort and its influence on livelihoods, is structured as follows: first, I will reflect on gaining access and the challenges I encountered in this phase. Next, I will reflect on my experiences and position as a researcher during data collection. I will then describe the data transcription and analysis process. Lastly, I will give an account of lessons from research report writing experience.

3.11.1 Gaining access

Gatekeepers are essential to gaining access to a research site and the participants (McFayden Rankin, 2016:85), hence their involvement is crucial to the progress and successful completion of a study. During negotiating access, gatekeepers have the upper hand and control the decision to grant or refuse access (Singh & Wassenaar, 2016). Negotiating access was a tiresome and endless cycle of making phone calls and being referred to various people. The initial plan was to obtain contacts of small-scale farmers' associations in Komatipoort as this is where farmers are organised in groups, and it is expected that this makes accessing them easily. So, I started by contacting the Department of Agriculture; I attenuated after my calls were unanswered. Eventually, an employee at the Mpumalanga Department of Agriculture responded to the call and he informed me that there was no land degradation in Komatipoort. He advised that I focus my research on sand mining, which he perceived to be the main problem faced by small-scale farmers in Komatipoort. I explained to him that the topic would most likely elicit responses linked to sand mining as literature provided that sand mining causes land degradation. This made me realise that gatekeepers can discourage research on land degradation. I learnt that I had to be assertive during the negotiation process and be prepared to convince the gatekeepers that the research is worth pursuing.

Fortunately, my co-supervisor shared with me the contact details of the manager of the South Africa Cane Growers Association, who was willing to assist and assigned a small-scale farmer advisor to work with us. I felt relieved and the wheels were now starting to roll. Gatekeepers communicate important information about the research to the participants (Dahlke & Stahlke, 2020:37). This was my experience after connecting with this key informant. I shared with the farmer advisor the research proposal which provided information about the research purpose and in addition, the criteria for participating in the study. Besides granting access to participants, gatekeepers can help in recruiting participants. The farmer advisor advised that recruiting telephonically would not be feasible considering that I had not met the potential participants in person; instead, he suggested that he recruits the participants himself since the

small-scale farmers know him. However, it is important to acknowledge the potential influence of gatekeepers in the selection and recruitment of participants. Gatekeepers may coerce participants (Sighn & Wassener, 2016), or the participant's attitude towards the gatekeeper or the nature of their relationship may influence participants' decision to contribute to the study (Borges, Guerreiro & Coride, 2023). So, I emphasised to him the importance of adhering to recruitment procedures and ethics. During the data collection, the potential participants also provided their written consent as assurance that they were participating voluntarily.

Despite all the challenges I encountered during the gatekeeping process, I learnt to be patient, how to use negotiation skills, be assertive; I also mastered people engagement skills, which I will continue to use in my future work.

3.11.2 Data collection

Data collection involves communication between the researcher and participants and is dependent on rapport and trust for it to generate rich data and establish respect between the participants and researcher (Guillemen & Heggen, 2009:292). I was so anxious when I started with field work, as I was meeting the potential participants for the first time. In addition, I perceived that building rapport with the participants would be challenging considering the language barrier as I am Zimbabwean and Shona-speaking. I was also wary about how they would perceive the motives of the research and whether it would make them reluctant to share with me their perception. My anxiety emanated from the widespread discrimination foreign nationals are subjected to in South Africa. My fears were confirmed when the second participant on the first day of interviews asked the interpreter, "Why can't she speak our language?" The interpreter translated this question for me. It was evident at this point that I was the "other" person in this research context. To address my fears and anxieties, I took effort to build rapport with the participants by introducing myself as a masters student at the University of Pretoria who was Shona speaking and that an interpreter was going to facilitate communication during the interviews. In addition, I explained the consent form in detail and invited participants to ask any questions about myself as the researcher and the research project, which helped in establishing credibility and creating a relaxing environment.

My co-supervisor, interpreter, and farmer advisor accompanied me to the research site. The interpreter was from eSwatini and the participants did not know him but he spoke Siswati, so it was easier for him to get acquainted with the participants. However, it is important to acknowledge that having other people present during data collection can influence participants' responses. Therefore, it was important to articulate the roles of each person during the data collection. The farmer advisor accompanied me, the interpreter and the co-supervisor to farmers' households, where he introduced us to the potential participants and

handed over the interviewing session to the researcher and then excused himself. The participants knew him, and I think this helped to build trust. However, he was present in some interviews that were conducted outside the houses, so he could hear as the interviews unfolded. His presence had influence because during the interview, a participant would ask him to confirm if what she was saying was true and if he wanted to add to what she had mentioned. I had to constantly remind the participant that her input was valuable to the study and sufficient. Upon reflection, I should have requested the farmer advisor to excuse himself from where the interview was being conducted. From this experience, I learnt that as a researcher, I must be highly aware of my surroundings and identify factors that can influence participants and find ways of eliminating these factors.

Dr Aucamp, my co-supervisor, was the driver during the data collection. She played an important role in making sure I met with participants where it was most convenient for them, at their homesteads or fields. As my study was part of a larger research project by SALDi, which she was part of, she sat in some of the interviews to take notes of participants' responses. During these interviews, she explained to the participants that she was my field supervisor and clarified that she was not assessing the interviews; rather, she was sitting in to obtain the information she would use in writing reports. She sought clarity on some things participants mentioned, which aided in obtaining more information on issues I may have overlooked.

The interpreter facilitated communication with all the participants and his presence in all the interviews was reassuring. Although the participants did not know him, he spoke Siswati fluently, which made communication and gaining participants' trust easier. He would converse with participants casually before the interview sessions as we were settling down. He also articulated to the participants that his role was to interpret only, while I was the researcher.

While researchers have power over the interview process, participants have control over what they share (Anyan, 2013:4). To equalise power, I treated participants as experts of their own experiences. Therefore, I allowed them to provide as much information as possible but considered time and stuck to the research goal. I used non-verbal cues such as nodding, using fillers such as "uh huh" to encourage participants to share details. I felt I had to put in a little effort to build trust with the participants by showing respect to them as knowledgeable individuals and showing respect for their culture. I was glad when I began to understand Siswati and started to catch on the language. I would greet them in Siswati by saying, "Sawubona" or thank them by saying "Ngiyabonga kakhulu" at the end of the interviews. I could see the faces beam with smiles, with one person commenting that she was glad to see me trying to speak their language. This reaction from the participant made me feel I was part

of them. This experience challenged me to want to learn at least one of the South African twelve languages.

After conducting six interviews on the first day of data collection, I was astonished by the amount of data I had collected. I learnt that despite having a language barrier, skills such as listening, communication, and being sensitive to language and culture are valuable attributes in collecting rich data. I became aware that it is important to possess research skills to be able to undertake a research study. Since I had undergone social work undergraduate training and had done a postgraduate research module, I possessed these skills, which made it possible for me to collect data.

3.11.3 Data transcription and analysis

I audio-recorded the interviews and personally transcribed them, which was time-consuming but enabled me to have good insight into the data. I did data transcription with the help of the interpreter; I relied on him, and he availed himself to review it and check if some of the words on the transcripts were captured correctly.

In qualitative research, the participant is an insider and expert in their own story (Moser & Korstjens, 2017:16). Therefore, I kept it in mind that data analysis had to represent participants' views. Data was analysed thematically. I read the transcripts repeatedly to fully understand the participants' responses. While doing so, I was so excited and kept thinking of the themes I would have at the end to present in my Chapter four (empirical findings). While reading, I wrote down some similar narratives in the participants' data. For example, words such as water logging (*kugcwala kwemanti*) and salinity (*luswayi*) were common in the interviews. I found note-taking extremely helpful as it ensured that I kept track of participants' responses and could compare them. This was an interesting exercise which made me realise that despite participants' differences in age, gender, and experience in small-scale farming, they each had unique experiences with land degradation and how it was influencing their livelihood. I then marked elements of the data that answered the research questions using different colour pens to highlight themes. For example, red was used to indicate the forms of land degradation while the green colour indicated the strategies that small-scale farmers used to manage their land. I re-arranged the quotations so that they reinforced the themes. At this stage, the data was becoming meaningful in relation to the research question. I started to appreciate the data collection I did because I could see that the responses answered the research question.

Ibrahim (2012:44) recommends having an outsider to evaluate whether the data excerpts support the themes. Prof Lombard, my co-supervisor, offered tremendous guidance in assessing the themes and ensuring that they were fully supported by data from the

participants. My first draft of the findings lacked clarity as most of the themes were overlapping. The feedback I received required me to cut down lengthy quotes and rewrite some themes so that they represented the data. After several rounds of revisions, my themes and sub-themes had been refined. This exercise was beneficial in that it introduced new ways of thinking about my data; it challenged me to conduct an in-depth analysis of the data by comparing and contrasting participants' views on the land degradation phenomenon.

3.11.4 Writing up the research report

Since I had recently completed a Bachelor of Social Work degree with honours, I knew how to structure a research report. I had an idea of what to write in every chapter; however, I was not prepared for the lengthy and in-depth analysis of writing at the postgraduate level. As such, I compared my academic writing experience to climbing the stairs. It was progressive, going one step at a time. I wrote one chapter at a time, taking careful consideration of the feedback to improve my writing. Writing the chapters helped me to sharpen my critical and analytical thinking. For example, Chapter two (the literature review), involved reviewing articles and restructuring certain sections of the chapter until they were well-developed.

In addition, writing the research report chapters was an emotional rollercoaster for me. For example, I was anxious when I was writing my first drafts because I felt I needed to be perfect. This made me less productive as I would bury myself in reading only and waste time overthinking what to write. Nevertheless, I had to challenge myself to write the respective chapters based on my understanding of what was expected for that particular chapter. In the feedback, my supervisor used the track changes function to insert comments and suggestions of what I needed to do. The feedback for the first draft sometimes frustrated me, but it guided me to focus on many things such as writing concisely, adding more information to certain sections, and correct in-text referencing. Academic writing requires a writer to manage their emotions; mismanagement of emotions may lead to unproductivity (Janke, Wilby & Zavod, 2020:106). To fully absorb the feedback, I would give myself a day to read it, noting down what I was required to do. Thereafter, I would address every comment, starting with easy ones such as sentence construction and grammar. Lastly, I would focus on comments that required in-depth reading of articles to substantiate sub-headings. This strategy made incorporating feedback into my writing less overwhelming. But looking back, I realise I should have scheduled in-person or online meetings with my supervisor to discuss the feedback before revising the work. When I received feedback for my second draft, I had improved. Whenever I felt discouraged to write; I revisited previous chapter drafts to see the improvements I had made, which allowed me to see the value of feedback in improving my writing skills. It further motivated me to improve my writing. While writing the research report chapters, I learnt to be

patient with myself, take feedback gracefully, and allow myself to improve in critical thinking and scholarly writing.

3.11.5 Conclusion

Overall, I received outstanding support, guidance, and encouragement from my supervisors during this research. Since I was a novice researcher and scholar, my research experience was filled with lessons and areas of improvement. As I continue to develop my research career, I will employ reflexivity more often and encourage other postgraduate students to adopt this skill as well. I found it to be a therapeutic exercise, which enabled me to process some intense and upsetting moments that transpired during the research experience, but more importantly, to draw lessons from these experiences. Lastly, reflexive writing is an important skill to take into my workplace, to keep track of my own professional and personal development.

3.12 Summary

Chapter three described the research methodology of this study. The present study followed the qualitative research approach to understand land degradation in Komatipoort and its influence, from small-scale farmers' perspectives. Twelve purposefully sampled small-scale farmers were recruited as participants in the study. To collect data, the researcher used face-to-face interviews based on an interview schedule to obtain diverse views on land degradation and its influence on livelihoods. Personal observations were used to supplement the interview findings. Several strategies to ensure data trustworthiness were explained. A description of the pilot study, whose purpose was to refine the data collection instrument, was given. Lastly, a detailed explanation of the ethical standards adhered to throughout the research to protect the rights of the participants was given.

