Listening to Land Users

A social representations theory lens on navigating land use challenges and carbon farming in the Eastern Cape, South Africa

Karen Marie Schellhase

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Abstract

This thesis explores the perceptions of private, commercial land users in South Africa's Eastern Cape, focusing on their perceptions around land use challenges and the potential implementation of Spekboom carbon farming as a potentially sustainable agricultural practice. Spekboom, a succulent plant, has been identified for its potential in ecosystem restoration, that is hoped to be financed on a large-scale via voluntary carbon markets. Despite extensive research on the ecological benefits of Spekboom farming, there remains a significant gap in understanding the people influencing the implementation of such land use practices. Using Social Representations Theory as a framework, this study examines how land users conceptualize land use challenges and navigate possible land use transitions to overcome these in the study area. The research draws upon semi-structured interviews and observations conducted with private, commercial land users, offering insights into two distinct social representations: land use challenges as threats to livelihoods and land use challenges as threats to environmental integrity. The findings reveal that while most land users are generally open to sustainable practices such as Spekboom carbon farming, financial uncertainties, administrative challenges, and a lack of successful examples often inhibit widespread adoption. This study contributes to bridging the gap between ecological and social considerations in land use transformations, emphasizing the importance of understanding cultural as well as economic factors in land use transitions towards possibly more sustainable agricultural practices like Spekboom carbon farming.

Keywords: carbon farming, social representations theory, South Africa, agriculture, Spekboom, land use challenges

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1. Introduction

1.1 Problem Formulation

The United Nations have declared 2021-2030 as the United Nations Decade on Ecosystem Restoration. In their declaration, they stress the urgency to restore degraded ecosystems and to promote sustainable development, so that irreversible social, economic, and environmental damages might be avoided (UN General Assembly 2019). Agricultural land use is one of the main factors contributing to global warming, which leads to climate change. Thereby, ecosystems, water- and food security are put at risk (IPCC 2023). Of the global land surface, around 38 percent is used for agricultural purposes (FAO 2020). In South Africa, around 37,9% of the country's landmass is used for commercial agriculture (Department: Statistics South Africa 2020). In total, 82% of the nation's landmass is in the hands of private landowners (Department: Rural Development and Land Reform 2017). However, the South African commercial agricultural sector is responsible for around 80% of national agricultural output, on which South Africa and multiple neighboring countries are dependent on for food security (Temoso et al. 2024). Since private, large-scale commercial farmers own most of South Africa's land, with their agricultural practices significantly contributing to food security simultaneously as they contribute to global warming, it seems crucial to explore strategies that promote more sustainable land use. The climate change mitigation potential within agriculture and other land use is substantial (IPCC 2023). By realizing it, the sector might be able to play a decisive role in tackling ecosystem degradation, while also improving livelihoods (UN General Assembly 2019).

Different options of how climate change could be mitigated through agriculture are widely discussed. One such debated option is the potential of agricultural

practices to remove carbon from the atmosphere by increasing the amount of carbon in agricultural soil, thus lessening the effects of climate change (Tang et al. 2019; Bossio et al. 2020; IPCC 2023). Such agricultural practices are called carbon farming (Tang et al. 2019). They are usually debated in connection to voluntary carbon markets, which are often hoped to finance carbon farming (Mills et al. 2007; FOEI 2021; Dupla et al. 2024).