CHAPTER 4: EMPIRICAL STUDY AND FINDINGS

4.1 Introduction

The empirical study and its findings will be discussed in this chapter. The research question that guided the study was as follows:

What are the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods?

The underpinning sub-questions that informed the research questions were the following:

- What are the contributing factors to land degradation in Komatipoort?
- How is land degradation affecting small-scale farmers' livelihoods?
- What land management strategies do small-scale farmers use to mitigate land degradation in Komatipoort?
- What strategies do small-scale farmers suggest to secure a sustainable livelihood?

The chapter starts with the biographical information of the participants, followed by the main themes and sub-themes that were generated during data analysis. The themes and sub-themes are supported by participants' verbatim and are discussed in relation to literature and the sustainable livelihood framework. The chapter ends with a summary.

4.2 Biographical information of participants

All participants in this study were small-scale farmers, practising sugarcane farming. Pseudo names were used to protect participants' identifying particulars. Participants are identified as P1, P2 to P12. The biographical information that will be discussed in this section relates to the participant's sex, marital status, age group, land ownership, size of the land, years of experience as a small-scale farmer, type of farming, farming assets, household size and people contributing to household income. It is important to discuss the biographical information of participants as it influences farmers' perceptions of land degradation and the influence it has on livelihoods. Table 4.1 presents a summary of participants' biographical information.

Table 4.1 Biographical information of participants

Participant	Sex	Marital status	Age	Land ownership	Size of land in ha ²	Type of farming	House-hold size	People contributing to household income	Years of experience
P1	Male	Married	69	Own	7.8	Crop farming	11	4	20
P2	Male	Married	43–47 ³	Own	10	Crop farming	4	2	30
P3	Female	Single	58+	Own	4.5	Crop farming	4	1	28
P4	Male	Single	24	Owned by grandfather	6.5	Crop farming	6	6	2
P5	Female	Married	56	Own	7.2	Crop farming	7	2	20
P6	Female	Widowed	72	Own	6.8	Crop farming	11	1	27
P7	Female	Single	28	Own	8.6	Crop farming	5	1	3
P8	Female	Married	41	Own	6.7	Crop farming	5	2	12
P9	Female	Single	57	Own	10	Crop farming	4	1	28
P10	Female	Single	52	Own	4.1	Crop farming	5	2	24
P11	Male	Lives with partner	46	Own	4.8	Mixed farming	8	3	23
P12	Female	Married	45	Own	5	Crop farming	2	2	7

² hectare

³ Participant responded in age category.

Table 4.1 shows that most of the participants (eight of twelve) in this study were female. Five were married, five were single, one was widowed, and one lives with a partner. The age of the participants ranged between twenty-four to seventy-two years, half of them were over the age of fifty-two. This study conforms with the findings of a study by Mdiya et al. (2019:6), which shows that most of the small-scale farmers in eastern Free State were elderly, with only a small percentage being between twenty to thirty years. These findings indicate the lack of youth involvement in small-scale farming in South Africa, a similar finding made by a study by Chipfupa and Tagwi (2021:8), which indicated that the youth lack interest in engaging in agriculture due to the challenges faced in this sector. The present study findings reveal that land size ranges from 4.1ha (P10) to 10ha (P2 and P9), which exceeds the national average hectare of small-scale scale farmers in South Africa who own land between one and two hectares (Pienaar, 2015). However, the study's findings corroborate with a study by Zantsi et al. (2019:85), who found small-scale farmers in the Eastern Cape Province to have land between 2.7 hectares to thirty hectares under production.

All participants owned the land on which they grew sugarcane, except P4 whose grandfather owns it. Some participants mentioned that the land was leased to them by the traditional authorities for a period of ninety-nine years and had documents to prove ownership. Except farmer P11, who was into mixed farming, the other farmers were practising crop farming. The small-scale farmer households ranged from two people (P12) to eleven people (P6), with the average number of people per household being six, which is consistent with the study by Sambo, Oguttu and Dweba (2022:6) in which most of the small-scale farmer households in Nkomazi Municipality had six and more people. Large household sizes have been found to contribute to household income and labour (Pienaar, 2015). The findings of the present study further show that there are few people who contribute to small-scale farmer household income. Most households (five out of twelve) had two people contributing to household income, four out of twelve households had one person contributing, and one household had six people contributing to household income. Household members are a source of additional income for small-scale farming households through increased diversified livelihood strategies (Oduniyi & Tekana, 2019:9). However, the findings suggest that small-scale farmer households may be vulnerable as fewer members contribute to household income. In addition, the present study's findings show that years of farming experience ranged from two years (P4) and thirty years (P2) with an average of 18.6 years. As Osondu and Ijioma (2014) state, small-scale farmers with more experience have mastered farming, which enables them to deal with some challenges in small-scale farming.

4.3 Key themes and sub-themes

The themes and sub-themes that emerged from the data will be discussed next. Findings will be supported by direct quotations of participants and where relevant, verified with literature.

Table 4.2 presents the themes and sub-themes that emerged in this study.

Table 4.2 Key themes and sub-themes

Themes	Sub-themes
1. Livelihood strategies	1.1 Agricultural livelihood strategies 1.2 Non-agricultural livelihood strategies
2. Nature of land degradation in Komatipoort	2.1 Forms of land degradation 2.2 Causes of land degradation
3. Land degradation factors that influence land productivity and livelihoods of small-scale farmers	3.1 Soil degradation 3.2 Water quality depletion
4. Land management strategies to control land degradation	4.1 Soil management 4.2 Slope management
5. Challenges to sustaining livelihoods	5.1 High input and operation costs 5.2 Theft and cattle invasion 5.3 Climate change
6. Suggested strategies to secure sustainable livelihoods	6.1 Financial assistance 6.4 Access to more extension officers and soil experts 6.3 Access to more agricultural land

Theme 1: Livelihood strategies

The livelihood activities of small-scale farmers consist of agricultural activities and non-agricultural strategies. The agricultural strategies include sugarcane farming, vegetable farming, and selling the produce. The participants also engage in non-agricultural activities, namely formal employment, receiving social grants, and owning side businesses. They also acquire short- and long-term loans to sustain their farming activities and livelihood. The findings will be discussed next as two sub-themes.

Sub-theme 1.1: Agricultural livelihood activities

All the participants identified small-scale sugarcane farming as the main livelihood strategy. Small-scale farming is organised in projects where individual farmers own pieces of land and irrigate their crops from the Komati River. The participants have a contract with TSB Sugar Mill Komatipoort to supply sugarcane to the mill after every harvest. In addition, other participants grow various vegetables such as tomatoes, cabbage, and spinach and sell the produce.

One participant explained sugarcane contract farming as follows:

P1 *...there is a contract that they (the small-scale farmers) need to sign when they started planting on their fields and the contract is such that the RCL said I will crush the sugarcane for you so grow the sugarcane, I crush it. So, for me to continue to crush sugarcane for you, you have to continue uh farming sugarcane.*

The findings indicate that farming activities are shared in families. While some family members focus on sugarcane farming, others grow and sell vegetables to local communities and all provinces. The produce is for farmers' own consumption and selling locally and to other provinces.

P4: *...at home, his grandmother grow and they sell a lot of vegetables to the community members.*

P6: *She also has a garden this side within the portion of land that's where she grows vegetables tomatoes, beans, spinach, cabbage... In COVID, there was a shortage so in Durban there was demand for green pepper and beans, so ...she was able to supply them with green pepper and also supply them with beans.*

All farmers sub-contract major farming activities such as land preparation, planting, applying fertiliser, cane-cutting, harvesting, and transportation of the sugarcane from the farms to the mill. The participants indicated that sub-contracting saves time. However, due to the high costs of sub-contracting, some farmers prefer to employ people from the community for some of the farming tasks.

P8: *Okay most of the work is subcontracted from planting because she mentioned that if you get a sub-contractor on planting, you save a lot of time it speeds up the process even in the application of fertilisers, irrigating....*

P9: *As- the sugarcane continues to grow, uhm the weed come back and then she employs people to come and weed manually... Cause sometimes you pay a lot*

of money to contractors, they want to benefit so if I hire people, the cost will be lower.

As indicated, after harvest, the sugarcane is supplied to TSB Sugar Mill. Before transferring the profits to the farmers, the mill deducts costs such as loan repayments and payment of sub-contractors. The remaining funds are transferred to Akwandze Bank and participants referred to this money as “retention”. The small-scale farmers can withdraw from this account monthly until the funds are depleted. The use of the retention funds depends on the farmers’ needs. Among others, participants mentioned that they use the funds to maintain the sugarcane on the fields and to pay employees’ salaries.

P5: *So, everything is deducted at the mill, contractors’ money everything is deducted there...there is a fund that is there, there is money that they keep. If they want to withdraw, they have to fill in a form. It’s the money that they keep for themselves... So that bank takes some money, they call it retention. The main purpose of the bank to take that money is for farmers to have funds to be able to manage the cane till harvesting.*

P8: *She survives through her retention...that is retained by-by the sugar mill. So that she is able to uhm withdraw the retention whenever they need to pay people who are irrigating the fields and also for own livelihood. ... it is Akwandze that keeps the retention, once a month you go and make the order a month until your money is finish. If it is finished, it’s finished.*

The retention enables participants to improve their homes, send their children and grandchildren to schools as they can pay school fees for them from primary to tertiary level, ensure household food security, and improve the standard of living.

P3: *From-from the profits she has been able to take her kids to school, she has been able [to] build herself a house, she has been able to buy herself groceries, uhm the day today running of the household from the profits that she gets from growing sugarcane. It has really helped her a lot.*

P6: *The farming has sent kids to school. She actually financed the kids’ education up to university level. And now she is educating-paying for grand children’s school fees through farming.*

P5: *She has enough to survive... she is able to live off those funds. But she is going to harvest next year, 2023 May. That’s when she expects to...get a good harvest that will actually she will actually buy a car for herself and improve her life.*

The findings above show that the developments in the small-scale agriculture sector in Komatipoort through the introduction of contract farming improve small-scale farmer livelihoods. Findings confirm that small-scale farming in the area is not limited to subsistence farming, but farmers are integrated into the economy by supplying to already established markets (Carelsen et al., 2021:102). The finding on the sub-contracting of farm work corroborates with the study by Bastian, Swanepoel and Van Niekerk (2019:68), who found that small-scale farmers in the Western Cape Province had improved access to machinery and used it through sub-contracting, which increased their farm productivity. In addition, the finding on increased income is concordant with Ginindza and Mpandeli (2020:6) who assert that an increase in income for small-scale farmers, in turn, increases their purchasing power as they can purchase food not produced on farms and meet their household needs, thus strengthening small-scale farmer livelihood. In addition, the TSB contract gives small-scale farmers access to the financial services Akwandze Bank provides. They also have access to farm machinery through sub-contracting. Therefore, the findings support the claim in the literature that institutions enable small-scale farmers' access to other types of livelihood assets that are crucial to developing a sustainable livelihood (Serrat, 2017:24).

Diversification with vegetable farming is advantageous for small-scale farmers' livelihoods. Vegetables such as green pepper, spinach, and cabbage have a short maturity period (Mohapatra, Mohapatra & Mishra, 2017:2) and are highly profitable. They provide a fast alternative income for farmers while they are waiting for the sugarcane harvest. Furthermore, they improve household nutritional security as some of the vegetables are for home consumption. Therefore, the finding confirms that small-scale farmers produce for both household consumption and markets, which improves their livelihood (Mbatha et al., 2018:34).

Subtheme 1.2: Non-agricultural livelihood activities

Except for one participant who was once employed but is now solely a small-scale farmer (P3), other participants had jobs in addition to being small-scale farmers. The job titles included teacher, band member, clerk, and chairperson of a farming co-operative. Others had side businesses. One participant owned a mobile toilet business, while another participant had a sub-contracting business. In the case where participants were older than sixty or had older persons in their households, they received additional income from old age grants. Some participants indicated that they acquired long- and short-term loans from credit institutions such as Akwandze, which cushion their livelihoods in different ways as indicated below. The participants highlighted that additional income enables them to deal with the impact of risks on their livelihoods while awaiting the sugarcane harvest.

The participants expressed their additional income as follows:

P4: *I am a keyboard player so that how I make a ...living apart from the sugarcane...*

P4: *I play the keyboard... at churches, events, and weddings.*

P7: *Hai no its not farming only, I do have another business mobile toilet business ...for the weekends. Friday and Saturday and Sundays.*

P11: *I am a sub-contractor...for applying fertilisers.*

The value of earning an additional income as a small-scale farmer is captured in the experience of P3 who depends solely on sugarcane for an income.

P3: *Before, I was employed so I was able to make a living. Because this sugarcane farming is something we do on a yearly basis, it takes 12 months for the sugarcane to reach maturity. So, when I was still working it really helped me because you would find that if I experienced any challenges in the field, I was...because I was working, I would deal with it. But now ...I solely rely on sugarcane farming.*

The participants indicated that loans are used for paying salaries for temporary workers, resuscitating farming projects, maintaining the sugarcane from planting till harvest, and replacing farm infrastructure such as electricity cables. The participants expressed the use of loans as follows:

P1: *There is actually a system that has been created by the way we [the farmers] are growing sugarcane, where-where we have to acquire loans in order for us to-to to be able to continue with farming operations, because we have to pay salaries,...maintain the sugarcane, have to do all sorts of things in order to...improve our livelihoods. But it's something that that we are used to. There is actually a-a bank where we get... loans its called Akwandze ba-bank*

P6: *In 2013, the project ended, because they stole everything... We [the farmer co-operative] were owing Land Bank R 4 700 000 at the time, during that time... We wanted the government to assist them financially so that we will be able to pay the Land Bank. We wanted money to resuscitate the project so that we will be able to pay back the loan that uh we acquired from Land Bank...*

To grant such a loan, financial institutions require collateral and evaluation. The participants indicated that they were required to form a co-operative and farm evaluations had to be conducted before loans could be approved. Loans are paid back with interest. The participants spelt out the requirements for a loan as follows:

P6: *The Land Bank said that we should form co-operatives... continued to form a co-operative. If we form the co-operative, the government would pay Land Bank 2 million (R2 00 0000) on their behalf...as 11 members agreed to form a co-operative. The government paid R2 750 000, we signed the forms of agreement.*

P7: *You go there and do a loan then the loan they take someone who will inspect and say eh this farm will value maybe 500 000. You go there and sign, you come and carry on. But you will pay back the money slowly, slowly with interest.*

The results show that non-agricultural strategies serve to cushion small-scale farmers from the uncertainties and risks that they encountered in the small-scale farming sector. The findings are in line with a study by Anang (2019:2), which found that formal employment supplements the income from small-scale farming to ensure that farming households continue to meet their needs between harvests. The findings are further supported by Twumasi, Chandio, Sargani, Asare and Zhang (2022:11), who found that off-farm income sources increase small-scale farmers' purchasing power, which enables them to purchase farm inputs and meet non-agricultural expenses such as purchasing clothing and food as well as reducing the household's reliance on credit. Although Luvhengo and Lekunze (2017:602) state that small-scale farmers lack access to credit due to lack of collateral, the small-scale farmers apply for loans from formal and informal credit institutions for additional funds. The finding shows that credit is important in sustaining small-scale farming as it provides the financial capital that enables small-scale farmers to invest in their farming activities and improve their livelihood. This may have been possible due to the small-scale farmers' membership in farming co-operatives and contract farming, as Karaivanov and Kessler (2018) assert that group membership increases access to loans as it serves as group collateral and substitute physical collateral.

Theme 2: Nature of land degradation in Komatipoort

Participants pointed out various causes and forms of land degradation in Komatipoort. Forms of land degradation include soil erosion, soil salinity, or soil puddling of the fields. Factors contributing to land degradation were identified as climatic change, poorly drained soils, and poor land use. The forms and causes of land degradation will be discussed next as sub-themes.

Sub-theme 2.1: Forms of land degradation

Findings indicate that soil erosion occurs following heavy rains or sand mining. The participants highlighted that rainwater erodes the topsoil and the fertilisers on the field,

exposing plant roots. In other areas, it creates dongas and erodes the topsoil down to the bedrock.

P1: *...we are affected by the rain, that's affecting our roads, causing a lot of erosion and creation of dongas.*

P8: *Uhm especially during heavy rains that's when the soil is eroded...it erodes down to the bedrock and when that happens, we can't even plant any sugarcane.*

P5: *I was affected by the rain; it washed a lot of soil and it washed-that exposed the roots then exposed the manure...It only happens during heavy rains.; what happens is it erodes the soil together with the manure-the fertilisers that are in the soil...*

Adding on, sand mining exerts pressure on the land, causing soil erosion, which results in the widening of the river channel and low water levels within.

P1: *It [sand mining] put pressure on the land because there is a lot of erosion that is taking place... It's causing this river to be widened when it's widened then the water levels decrease...*

In addition, the findings show that there is water logging, which occurs concurrently with soil salinity. The participants highlight that some areas of the fields are waterlogged and that causes the soil to become saline and affect plant growth. The observations by the researcher confirm the findings that soil salinity is a form of land degradation. The photo in Fig. 1 below shows a patch of land on the field with white salt crystals and some weeds growing in the area. The participants voiced the forms of land degradation in the following words:

P11: *The section where they gave us there is puddling. There is also soil salinity in some areas... It's a marshy area when they designed it. It's a wetland.*

P12: *It's the salinity of the soil, the water is stagnant and it affects the growth of the sugarcane.*



Figure 1: Soil salinity in Komatipoort (Photo: Extension officer in Komatipoort)

The findings on land degradation related to the soil quality, corroborate with the report by the Department of Agriculture (2012:8) stating that soil degradation is prevalent, particularly in communal areas. The findings on soil erosion by water are confirmed by Orchard et al. (2017:50), who found that heavy rains in Swaziland erode the topsoil and the nutrients applied to the crops. The study by Muloo et al. (2019:7) further confirms this study's finding as they revealed that heavy rains were responsible for the soil fertility loss, presence of gullies, and exposed plant roots and stones in Kalama Division, Machakos County. Regarding soil salinisation and waterlogging, the literature states that these two problems are common in areas that are under irrigation (Dikeogu, Okeke, Nwachukwu & Agbo, 2021:48), which confirms the findings of the study as small-scale farming is practised under irrigation as mentioned (see Sub-theme 1.1). In addition, the concurrent presence of water logging and salinity is confirmed by Amer (2021:2), who states that water logging reduces soil aeration and soil chemical composition, which reduces the soil's infiltration capacity, while soil salinisation reduces the structure hence the presence of salt crystals on the soil surface. From the SLF perspective, the findings show that the natural capital from which the small-scale farmers derive their livelihood is depleting at varying rates and threatens the sustainability of small-scale farming in the study area.

Sub-theme 2.2: Causes of land degradation

The findings show that land degradation is a result of climate variability. It has been mentioned in sub-theme 2.1 that heavy rains cause soil erosion. While heavy rains lead to water logging on the fields, droughts cause soil salinity.

P3: *We are affected by the water rainwater that- you find that when it rains-when it rains heavily there are puddles that are formed within the fields.*

P10: *...when there is a drought, there is less water then the soil becomes saline.*

In addition, the findings show that the soils on the fields are poorly drained, which changes the quality of soil; it becomes waterlogged and saline. In other instances, the topographical location of the fields coupled with poor drainage cause water logging and the subsequent salinity. The participants described poor drainage as a cause of land degradation as follows:

P6: *Our soil retains a lot of water...it changes the quality of the soil that's why it becomes saline...*

P9: *The fields are on the lower ground there are fields that are located much higher than mine. So, every drainage comes onto my fields...*

P12: *When we irrigate, the water is supposed to flow out but, in this case, it is not flowing, so it causes a lot of salts in the fields, which is not good...*

Furthermore, the findings show that poor land use practices, namely over-irrigating and sand mining contribute to land degradation. Instead of moving irrigation pipes around the field, they are left in one place, causing water puddles to form. One participant described the contribution of poor farming methods to water logging as follows:

P9 *...they [farm workers] come in the morning to irrigate the fields and during this time of the day they just dock off, but the sprinklers continue irrigating the-the land and there is no one moving the sprinklers around. And then in the morning you find that there is puddling as well...*

Soil mining along the Komati Riverbed causes the widening of the river and environmental pollution.

P1: *The main aspect is this-soil- sand mining, these guys they come and mine their soil within the river-the riverbed and they are affecting the environment, polluting the river with their oils.*

The findings show that participants perceive land degradation to be a result of a combination of natural and human factors. The finding on rainfall and droughts as causes of land

degradation are confirmed by Rabumbulu and Badenhorst (2017:227), who found that drought and periods of intense rainfall were causes of land degradation in the Free State. In particular, the link between soil salinity and puddling is confirmed by literature, which states that salinisation causes the soil to be impermeable, thus leading to waterlogging, while waterlogging can also increase incidents of salinisation as evaporation leaves salts in the soil (Dikeogu, Okeke, Nwachukwu & Agbo, 2021:45). In addition, the findings on poor land use and poor farming methods causing land degradation corroborates with the study by Ighodharo and Lewu (2020:235) who found that land under agricultural use, which is characterised by poor farming methods, is prone to soil degradation. Furthermore, sand mining causes environmental pollution as found in the O.R Tambo District that sand mining causes pollution of the wetland and on the roads (Mngeni, Betek, Musampa & Nakin, 2016:4). Therefore, while natural factors cause degradation, farmers' practices exacerbate the problem in Komatipoort.

Theme 3: Land degradation factors that influence land productivity and livelihoods of small-scale farmers

The findings show that land degradation in Komatipoort influences land productivity through soil erosion and depletion of water quality, which in turn affect sustainable livelihoods. Soil degradation reduces agricultural productivity and subsequently, livelihoods. Likewise, water quality depletion damages irrigation infrastructure, which in turn affects crop productivity. The influence of soil degradation and depletion of water quality on small-scale farmers' livelihoods will be next discussed as sub-themes.

Sub-theme 3.1: Soil degradation's influence on livelihoods

The participants indicated that land degradation reduces their farm's land sizes and subsequently, land productivity and farmland profits. In addition, farmers are unable to plant on land that is waterlogged or salinised; instead, they maximise on the remaining part of the field.

P8: *The... puddled area is around 5.6 hectares and from there uhm I can't plant anything. I have to intensify on the remaining part of-of the field.*

P11: *Initially when they [traditional authorities] gave us land it was 7.4...The section where they gave us there is puddling. There is also soil salinity in some areas. So that is why now the land is now 4.8.*

As the findings indicate, unproductive land leads to low yields. Comparing their first yields to the recent ones, participants pointed out a decreasing trend in the number of truckloads they deliver to the sugar mill.