One such discussed carbon farming practice is planting the succulent plant Spekboom within the study area of this thesis, the Eastern Cape Subtropical Thicket in South Africa, where it occurs naturally. Spekboom is said to aid ecosystem restoration by capturing and storing high amounts of carbon dioxide from the atmosphere (e.g. Mills et al. 2007; Mills & Cowling 2010; Polak & Snowball 2019; Galuszynski et al. 2023). Transitioning agricultural land use practices in this region to accommodate Spekboom planting, is debated and complex. However, while the body of research on ecological processes behind Spekboom carbon farming in the Eastern Cape seems extensive (e.g. Mills et al. 2007, 2023; Mills & Cowling 2010; Powell 2019), few studies have been conducted on the perspectives of commercial, private land users, on whose land it is largely hoped to implement Spekboom planting (e.g. Curran et al. 2012; Polak & Snowball 2019). Not regarding social science focusing on the human agents in the study of land use and agriculture, is a common issue (Juana et al. 2013; Fischer et al. 2018). Implementing restoration programs, however, inherently involves both social and ecological processes. Humans like the private, commercial land users in this study area, are crucial in transforming land use to implement practices such as Spekboom carbon farming. Understanding how willing they are to participate in these processes, and why, appears necessary to navigate them successfully. How effective the implementation of measures such as voluntary Spekboom planting is, thus largely depends on social factors (Curran et al. 2012).

1.2 Research Aim and Questions

The aim of this thesis is to contribute to bridging the gaps in social science research on land use transformations as described above, by focusing on understanding the

meaning-making processes of private, commercial land users in the study area. Exploring the land users' perceptions of land use challenges and ways of navigating these, is hoped to provide a better understanding of the factors that might influence land use transformations and the implementation of possibly more sustainable practices such as Spekboom carbon farming (Juana et al. 2013). It is thus explicitly not a goal to judge whether certain land use practices are better than others and should be implemented or not. I apply social representations theory as a tool to study the everyday knowledge these land users draw on when perceiving land use challenges, and how this helps them to navigate the challenges (e.g. Moscovici 1988; Keulartz et al. 2004; Michel-Guillou & Moser 2006; Buijs et al. 2011). Next, the study hopes to reveal how their perceptions of Spekboom carbon farming are shaped by their social representations of land use challenges. Therefore, it is examined how they try to make the concept of Spekboom farming self-evident by anchoring or objectifying it within the representations (Moscovici 1988). This is hoped to reveal implications for implementing land use transformations to overcome land use challenges.

The following research questions guide the research process in reaching this aim:

RQ1. How do private, commercial land users in the Eastern Cape Subtropical Thicket biome, South Africa, socially represent land use challenges?

RQ2. How do they relate the concept of Spekboom carbon farming to their social representations of land use challenges?

RQ3. What implications for implementing land use transformations to overcome land use challenges might the findings from RQ1 and RQ2 reveal?

The first two questions guide my data generation process. The third question builds on the findings of questions one and two and becomes more significant in the discussion section.

This thesis is structured as follows. Following upon this chapter, the background informing this project is laid out, providing a broader contextualization of the study site and research problem. Then, the theoretical framework building on social representations theory and how it informs this study is elaborated upon. Thereafter, the qualitative methodology, including semi-structured interviews and participant observation, that was applied to generate data and to guide data analysis is described and reflected upon. Subsequently, the results are laid out to reflect the private, commercial land users' social representations of land use challenges, and how they relate the concept of Spekboom carbon farming to these. In the discussion, the findings are set into a broader context and discussed in light of the research questions. The conclusion states the thesis' limitations and gives suggestions for future research.

2. Background

2.1 Study Site

The study site within which the research project is located is the Subtropical Thicket biome in the Eastern Cape province of the Republic of South Africa. The Eastern Cape Province covers 168 966 km2 of land area and is inhabited by around 6,6 million people, making it the second largest province in South Africa by landmass and the third largest province by population (Maroyi 2022; Mujuru et al. 2022). The Eastern Cape Subtropical Thicket biome alone makes up around 25% of the Eastern Cape's landmass (Kerley et al. 1995). Thicket can be described as an area with dense clusters of mostly evergreen bushes and trees below 5 meters in height (Cowling et al. 2005). The focus of this study lies within the areas of the thicket within which the succulent plant Portulacaria afra, also known as Spekboom, occurs naturally.