P9: *It affects the yields, because on that section maybe I would get 2 - on a normal basis 2 truckloads but due to the waterlogging and puddling I will get half a truck.*

P12: *It affects us a lot because the tonnage has gone down the amount of harvest has gone down because of the soil... From the time I started I used to deliver 20 cargo trucks but now I deliver about 16, it's no longer the same compared to when I started.*

Consequently, the low yields imply a reduction in the profits farmers get from small-scale farming. Land degradation causes small-scale farming to be unprofitable and farmers have to acquire loans to continue with farming operations, as previously mentioned (see Sub-theme 1.2). Reduced yields and profits force small-scale farmers to obtain loans to continue farming.

P8: *It has affected what I get, my profits they actually diminished over time. Now... in order for me...to continue to work I acquire loans ... to continue with the growing of-of sugarcane.*

P11: *When there is low tonnage, the retention decreases... So I have to go and source some loans for me to continue to work.*

Aseefa and Hans-Rudolf (2016:1555) confirm the finding that low soil fertility results in farmers experiencing poor yields; this happens despite having good rains. The findings are further supported by Ighodaro and Lewu (2020:227) who found that soil erosion lowers crop productivity among small-scale farmers in Didimana in the Eastern Cape. The findings on the socio-economic influence of low land productivity are supported by Zeleke and Welemiriam (2020:9), who found that small-scale farmers in Ethiopia experience increased vulnerability to the impact of land degradation because of low profits that result from land degradation. The findings are further corroborated by a study carried out by Mizarbaev, Stokov and Krasilnikov (2022:7), confirming that land degradation reduces agricultural profits of small-scale rural farmers across Central Asia, leading to increasing poverty rates among agricultural households. Furthermore, the finding on the need to access loans is aligned with a study by Mdiya et al. (2021:199) who found that small-scale farmers in Ingquza Hill Local Municipality acquire loans to ensure the profitability of their farming operations.

Subtheme 3.2: Water quality depletion's influence on livelihoods

The participants indicated that sand mining on the river contributes to pollution from oils, chemicals, and waste resulting in farmers using contaminated water for irrigation and household use as well as causing the death of fish in the river. In addition, the researcher's observation

showed that sand mining resulted in the sedimentation of the river as she saw patches of sand in the river.

P1: *The main aspect is this-soil- sand mining, these guys they come and mine their soil within the river-the riverbed and they are affecting the environment, polluting the river with their oils...So that's why I am actually scared that in the near future we won't be able to get water... In terms of the chemicals, I suspect that maybe there are different chemicals because I have seen that fish that are also dying in the-in the river and uhm it's a big problem...I am fearing that people who are living downstream are drinking uh contaminated water....*

P11: *The water that they [other farmers] irrigate with is polluted because of the oil.*

The environmental pollution has economic implications as it damages irrigation infrastructure. The participants stated that waste and sand from sand mining blocks irrigation pipes and pumps that draw water from the river. As a result, the farmers are unable to extract water from the river and to irrigate their crops, which affects their growth. The participants articulated their challenges as follows:

P1: *Due to the excavation, when the water comes through, it...just sweeps the waste down to-downstream and because we have all our pipes, the irrigation pipes there. What happens is when we start uh to extract water, that waste that is emanating from the excavation uhm blocks our pipes and I foresee that in the next three years we won't be able to get water from that place because of these excavations.*

P9: *There is sometimes blockages. You find that where we are extracting the water, the levels are low, we end up extracting the soil and you find that the pipes are blocked...we... won't be able to irrigate for as long as three weeks and it affects the yields.*

Besides the water pumps being blocked by waste and sand, the excavations lower the water levels such that farmers are unable to extract water. Farmers must extend the water pipes to reach the waters level.

P9: *...You find that where we are extracting the water, the levels are low, we end up extracting the soil... It affects the land because it becomes dry.*

P11: *It is affecting on the pumps because... You find that as they [sand miners] continue to excavate, [the] pipes... end up not extracting any water, they will just be dangling in the air, they need to be extended lower.*

While land degradation is responsible for pipe blockages, one participant alluded to the reluctance among farmers to drain the water pipes, which leads to a build-up of waste in the pipes, causing pipe blockages.

P9: *Some people have got fields that are close to the water source, so they are supposed to flush out...the mainline but if they don't do that that's when the pipes get blocked.*

The findings on water scarcity resulting from water pollution are similar to those in the study by Musakwa et al. (2020:14) who found that farmers in Nzhelele Catchment, Limpopo, experience water scarcity due to pollution by agricultural chemicals in the catchment area. In addition, the findings on stunted crop growth are aligned with the study by Woldetsadik, Drechsel, Keraita, Itana and Gebrekidan (2018:59) who found that contaminated irrigation water in the Akaki River affects crop growth and poses health risks for the small-scale farmers in Addis Ababa, Ethiopia. Furthermore, the finding on infrastructural damage to irrigation infrastructure due to land degradation is supported by Woodhouse and James (2017:33) who conducted a study with small-scale sugarcane farmers in the Nkomazi Municipality. The finding on the damage to irrigation infrastructure confirms that the depletion of profits leaves the farmers with no choice but to obtain loans to purchase new pipes to continue farming.

Theme 4: Land management strategies to control land degradation

The findings indicate that small-scale farmers in Komatipoort adopt soil and slope management strategies to control land degradation in their fields. The participants indicated that they manage their soils through soil sampling, applying more fertiliser, installing drainage infrastructure in their fields, and re-gravelling the roads. The participants further highlighted that they cultivate across the slope and install gabions on the riverbed. These soil and slope management strategies will be discussed below as sub-themes.

Sub-theme 4.1: Soil management

The findings indicate that participants employ soil management strategies from land preparation to harvest. During land preparation, soil sampling was identified as crucial in growing sugarcane as it alerts the farmer on the state of the soil and the type and amount of fertiliser to apply.

P1: *After cultivating, I do soil sampling so as to know the kind of fertiliser that I need to apply. How you do soil sampling is by (demonstrating) you cross it like this, you start here then you go there then you move to the centre. So that you know the state of this whole area, whether there are salts here, which fertiliser to apply... We take the soil sample to Durban, when the results come back, they will tell you the type of fertiliser and how many bags of fertiliser you must apply.*

P12: *Since 2020, that was the last time I did a soil sample after harvesting... It really helps in our fields because you are able to know the content of the fertiliser and the amount of the fertiliser they are supposed to use in the field.*

Some small-scale farmers use integrated fertiliser application to enhance soil fertility. It means that they use inorganic fertilisers and cattle or chicken manure concurrently to enhance fertility and control salinity. The manure is obtained from chicken and cattle farmers in the area. In addition, sugarcane leaves are used as mulch in the fields. To corroborate this finding, the researcher observed that there were burnt sugarcane remains on the fields. Participants indicated that the remains act as mulch and enhance soil fertility. The findings further show that government officials are important in directing small-scale farmer responses to land degradation.

P4: *So, I use cattle manure... Where I stay there are a lot of cattle farmers, so I negotiate with them then I get tractors to transport the manure onto the land.*

P5: *I also use uh chicken manure...to supplement the fertiliser that I have applied onto the soil and... from these sugarcane leaves I then apply them on top-on top of-of what they have planted...to hold the moisture, so that the moist doesn't escape the planted area...*

P5: *I buy it [chicken manure] from the chicken farmers.*

P6: *The government said that we can use chicken manure and we apply it on the soil to try and mitigate.... So, they [government] were suggesting that we should get the chicken manure to apply to reduce the salinity...now I have to purchase... over 100 bags of chicken manure to neutralise it.*

Specifically, chicken manure is valuable in managing soil salinity. Farmers have devised a diversification plan to assist each other to cut down costs of buying chicken manure. The participant indicated that her daughter has been trained in poultry farming and is planning to have a chicken farm, and she will supply the farmer with the manure.

P6: *One of my children...has a chicken farm. She has been trained for chicken farming. So, she is opening her chicken farm, she has already acquired a place for the chicken farm... She is now going to supply me with the chicken manure.*

The effectiveness of land preparation on managing land degradation was shown by one participant who remarked that salinity on her field did not affect her sugarcane yield because of the soil management measures she implemented.

P6: *...it [soil salinity] doesn't affect me because I am using the chicken manure... after harvesting I spray, clean, apply fertiliser, I apply herbicides then I apply the manure again. So, it's a routine that I am used to...because I know that if I don't do that, I won't be able to...get a good yield.*

As part of soil management, the participants build drainage infrastructures on the farms to reduce waterlogging. Participants rely on support and advice from extension officers from the South African Cane Growers Association on managing waterlogging.

P3: *We get advice from the extension officers such as [farmer advisor], who actually tell us what to do in terms of drainage, in terms of the puddling within... on how to actually best drain their land so that these puddles do not form very often.*

P9: *I done the smaller drainage...I hire machinery...to excavate, to try to open up the puddled ground.*

While some farmers have taken initiatives to manage degradation, others are relying on external assistance for more permanent measures. In the following extract, the participant highlights that she does nothing to manage the water puddles on her field; instead, she is waiting for an organisation to install a drainage system.

P8: *... there is some people from some organisations who said uhm they will come and install some drainage system because there is a river that is nearby. So that when the puddles form, we are able to drain the water...into the nearby river... but that hasn't happened yet. Now, there is nothing that I am doing but to ensure that I continue to- plough on the remaining part... There is nothing else that I can do apart from installing the drainage system.*

Similar findings were reported by Abeje et al. (2019:12) who indicated that chemical fertiliser application, drainages, and gabions were some strategies that small-scale farmers in Aba Gerima, Ethiopia, use for managing their land. The finding on integrated soil fertiliser use is confirmed by Tedese and Mola (2021:104). They state that organic fertilisers were used to improve soil fertility and they are a cheaper option for small-scale farmers in Ethiopia since they purchase it from other farmers. The study by Mango et al. (2017:127) confirms that extension services increase small-scale farmer awareness on land degradation and the rate of adopting soil and water management strategies. However, the study by Oduniyi and Tekana (2021:6) shows contradicting findings on support from extension officers. Their study found that despite having access to extension services, small-scale farmers are less likely to adopt sustainable land management practises due to infrequent visits by extension officers.

Furthermore, Abeje et al. (2019) confirm that diversification improves the adoption of sustainable land management strategies.

Sub-theme 4.2: Slope management

The participants indicated that they adopt measures to stabilise the ground and reduce the rate of erosion. They highlighted that they install gabions along the Komati River, farm across the slope, or re-gravel the roads to reduce the rate of erosion.

In the following excerpt, the participant remarks that small-scale farmers contribute funds as a co-operative towards hiring a contractor to install gabions. However, the installed gabions are not effective enough to fully deal with the soil erosion as the river erodes around the gabions and they require a huge financial investment.

P1: *... we do try; we do have initiatives just recently we have engaged a contractor to...to install gabions uh within the-the riverbed just to...at least try to reduce the amount of soil is being eroded by the river. But what we have discovered is that uhm the gabions are not working because the river just keeps taking its own trajectory around the gabions. And we engaged a contractor who we paid not less than 1.1 million just to install those-those gabions.... It's becoming expensive for us. We spend a lot of money trying to manage land degradation...*

In addition, the findings show that when farmers become aware that there is soil erosion in their fields, they minimise it by cultivating across the slope.

P1: *We try to change our farming methods especially when...seeing that something is affecting our land, we do try to actually change the way we are doing farming. We sometimes cultivate across the slope instead of cultivating along the gradient.*

P3: *...if I notice that...the land is degrading because maybe the gradient of the land, I change the direction of lines, so if I can just plant in this kind of direction, erosion would be minimised.*

In addition, small-scale farmers stabilise slopes on the roads by re-gravelling to make way for trucks that collect the sugarcane and transport it to the mill. Participants use their own funds which they accumulate as a farmer co-operative to hire contractors. Sometimes they borrow machinery from a nearby mine to deliver gravel they use for re-gravelling.

P1: *...to maintain the roads, [we] try to close up the dongas... we have just recently spent R87 000 in trying to fix the roads ...for the trucks... that come and collect our sugarcane...*

P2: *...we usually negotiate with the mine to provide us with the machinery... because there is a coal-mine... just around...we hire trucks...to come and deliver the gravel and...we use our own resources as...a co-operative...we have got a fund where which we contribute to. Then from the fund we are able to get those resources from the fund and outsource for machinery.*

The finding that small-scale farmers adopt measures for slope management is supported by Oduniyi and Tekana (2021:7), who found that despite being poor, small-scale farmers in Mpumalanga are willing to pay for innovative ways of managing the land to enable them to continue with their farming operations. In addition, the finding that farmers' co-operatives and associations facilitate the implementation of land management strategies is supported by Nel (2015) and Ng'anga et al. (2016:49), who posit that social capital alleviates financial constraints, which enables small-scale farmers to adopt innovative methods to control land degradation. The finding is further supported by Mango et al. (2017:7), who state that small-scale farmer groups in the form of co-operatives increase the adoption of better conservation practices.

Theme 5: Challenges to sustain livelihoods

The findings show that participants face numerous challenges to attain sustainable livelihoods. The participants indicated that they are constrained by high input and operation costs, which leads to low incomes as they spend large sums of money on buying fertilisers, paying for electricity bills and maintenance, harvesting, and transporting sugarcane. In addition, the participants experience setbacks such as theft of their infrastructure and crop produce and invasions of fields by livestock. Weather variations due to climate change are a challenge participants are faced with. It contributes to poor crop productivity and reduces the profits farmers get from sugarcane farming. These challenges will be discussed in the sub-themes below.

Sub-theme 5.1: High input and operation costs

The participants alluded to the increase in fertiliser prices and water and electricity rates as the major causes of high input and operation costs. Operations costs highlighted by the participants include maintenance of irrigation, hiring labour, and high costs of cutting, loading and transporting the produce to the mills. For instance, one participant (P8) provided a breakdown of her costs per farming season. It is as follows: R8000 per hectare for electricity, almost R17 000 for cutting while loading and transportation costs are more than R100 000. The participants highlighted that the high costs make small-scale farming unprofitable. Participants commented on high input and operations costs as follows:

P1: *Uhm mainly, it's the rise in prices of fertiliser, water and electricity, those are most touching issues.*

P2: *... electricity is very expensive... For electricity we have tried to complain to government that we are paying too much... And fertiliser is also expensive because per hectare we are supposed to adhere to a certain amount to apply a certain amount of fertiliser. If its applied below obviously the-the yield will will go low.*

One participant (P7) mentioned that global political instability, such as the Russia-Ukraine War, has a bearing on the high prices of fertiliser:

P7: *You end getting less than and then with that less than you end up buying... fertiliser and now you see fertiliser...the Russia war yah it affects us. It's expensive. Imagine if you didn't make a profit and you have to buy one bag uhm [a] 50kg bag for R1100...and you have to put 150 bags which means we have loss.*

As in the case of the present study, findings of a study by Muzekenyi, Zuwarimwe and Kilonzo, (2021:96) indicated that small-scale crop farmers in Vhembe District in Limpopo experience high input and operations costs, which lead to extremely low profit margins. The study by Khapayi and Celliers (2016:31) further supports the finding that high input prices are a barrier to small-scale farmers transitioning to commercial farming. Specifically, the finding on the price increase of fertiliser resulting from political instability is confirmed by Kimenyi, Adibe, Djire, Jirgi, Kergna, Deressa, Pugliese and Westbury (2014:21), who indicate that lack of political stability disrupts the transportation of agricultural inputs and causes price increases. Similar findings on high fertiliser prices were made in a study in Malawi, where small-scale farmers applied less fertiliser, which in turn reduced the incomes of their households (Komarek, Drougue, Chenoune, Hawkins, Msangi, Belhouchette & Flichman, 2017:73).

Subtheme 5.2: Theft and cattle invasion

Participants are not only affected by the theft of infrastructure such as irrigation pipes and electric cables but bags of fertiliser in the storerooms and crop produce in the field are also stolen. The theft of irrigation infrastructure and electric cables delays irrigation, which results in low crop yields. Theft as a constraint faced by participants was described as follows:

P1: *...the crime is really affecting us... At one point we lost 160 bags of fertiliser, I lost 50 bags, I have also lost my drip irrigation... pipes, they came back and took another 20 [pipes]... What they do they even come and capture the security first, lock him up in the toilet and they come with a huge truck and to*

the storeroom where they steal all the consignment. So that's really affecting...us a lot, really affecting us because...it all comes to the financial part.

P8: *Our fields are located closer to the community. So, the community goes and steal the sugarcane...*

P5: *...the children from the community...go inside... the field, they start stealing the sugarcane and eating. They just collect bundles of sugarcane and come and eat them in their homesteads.*

P9: *Another problem is cable theft... It is a big problem because Eskom can take months without replacing. So, it affects us. We can't even irrigate.*

Furthermore, the sugarcane fields are invaded by stray cattle.

P5: *I was affected by the cattle they came and ate my sugarcane... If it wasn't for the cattle, it [the sugarcane in the field]- would be in a better state than what it is now...*

Although the researcher observed that some fields were unfenced, which makes them easily accessible to cattle, P5 indicated that the gate they share with the mine is left open and the cattle grids are covered, which allows the cattle to invade the fields through the open gate.

P5: *...the mine...opened the gates and they covered the cattle grids. So, the cattle are now able to walk over the grid and enter the fields and start eating.*

Mathinya et al. (2023:144) confirm that small-scale farmers are constrained by theft of crop produce. The finding is further supported by Netshipale (2021:90), who states that land reform beneficiaries in Waterberg District, South Africa, lost farm infrastructure and crop produce and livestock due to theft, resulting in some quitting farming. The finding on the theft of electric infrastructure is supported by a study carried out by James and Woodhouse (2019:66) on land reform and small-scale sugarcane farming. It highlighted that electric cable theft in the Nkomazi Municipality causes delays in irrigation and reduces crop yields. Furthermore, as in the present study, Mgushelo and Bara (2021:37) found that the lack of fencing makes it easy for livestock to invade fields and graze on farmers' crops, which has caused some farmers to abandon small-scale farming overall.

Sub-theme 5.3: Climate change

Unpredictable weather patterns due to climate change pose a threat to small-scale farming. While hailstorms result in crop damage, changes in rainfall patterns cause delays in harvesting and reduction in the sucrose content and quality. The participants further indicated that the unpredictable weather patterns have financial implications as harvested cane cannot be picked up by trucks if it rains, which means that they risk not selling to the mill. Subsequently, they are unable to earn an income and eventually, they quit farming.

P3: *I sometimes face droughts that affect the whole yield. Sometimes you find that the year there was hail that had just damaged the whole field and with that being said, I can't continue with my farming, and it affects me financially because you find that there won't be a yield, our pipes have been damaged, our implements have been damaged by...the hail... I was once affected by the hailstorm especially last year [2021]. A large portion of the-of the sugarcane was damaged at an early stage and when that happens, I had to remove them from the fields and start all over again and that has an impact on the finances... when that has happened most of the farmers then stop farming because they don't have the money to do it.*

P11: *I was supposed to have harvested in July, I couldn't, then I harvested in August... The winter rains delay my harvest, usually in winter it doesn't rain. So, once it rains, I can't harvest... Sometimes you find that we have harvested the cane, and it starts to rain. It will be difficult for trucks to access the fields; they get stuck in the mud. So, you find that the cane will be lying in the fields the whole week the sucrose content decreases. And then they [sugar mill] might just reject it...*

The finding on the unpredictable weather patterns and the risk it poses to crop production and the loss of livelihood corroborates with findings of a study by Ochieng, Kirimi and Mathenge (2016:76), which indicates that climate change reduced tea production and revenues of small-scale farmers in Kenya. These findings are further supported by Ndlovu and Nhamo (2017:49), who state that rainfall and temperature variability lower the sugarcane sucrose content and quality and, consequently, reduce farmers' profits. Sucrose content is an important factor in sugar cane production because it determines the pricing of the harvest (Ndlovu & Nhamo, 2017:51). Agribusiness rejects sub-standard produce as is evident in the findings of the study by Van Niekerk et al. (2018:200), which focuses on the challenges of contract farming faced by small-scale commercial vegetable farmers in the Eastern Cape.

Theme 6: Suggested strategies to secure sustainable livelihoods

The participants indicated that they need financial assistance, and improved access to extension officers and soil experts who will assist them to manage land degradation better. In addition, to increase agricultural productivity, they proposed that they be granted more access to more agricultural land. Participants also suggested that access to more land could contribute positively to their livelihoods and enable them to diversify their livelihoods. The suggested strategies will be discussed in the following sub-themes.

Sub-theme 6.1: Financial assistance

The findings show that participants need financial assistance. They proposed that the government provides them with financial assistance in the form of subsidies, a grant or compensation. They explained that financial assistance would enable them to manage agricultural risks such as crop damage due to hail, pay electricity bills and purchase more land. Participants' suggestions are reflected in the following quotes:

- P3: *I would like the government to assist us that should there be a-a season where the crop has been damaged by hail, we can then be assisted or compensated maybe in some other way so that we can continue farming. Because one thing...when that has happened most of the farmers then stop farming because they don't have the money to do it.*
- P10: *A grant to assist with electricity because the electricity uses a large chunk of our money.*
- P6: *If they [government] would actually assist us in purchasing farms there is a good 10 hectares that I have seen the soil is good but it's very expensive, they [sellers] are asking around R800 000 for that 10 ha.*

However, the findings show that when compensation is made available, it does not reach all the small-scale farmers. Furthermore, in the case when farmers were affected by a hailstorm in 2021, compensation was available for vegetable farmers and not sugarcane farmers. Sugarcane farmers did not receive any explanation for being excluded from the compensation funds.

- P3: *...previously there were forms that we were made to fill, the compensation forms but nothing reached especially the sugarcane farmers. But I heard that...the vegetable farmers got something [from] government because they were also affected by the hailstorm... I am not sure why we never got the compensation...they never explained to us...what criteria did they use to...select the ones that would be compensated...*

The findings are supported by literature, which states that financial capital enables small-scale farmers to purchase farm inputs such as better seed varieties, fertilisers, and land as well as infrastructure (Gwiriri et al., 2020:15; Metiso & Tsvakirayi, 2019:6; Shakhovsky et al., 2019:8). In particular, the finding on the government as a source of financial capital corroborates with a study by Ndlela (2015:76), who found that the farmers identified the government, among other stakeholders, to be key in financing small-scale farming through subsidies. A study by Kinyondo and Magashi (2017:74) confirmed the opinion of small-scale farmers that the government could solve some of the problems they face by providing subsidies, strengthening extension services, and providing agricultural infrastructure. In a different context, Popoola and Yusuf (2021:23) found that some small-scale farmers were excluded from the COVID-19 government emergency fund because they lack proper documentation.

Sub-theme 6.2: Improved access to extension officers and soil experts

The findings show that small-scale farmers need capacity building to improve their response to land degradation and to improve crop production. Participants believed they could benefit by having the integrated support of soil experts and more extension officers in managing land degradation. Furthermore, if extension officers train the farmers, they will adopt better farming methods. Participants' suggestions are captured in the following quotes:

P3: *... if the government can uhm provide more experts who can assist us with the land degradation...If they can bring people who are, who are soil experts... Sometimes, we rely on the extension officers but sometimes we do need other expert advice, because sometimes they are faced with - with situations where...the whole sugarcane field is under...a huge puddle and you find that they don't even know what to do.*

P10: *If we can get expert opinion on how we can improve our farming system because sometimes after harvesting you find that we do not apply fertilisers on time, we delay in planting so we need experts to come and just educate us, train us on how they can improve their farming in order to get a yield... If we can get added support from the - the extension officers, even other experts come in to just assist us...*

However, some participants suggested that having platforms where small-scale farmers can share their knowledge would benefit them immensely. One participant articulated the following suggestion:

P12: *...if only we could share information with the older farmers, the ones who have been farming for a long time just to share and compare notes...That*

maybe we are doing something wrong to the fields, because when I started, I didn't have any knowledge or experience, I struggled a lot.

The finding that access to more extension officers could assist in attaining sustainable livelihoods is supported by Ginindza and Mpandeli (2020:6) and Mdiya et al. (2021:194), who state that extension services provide farmers with knowledge and tools for managing their land and improving crop production. In addition, Khwidzhili and Worth (2020:9) assert that extension officers have a role to play in promoting sustainable agriculture by raising awareness and encouraging farmers to adopt conservation farming. However, Dube, Francis and Maliwichi (2018:40) highlight that access must be complemented by responsive and effective services to ensure that small-scale farmers benefit from extension officers.

Furthermore, the finding on the need to integrate support from extension officers and soil experts corroborates the observation by UNDP (2019:13) that partnerships between the government, land users, extension services, and research are essential in managing land degradation more sustainably. The finding on farmer-to-farmer learning is supported by Gwiriri et al. (2021:18), who state that peer learning among farmers is a key source of agricultural knowledge, and it improves livestock production among small-scale communal farmers and small-scale commercial farmers in the Eastern Cape.

Sub-theme 6.3: Access to more agricultural land

Participants were positive that they could benefit from having more land to grow sugarcane and vegetables to diversify their livelihoods and, as a result, earn more money.

P2: If we can be allocated more land ...Because our neighbouring farmers have vast lands [200 ha] so they can harvest for many months and get a lot of and receive a lot of money through harvesting. We only harvest once after twelve months, while the uh large sclarge-scale actually harvest for four to six months, and that person will be making more money than us.

P9: Maybe if I can get twenty hectares... if I get twenty hectares... I can use ten hectares for sugarcane, ten hectares for maybe for vegetables.

Xiong, Zhu, Xiao, Kang and Xi (2021:10) support the potential of land as a natural capital to improve small-scale farmers' livelihoods. In a study, Gwiriri et al. (2021:6) found that small-scale cattle farmers who acquired more land through the land reform programme were able to expand into commercial farming and diversify by venturing into horticulture. However, Rusenga (2022:138) found that having access to more land through land reform does not in itself guarantee an improved livelihood for small-scale farmers in Limpopo Province, as they

needed further support to acquire physical assets and finance to invest in other farming activities.

4.4. Summary

In this chapter, the research findings were presented and discussed. The livelihoods of small-scale farmers in Komatipoort are characterised by agricultural and non-agricultural activities. However, the small-scale farming activities are affected by land degradation in the area. Land degradation is in the form of soil erosion, waterlogging, and soil salinity. The findings further indicate that land degradation is a result of climate change and poor land use. Furthermore, land degradation in the study area influences livelihoods in an integrated manner through reduced yields and water pollution causing low yields and low profits. The findings also show that the participants rely on advice from extension officers and experts to control land degradation through soil and slope management strategies. However, small-scale farmers are also faced with high input and operations costs, theft, invasion by cattle, and the consequences of climate change, which increase their vulnerability to the impact of land degradation. To attain sustainable livelihoods, the participants suggested having access to financial assistance, more extension services, and experts to improve their soils and crop production, as well as access to more land.

The final chapter will present the key findings, conclusions, and recommendations of the study.

CHAPTER 5: KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter describes how the goal and objectives of the study were met. Furthermore, the key findings from which conclusions will be drawn are discussed. Lastly, the chapter presents recommendations derived from the study.

5.2 Goals and objectives

The goal of the study was to explore and describe the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihoods. This goal was achieved through the following objectives:

Objective 1: To conceptualise and contextualise land degradation and small-scale farming in a sustainable livelihood framework.

This objective was achieved in Chapter two, Sections 2.2, 2.3, and 2.8. The small-scale farming sector was described as crucial for the development of South Africa through its contributions to food security and income for small-scale households (Khapayi et al., 2018:200; Zantsi, 2019:86). However, small-scale farmers face challenges such as lack of finances, lack of access to markets, and low productivity, which threatens the livelihoods for households relying on small-scale farming. In Section 2.3 land degradation was discussed as a global problem affecting more than six million hectares of land (Salmon & Gibbs, 2015) and almost 250 million people who live in these degraded lands (UNCCD, 2018). In South Africa, land degradation dates to apartheid, where the laws segregated Black people to marginal land. The huge populations of Black people in these areas exerted pressure on the land, which in turn increased the risks of degradation. The types of land degradation were discussed, including soil degradation, bush encroachment, and water degradation (see Section 2.3.2). The sustainable livelihood framework (SLF) was discussed as a relevant theoretical framework for the study (see Section 2.8). The elements of the SLF include the vulnerability context; human, natural, social, financial, and physical capital; livelihood outcomes, as well as institutional processes and organisational structures.

Objective 2: To explore and describe the contributing factors to degradation in Komatipoort.

The objective was addressed in Chapters two and four. Poverty and insecure land tenure were discussed as contributory factors to land degradation (see Section 2.4.1). Poverty increases farmers' reliance on land to meet their livelihood needs, which speeds up the rate of land degradation (Barbier et al., 2015:416). Insecure land tenure reduces small-scale farmers'

efforts to invest in conservation practices, which in turn contributes to land degradation (Barbier & Horchard, 2018:626). In Chapter four, findings indicated that soil erosion, soil salinity, and waterlogging are the prevalent forms of land degradation in Komatipoort (see Section 4.3 sub-theme 2.1). The findings further indicated that the land degradation in Komatipoort was a result of climate change, poor soil drainage and poor land use practices, which included soil mining and over-irrigating (see Sub-theme 2.2).

Objective 3: To identify and describe the strategies used by small-scale farmers in Komatipoort to manage land degradation.

The study's findings showed that with the assistance of extension officers and the government, the participants utilised soil and slope management strategies to protect the land (see Sub-themes 4.1-4.2). Soil sampling done during land preparation is an important step in determining the condition of the soil and the fertiliser application, while inorganic fertilisers and cattle and chicken manure are used to improve soil fertility and manage soil salinity. Soil is also managed by installing temporary drainage infrastructures in the fields to drain the soil. Furthermore, participants employ across-slope cultivation, re-gravelling of roads and installing gabions along the Komati River channel to stabilise slopes. The research findings corroborate with literature findings on land management strategies that small-scale farmers combine the use of chemical and organic fertilisers to improve soil fertility (see Chapter two, Section 2.5).

Objective 4: To explore and describe how land degradation influences small-scale farmers livelihoods in Komatipoort.

The objective was realised in Chapter four, sub-themes 3.1 and 3.2, where participants revealed how land degradation influenced their livelihoods. Findings indicated that soil degradation leads to low productivity, and low profits, and threatens the sustainability of small-scale farming in Komatipoort. Furthermore, water quality depletion blocked irrigation pipes as they ended up extracting sand instead of water. In addition, water degradation caused water scarcity problems for the participants and downstream communities due to contamination. Literature confirmed findings that land degradation reduces land productivity and causes water scarcity problems arising from water contamination and river sedimentation (Issaka & Ashraf, 2017:5; Musakwa et al., 2020:14).

Objective 5: To recommend strategies to manage land degradation for sustainable livelihood outcomes for small-scale farmers in Komatipoort.

Participants proposed suggestions for attaining sustainable livelihoods. In Chapter four, sub-themes 6.1 to 6.3, the suggestions included financial assistance, improved access to

extension officers and soil experts as well as access to more agricultural land. The researcher integrated these strategies into the recommendations (see Section 5.4).

5.3 Key findings and conclusions

In this section, the key findings on a particular theme will be presented first, followed by a conclusion.

5.3.1 Key finding on the causes of land degradation in Komatipoort

- The findings show that participants are aware of the land degradation challenges in their fields and around Komatipoort. They identified that land degradation occurs in the form of soil erosion, soil salinity, and waterlogging. Furthermore, the findings revealed that a combination of human and natural factors influence land degradation. Participants identified the natural factors to be climate change and poor soil drainage. However, land degradation is also accelerated by poor land use practices that include soil mining and over-irrigating fields, which is linked to the ignorance of small-scale farmers, and sand miners. Participants explained that they found saline soils in waterlogged areas and that this mix causes further land degradation.
- It can be concluded that the natural capital on which the small-scale farmers rely for their livelihoods is depleting at varying rates. The interaction between natural and human factors contributes to land degradation, which requires management strategies. Awareness of small-scale farmers' contributions to land degradation emphasises the importance of encouraging them to adopt sustainable land practices.

5.3.2 Key finding on the influences of land degradation on livelihoods

- The findings indicate that soil degradation reduces land sizes and influences land productivity. In turn, small-scale farmers are unable to utilise the degraded land, which reduces their crop yields and profits. With low profits, participants must acquire loans to finance and intensify their farming activities and cover expenses such as paying salaries and purchasing fertilisers. Loans have to be repaid, which further impacts small-scale farmers' profits. Furthermore, water degradation contributes to water scarcity problems for small-scale farmers due to river sedimentation and pollution. In turn, river sedimentation damages irrigation infrastructure, which results in non-irrigation of fields and poor crop yields.
- It can be concluded that land degradation threatens the sustainability of small-scale farming and small-scale farmers' livelihoods. Diminishing profits and income

emphasise the need for sustainable land use and prioritising diversification of livelihood strategies to strengthen small-scale farmers' livelihoods.

5.3.3 Key finding on land management strategies

- The findings reveal that when farmers notice changes in the land, they use soil and slope management strategies to control land degradation. These management strategies are based on knowledge and empowerment from extension officers and the government. While some participants use this knowledge to take the initiative in implementing strategies to control land degradation, others wait for external agencies such as the government to do it for them. Participants identified soil sampling as an important task in determining the quality of the soil and as a land practice routine which small-scale farmers adopted as a soil management strategy. The participants found that a mix of cattle and chicken manure is good fertiliser to manage the land and as such support one another to obtain manure. The slope management strategies that were identified include cultivating across the slope, installing gabions, and regravelling the road. However, the participants pointed out that some of these strategies, such as installing gabions, are expensive to implement.
- The conclusion is that small-scale farmers can manage their land when they are well-informed about possible land degradation management strategies. They support one another to sustain their land through integrated soil management, installing gabions and regravelling roads. Building small-scale farmers' capacities to implement management strategies enables them to take initiative in managing their land. However, their responses to land degradation and the adoption of land management strategies are influenced by limited funds.

5.3.4 Key finding on the challenges to sustain livelihoods

- Findings reveal the challenges that restrict small-scale farming activities and cause barriers to sustainable livelihoods. Challenges include high input and operational costs, theft of produce and irrigation infrastructure, invasion of fields by cattle, and climate change. High costs of fertilisers and operational costs, which include maintenance, electricity, water, and transport costs, contribute to financial losses, and discourages adoption of land management strategies. Theft of produce and irrigation infrastructure reduce crop yields and cause further financial losses. Climate change contributes to poor-quality produce, which increases the risk of financial losses if milling companies reject it. Participants highlighted the impact of climate change on their finances, which sometimes forced some to quit small-scale farming.

- The conclusion is that the challenges faced by small-scale farmers to implement proper land management strategies lead to low yields and adverse financial losses. The high fertiliser and operation costs, theft of produce and irrigation infrastructure, invasion of fields by cattle and climate change pose risks to the livelihoods of small-scale farmers and, moreover, sustainable livelihoods. Small-scale farmers lack a safety net that can enable them to continue farming despite these challenges. As such, some farmers abandon small-scale farming to pursue other activities they deem viable to generate enough income. Hence, the risks must be mitigated, and a plan espoused for better preparedness and responses in times of shocks.

5.3.5 Key findings on the suggestions for livelihoods

- For small-scale farmers to attain a sustainable livelihood, findings indicate that they need access to more finances, land, and extension officers as well as soil experts. The participants suggested having more human capital to assist with land and crop management is crucial. Participants proposed that government should assist them financially in the form of grants, compensation, and subsidies. This help will cushion their livelihoods in the event of price increases and crop loss. However, participants highlighted that financial assistance is not inclusive as some are excluded from governmental financial assistance despite having applied for it. Participants believe that having more agricultural land could enable them to diversify their livelihood portfolio.
- The conclusion is that the government distributes resources to small-scale farmers unequally. The small-scale farmers rely mostly on the government to improve access to human, financial, and natural capital to increase crop productivity and enhance their capacity to manage the land and, ultimately, improve their livelihoods. However, in the historical context of the loss of land and ownership in South Africa, the government has a pertinent role in supporting small-scale farmers towards sustainable livelihood outcomes. While extension officers and soil experts are available to assist small-scale farmers in transforming physical and financial assets to improve crop production, unexpected shocks linked to climate change and unequal distribution of resources pose risks for sustainable livelihoods.

5.4 Recommendations

The study endeavoured to recommend strategies to manage land degradation for sustainable livelihood outcomes for small-scale farmers in Komatipoort. The following recommendations are based on the key findings and conclusions of the study that include participants' suggestions for attaining sustainable livelihoods.

5.4.1 Training and capacity building of small-scale farmers

The key findings highlighted the need for more extension officers who can assist farmers with addressing challenges related to farming and managing land degradation. Training should take place on two levels: through extension officers and directly with small-scale farmers. The government should invest in training and deploying more extension officers so that they are readily available to support small-scale land management strategies. However, small-scale farmers who prefer to be directly equipped with the technical skills to effectively control the rate of land degradation in their fields through relevant land management strategies should have the opportunity to do so. The farmers' associations can create learning platforms where they invite professionals such as soil and water management experts to educate them on better soil and water management strategies, conduct workshops and seminars directed at transferring new knowledge to both extension officers and small-scale farmers, to ensure that they are better prepared to address small-scale farmers' needs. Training small-scale farmers directly can enhance self-reliance among farmers, instead of waiting for external intervention or quitting small-scale farming for other livelihood strategies.

5.4.2 Livelihood diversification strategies to cushion small scale farmers

The findings pointed out the need for livelihood diversification as small-scale farming faces challenges that make it unprofitable and unsustainable. Small-scale farmers should be supported and encouraged to pursue other livelihood activities within the farming context to diversify their incomes. From the study's findings, diversification could include mixed farming, growing other crops for reselling or venturing into non-agriculture-based livelihood activities. Having other streams of income would present a safety buffer for livelihood outcomes in the event of unexpected shocks. However, farmers need to be assisted through an enabling environment, such as access to seed variety and lucrative markets for their produce. To this end, co-operatives should liaise with one another and farming associations to explore how small-scale farmers could strategise to diversify their farming activities. The Department of Agriculture should create an enabling environment for small-scale farmers by making available livelihood assets such as seed varieties, fertilisers, and infrastructure at subsidised prices. The government should also release more land to small-scale farmers where they can diversify their farming activities. However, the Department of Agriculture could monitor progress to ensure that capacity building and other support of small-scale farmers contribute to quality produce and increased profits for sustainable livelihoods.

5.4.3 Intersectoral collaborations in managing land degradation and improving livelihoods

Small-scale farmers face a wide range of challenges resulting from land degradation as well as other already existing socio-economic challenges. For example, water scarcity, damage to infrastructure, financial constraints, and exclusion from government assistance. It is impractical for extension officers and the government to address all the challenges faced by small-scale farmers, hence intersectoral collaboration is key in addressing these multifaceted challenges. Effective land management strategies for sustainable livelihoods require collaborative efforts from environmental scientists, extension officers, water and soil experts, community development workers, the Department of Agriculture, and farmers' associations along with small-scale farmers. The findings show the interconnectivity of natural and social sciences and hence the importance of integrated interventions to ensure sustainable livelihood outcomes for small-scale farmers. That is the only way to address the multiple socio-economic and environmental challenges faced by small-scale farmers for sustainable livelihood outcomes. However, the inclusion of small-scale farmers and harnessing the already existing social capital and institutional linkages they have are central to multiple-sectoral collaborations for sustainable livelihood outcomes for themselves and their families.

5.5 Recommendations for future studies

Future research should pilot a multiple-sector collaboration with a few small-scale farmers, which includes direct training of small-scale farmers in land management strategies and implemented under the mentorship of successful farmers. The collaboration must include integrated social and natural sciences interventions which are monitored and evaluated to adapt institutional processes and organisational structures that facilitate capital development and sustainable livelihood outcomes.

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APPENDICES

Appendix A: Permission to conduct research: SA Cane Growers Association



06 July 2022

To: Melody Mudukuti

From: Komati Small Scale Growers Association (KSSGA) Chairperson

Subject: Permission to conduct research with KSSGA affiliated sugarcane growers

Dear Melody

It is with pleasure to inform you that we grant you permission to conduct your research with KSSGA affiliated small-scale sugarcane growers in Komati. The permission is granted under the following conditions:

- Informed consent must be obtained before the interviews commence,
- The vulnerable population must not be included in the study, which includes but not limited to; pregnant women, prisoners, children,
- The respondents must be aware that their contribution to the study is voluntary, and they can withdraw from the research process at any time,
- The anonymity and confidentiality of the respondents must be preserved by not revealing their names and identity during data collection, analysis, and reporting of the findings,
- The findings of the study must be reported back to the growers, and
- The study must comply with the Protection of Personal Information Act 4 of 2013 (POPIA)

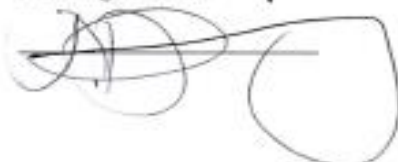
We wish you all the best in your research.

Thank you,

Your Sincerely,

KSSGA Chairperson,

Msimango Mfundo



Appendix B: Participant consent form



04/06/2022

Researcher: Melody T. Mudukuti
Mobile: 067 257 8559
E-mail: melodymudukuti@gmail.com

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

1. **Title of the study:** An exploratory study of small-scale farmers' perceptions of land degradation in Komatipoort and how it influences their livelihoods
2. **Goal of the study:** To explore and describe the perceptions of small-scale farmers on land degradation and its influence on their livelihoods.
3. **Procedures:** The study will use one-on-one interviews and personal observation to collect data from participants. Each interview is expected to take approximately 1 hour. The interviews will be audio recorded. The recordings will be transcribed for purposes of data analysis. Only the researcher and the study supervisor will have access to the recordings and transcripts which will ultimately be stored in a secure place by the University of Pretoria for a period of 10 years. If data is used again, it will only be for research purposes. The findings of this research study will be published for academic purposes.
4. **Risks and discomforts:** There are no known risks and discomforts that may be endured by participants in this study.
5. **Benefits:** Participants will not receive any incentives for being involved in the study. The study will benefit the participants indirectly in that they may feel a sense of satisfaction in knowing that their views matter and will shape strategies designed to improve small-scale farmers' livelihoods.
6. **Participants' rights:** Participation in the study is voluntary and participants have the right to withdraw from the study at any time. Participants have the right to refuse to answer any question that they do not wish to respond to.
7. **Confidentiality:** Information collected in the study will be treated confidentially and the names of participants will not appear in the research report or the scientific journal in which

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Fakulteit Geesteswetenskappe
Lefapha la Bomotho

the results will be published. Findings will not be presented in a way that could be directly linked to any specific participant.

8. **Person to contact:** If participants have questions or concerns relating to the study, they may contact the researcher, Melody, T. Mudukuti on 067 2257 8559 or email on melodymudukuti@gmail.com

Declaration

I, _____, understand my rights as a research participant, and I voluntarily consent to participate in this study. I understand what the study is about and how and why it is being conducted.

_____	_____	_____
Date	Place	Participant's signature

_____	_____	_____
Date	Place	Researcher's sig

Faculty of Humanities
Fakulteit Geesteswetenskappe
Letapha la Bomotho

Appendix C: Translated participant informed consent form

Umcwaningi: Melody T. Mudukuti

Inombolo yelucingo: 067 257 8559

Luposi lwembane: melodymudukuti@gmail.com

LWATI LEKUBA YINCENYE YALO LUCWANINGO

- 1. Sihloko Selucwanigo:** Lucwaningo lebalimi labalima kancane nemivo yabo ngekugedvuka kwemhlaba eKomatipoort nekutsi kutitsintsa njani timphilo tabo.
- 2. Injongo yalolucwaningo:** Kucwaninga nekuchazeleka ngemuvo yebalimi nebafuli ngekugedvuka kwemhlaba, nangekwekutsi kutitsintsa njani timphilo tabo.
- 3. Inhubo:** Indlela letawulandzelwa kuulelicwaningo litawufuna kwekutsi kuhlalwe phansi naloyo lotawube abutwa imibuto umlomo ngemlomo. Imibuto ibhekeke kutsi itsatse sikhatsi lesingendluli emizuzwini lendlula e-aweni linye. Lemibuto itawungcinwa kubo ngcondvo mshina. Timphendvulo talemibuto titase tiyagcinwa eNyuvesi yase Pitoli iminyaka lengendluli kulelishumi. Lolucwaningo lutase luyetfulwa yiNyuvesi lentelwe bafundzi.
- 4. Bungoti netikhinyabeto:** Atikho tikhinyabeto nebungoti kulotawuba yincenye yalolucwaningo.
- 5. Inzuzo:** Labataba yincenye yaloluhlolo ngeke babhadalwe. Kodwa ke, kulaba labatawuba yincenye yaloluhlolo bata yibona inzuzo yaloluhlolo ngekutsi imivo yabo itawatiwa velonkhe, netindlela tekwenta lesimo sebalimi siboncono sesitawatiwa.
- 6. Emalungelo alabo labatawuba yincenye:** Kulabo labatawuba yincenye banelilungelo lekungabi yincenye yaloluhlolo futsi banalo lilungelo yekunga phendvuli imibuto.
- 7. Lokuyimfihlo:** Yonkhe imivo letawutsatfwa kulolu hlolo litabawuba yimfihlo ngobe kute ligama lemuntfu lelitawuhaziswa esiveni, futsi naleyomivo itawugcinwa ngebumfihlo lobusezingeni lelisetulu.
- 8. Umuntfu longamutsintsa:** Kulaba labatawuba yincenye yaloluhlolo, uma batawuba nemibuto bangatsintsana nemucwaningi, Melody T. Mudukuti enombolweni letsi 067 2257 8559 nome liposi lembane lelitsi melodymudukuti@gmail.com.

Lusuku:

Indzawo

Sayina Loyincenye

Lusuku:

Indzawo

Sayina Mcwaningi

Appendix D: Interview guide

Semi-structured Interview schedule

Goal of the study:

To explore and describe the perceptions of small-scale farmers on land degradation and how it influences their livelihoods.

Participant number: _____

Date: _____

Section A: Biographical Information

1. Sex

Male		Female		Prefer not to say	
				Other	

2. What is your marital status?

Single		Married		Divorced		Widowed		Live with partner	
--------	--	---------	--	----------	--	---------	--	-------------------	--

3. Age group

18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58+
-------	-------	-------	-------	-------	-------	-------	-------	-----

4. Do you own or rent land?

Own		Rent	
-----	--	------	--

5. Size of land

<0.5 ha	0.5-2 ha	2-5 ha	5-15 ha	15-50 ha	50-100ha	100-500ha	>500 ha

6. Type of farming

Crop farming		Livestock production		Mixed farming	
--------------	--	----------------------	--	---------------	--

7. What are you farming with? _____
8. How many people live in your household? _____
9. How many people contribute to the income of the household? _____
10. How long have you been farming in this area? _____

Section B: Questions on land degradation

1. In your view, what forms of land degradation are there in Komatipoort?
2. What do you think contributes to land degradation?
3. How do you manage land degradation?
4. What are the resources you use in managing land degradation?

Section C: Questions on livelihoods

1. How do you make a living as a small-scale farmer?
2. In what way is land degradation influencing your way of living and livelihoods?
3. How do you adjust your farming activities to ensure an income if you experience sudden changes in the land and / or soil for grazing and growing?
4. Where do you sell your agricultural / farming produce? How often do you sell?
5. What should be done to support small-scale farmers in Komatipoort to look after the land / soil to ensure it can produce a livelihood?
6. What are the challenges of small-scale farmers in Komatipoort?
7. We have come to the end of our interview. Is there anything that you want to add that you think may be of relevance to the study which I have not asked?

Thank you for your participation in the study.

Appendix D: Semi structured interview schedule

Semi-structured Interview schedule

Goal of the study:

To explore and describe the perceptions of small-scale farmers on land degradation and how it influences their livelihoods.

Participant number: _____

Date: _____

Section A: Biographical Information

1. Sex

Male	Female	Prefer not to say	Other
------	--------	-------------------	-------

2. What is your marital status?

Single	Married	Divorced	Widowed	Live with partner
--------	---------	----------	---------	-------------------

3. Age group

18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58+
-------	-------	-------	-------	-------	-------	-------	-------	-----

4. Do you own or rent land?

Own	Rent
-----	------

5. Size of land

<0.5 ha	0.5-2 ha	2-5 ha	5-15 ha	15-50 ha	50-100ha	100-500ha	>500 ha
---------	----------	--------	---------	----------	----------	-----------	---------

6. Type of farming

Crop farming		Livestock production		Mixed farming	
--------------	--	----------------------	--	---------------	--

7. What are you farming with? _____
8. How many people live in your household? _____
9. How many people contribute to the income of the household? _____
10. How long have you been farming in this area? _____

Section B: Questions on land degradation

1. In your view, what forms of land degradation are there in Komatipoort?
2. What do you think contributes to land degradation?
3. How do you manage land degradation?
4. What are the resources you use in managing land degradation?

Section C: Questions on livelihoods

1. How do you make a living as a small-scale farmer?
2. In what way is land degradation influencing your way of living and livelihoods?
3. How do you adjust your farming activities to ensure an income if you experience sudden changes in the land and / or soil for grazing and growing?
4. Where do you sell your agricultural / farming produce? How often do you sell?
5. What should be done to support small-scale farmers in Komatipoort to look after the land / soil to ensure it can produce a livelihood?
6. What are the challenges of small-scale farmers in Komatipoort?
7. We have come to the end of our interview. Is there anything that you want to add that you think may be of relevance to the study which I have not asked?

Thank you for your participation in the study.

Appendix E: Interview schedule translated in siSwati.

LUHLA LWEMIBUTO LEHLELIWE

Umgomo Walolucwaningo:

Kucwaninga neluchazeleka ngemuvo yebalimi nehafuyi ngekugedvuka kwemhlaba, nangekwelutsi kutitsintsa njani timphilo tabo.

Inombolo Yalomphendvulako: _____ Lusuku: _____

Sigaba A: Simo Semvelaphi Yakho

1. Bulili:

Wesilisa		Wesifazane		Ngikhetse kungasho	
----------	--	------------	--	--------------------	--

2. Simo sekushada:

Awukashadi		Ushadi		Nehlukene		Washonelwa		Uhlela nemunfu lotandzana naye	
------------	--	--------	--	-----------	--	------------	--	--------------------------------	--

3. Luhla lweminyaka yakho?

18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58+

4. Ngewakho yini lomhlaba noma uwuchashile?

Ngewami		Ngiwuchashile	
---------	--	---------------	--

5. Bunganani bukhulu bemhlaba wakho (Umgamu){ha}?

0.5	0.5-2ha	2-5ha	5-15ha	15-50ha	50-100ha	100-500ha	>500 ha

6. Wenta nhloboni yekulima noma ulimeni?
7. Usebentisa tindlela tiphi tekulima nekufuya?
8. Uhlala nabangakhi bantfu lapha ekhaya?
9. Bangakhi bantfu emndenini wakho labafaka emandla lapha ekhaya kute kutsi kube khona lokuya entfunjini?
10. Ulime nome ufuye iminyaka lemingakhi kulena ndzawo?

Sigaba B: Imibuto lephatselene ngekugedvuka kwemhlaba

1. Ngekubuka kwakho, tingakhi tihlobo tekugedvuka kwemhlaba letikhona lapha eKomatipoort?
2. Ucabanga kwekutsi yini lokubanga lokugedvuka kwemhlaba?
3. Wenta tabani tini nome tindlela tekumelana nalokugedvuka kwemhlaba?
4. Yini tinsita nome tindlela lotisebentisako ekuvimbeni noma ekuciphisaneni kugedvuka kwemhlaba?

Sigaba C: Imibuto lephatselene nemfuyo

1. Utiphilisa kanjani ngekulima?
2. Lokugedvuka kwemhlaba kuyitsintsa njani imphilo yakho?
3. Ukuhlala njani kulima nome kufuya kwakho, nawubona kwekutsi simo semhlaba wekulima, futsi nalapho khona kudla imfuyo yakho, siyagucu gucuka?
4. Utitsengisaphi tilimo takho? Uye utitsengise emvakwesikhatsi lesinganani?

5. Yini tintsita nome lokungentiwa kwekutsi kwelekelele balimi nebafuyi balapha eKomatipoort, kwekutsi bakhone kunakela imihlaba yabo futsi bakhone kuwonga kute bakhipe tivuno letinhle?
6. Yini tinkinga nome bulukhuni laba hlangabetana nabo balimi nebafuyi balapha eKomatipoort?
7. Sesifike emaphetselweni lwaloluhlolo lwetfu. Kukhona yini longakungeta nome longakucabanga ikakhulu lokungaka khulunywa ngako, kani kungaba lusito kuloluhlolo?

SIYABONGA KAKHULU KUBAMBISANA NAWA KULOLUHLULO

SIYABONGA.

Appendix F: Interpreter consent form



14/07/2022

Our Ref:

Researcher: Melody T. Mudukuti

Cellphone: 067 257 8559

Email: melodymudukuti@gmail.com

INTERPRETER CONSENT FORM

Research topic: An exploratory study of small-scale farmers' perceptions of land degradation in Komatipoort and how it influences their livelihoods.

I, _____, agree to act as Interpreter for the study to explore and describe the perceptions of small-scale farmers on land degradation and its influence on their livelihoods. In doing so, I undertake to

1. respect the confidentiality of any conversation I interpret. I will not communicate or share any information from the research study with any individual or organisation other than the researcher named above.
2. completely and accurately interpret, without omitting or changing anything discussed in the course of the interview.
3. not derive any personal profit or advantage from any confidential information that I may acquire during the interviews.

(Print Name)

(Signature)

(Date)

(Researcher)

(Signature)

(Date)

Room 10.21, Humanities Building
University of Pretoria, Private Bag X20
Hatfield 0020, South Africa
Tel +27 (0)12 420 2325 or 420 2030
Email antoinette.komband@up.ac.za
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Appendix G: Back translation: Interview schedule

INTERVIEW SCHEDULE BACK-TRANSLATION

Goal of Study: To explore and describe the perceptions of small-scale farmers on land degradation in Komatipoort and how it influences their livelihood.

Number of Participant: _____ Date: _____

Section A: Background Information

1. Sex:

Male		Female		Choose not say	
------	--	--------	--	----------------	--

2. Marital Status:

Single		Married		Divorced		Widowed		Live with partner	
--------	--	---------	--	----------	--	---------	--	-------------------	--

3. Age Group?

18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	58+

4. Are you the owner or renting the land?

Own		Rent	
-----	--	------	--

5. What is the size of your land in hectares?

0.5	0.5-2ha	2-5ha	5-15ha	15-50ha	50-100ha	100-500ha	>500 ha

6. Type of farming?

Crop farming		Livestock production		Mixed farming	

7. What are you farming with??

8. How many people do live with within your household?

9. How many people contribute to the income of the household?

10. How long have you been farming in this area?

Section B: Questions on Land Degradation

1. In your view, what forms of land degradation are there in Komatipoort?

2. What do you think contributes to land degradation?

3. How do you manage land degradation?

4. What are the resources you use in managing land degradation?

Section C: Questions

1. How do you make a living as a farmer?

2. How does land degradation impact on your livelihood?

3. How do you adjust your farming activities to ensure an income if you experience sudden land changes?

4. Where do you sell your agricultural produce? How often do you sell your produce?

5. What kind of support would farmers in Komatipoort appreciate to ensure that land is preserved so that it produces the best yields?

6. What kind of challenges do Komatipoort farmers encounter?

7. We have come to the end of the interview. Is there anything that you feel has not been discuss, but relevant to the study?

THANK YOU VERY MUCH FOR CORPORATION WITH REGARDS TO THE STUDY

THANK YOU.

Appendix H: Back translation of participant informed consent

Researcher: Melody T. Mudukuti

Number Cellphone: 067 257 8559

Email: melodymudukuti@gmail.com

Informed Consent for participating in Research Study

1. **Title of the Research:** Research of small-scale farmers on the views and perspective on land degradation and how it impacts on their livelihood.
2. **Aim of the Study:** To conduct a study and to ascertain of the perspective of small-scale farmers on how land degradation and how it affects their livelihood.
3. **Procedure:** The study will involve a mouth to mouth interviews. The interview will not last not more than an hour. All questions and answers will be stored in the computer. All responses to questions will be stored at the University of Pretoria for not more than ten years. The research will then be shared by the University to the students.
4. **Constraints and discomforts:** There will be no constraints and discomforts for the interviews in the study.
5. **Benefits:** Participants of the study will not be paid. Those participants who will benefit from the study are those whose responses will be published for the whole country where government, stakeholders, decision-makers will be able to make recommendation with reference to the studies and improve the livelihood of small-scale farmers.
6. **Rights of the Participants.** Participants have the right to reserve their comments and also, they have the right not to respond.
7. **Confidentiality:** The identity of participants will not be revealed. All information gathered from the study will remain the property of the Researcher. No names will be revealed all information received from the study will be reserved at all costs.
8. **Contact Person:** All participants who have been part of the study, should they have queries or questions or need further clarification on the study should not hesitate to contact the Researcher Melody T. Mudukuti, at 067 2257 8559, or email: melodymudukuti@gmail.com.

Appendix I: Permission letter: Research ethics committee



Faculty of Humanities

Fakulteit Geesteswetenskappe
Lefapha la Bomotheo



1 August 2022

Dear Miss MT Mudukuti

Project Title: An exploratory study of small-scale farmers' perceptions of land degradation in Komatipoort and how it influences their livelihoods
Researcher: Miss MT Mudukuti
Supervisor(s): Prof A Lombard
Department: Social Work and Criminology
Reference number: 15295372 (HUM006/0722)
Degree: Masters

I have pleasure in informing you that the above application was **approved** by the Research Ethics Committee on 28 July 2022. Please note that before research can commence all other approvals must have been received.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely,



Prof Karen Harris
Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: tracey.andrew@up.ac.za