2.2 The Historical and Agricultural Context

Since my research focuses on private, commercial land users, it is important to grasp in which agricultural context they are situated. I use the term land users throughout this thesis, since the ways in which they use their land are very diverse and include more than farming, for example game reserves or hunting businesses. In South Africa and thus also the Eastern Cape Subtropical Thicket, land ownership remains highly skewed with most land remaining in the ownership of the country's white minority. This is a remnant of colonial times (Gwiriri et al. 2021), with the last period of colonial ruling being the racist, violent apartheid system starting in 1948 and formally ending in 1994 (Hebinck et al. 2011a; Rogobete 2015; Zantsi &

Nengovhela 2024). During the eighteenth and nineteenth centuries, the Eastern Cape, where the present study is located, was shaped by struggles between British and Dutch colonists, and native people, mainly Xhosa-speakers but also Khoikhoi and San people (Crais 1992; Hebinck et al. 2011). Multiple wars of dispossession led to large areas of land being taken by white European settlers (Crais 1992; Hebinck et al. 2011).

Today, South Africa has the highest total gross domestic product out of all countries within Africa (International Monetary Fund 2024; Statista 2024), while also having one of the highest poverty inequality rates worldwide (Gwiriri et al. 2021). South Africa further has the second largest land area dedicated to agriculture on the African continent (Statista Research Department 2023). The gross value of South African agriculture has grown modestly in the last couple of years (Sihlobo 2023b), and employment in the agricultural sector has increased (Sihlobo 2023a). Most of this growth is attributed to the large scale, still largely white owned, farming sector.

Nonetheless, land users in the Eastern Cape and across South Africa are currently grappling with a range of challenges. Crime, such as livestock theft and violent incidents including farm attacks and murders, is a concern (Burger 2018; Farmer's Weekly 2024; Westerdale 2024). These crimes can be linked to broader social and economic issues. The legacy of forced land dispossession from the apartheid-era and failed government efforts at land redistribution, have led to frustrations among black South Africans and exacerbated tensions around land ownership and access in rural areas (Akinola 2020). Although private, commercial land users have better infrastructure compared to communal farmers, they often experience the situation as challenging. Inadequate roads are for example experienced to complicate the transportation of goods (Musa & Phillip 2015). Regular scheduled cuts in electricity further compound the difficulties, particularly when critical systems like water irrigation are disrupted (Kusakana 2019).

The study area is further faced by various environmental challenges. It generally gets little rain and is facing serious drought and water-scarcity issues (Kerley et al. 1995) that have intensified within the last decades (Mahlalela et al. 2020). The Eastern Cape Subtropical Thicket is also facing severe land degradation (Mills &

Cowling 2010), partially due to long periods of overgrazing through heavy pastoralism with large numbers of goats and cattle (Kerley et al. 1995). This is where Spekboom carbon farming comes into play, as shall be described in the next section.

2.3 Carbon Farming and Carbon Credits

Planting Spekboom plants is suggested to aid rehabilitation of degraded lands in areas where the plant occurs naturally (Mills et al. 2007; Mills & Cowling 2010). Spekboom's capacity to draw high rates of carbon from the atmosphere and store them, is hoped to lead to support the natural recovery of the ecosystem (Mills et al. 2007). Public sector funding for thicket biome restoration began in 2003, aiming to encourage larger private sector investments (Mills et al. 2015, 2023). The first attempt to demonstrate the feasibility of large-scale restoration using Spekboom in the Eastern Cape, funded by the South African government′s Working for Water program, started in 2003. It sought to collect quantitative data on the amount of carbon dioxide that could be captured from the atmosphere and stored in the ground by planting Spekboom. Biodiversity gains were measured, and the financial requirements for large-scale restoration explored. One funding stream envisioned in that project was the private sector, in particular self-regulated, voluntary carbon markets (Mills et al. 2007, 2023; Mills & Cowling 2010; Powell 2019). These employ specific protocols to track changes in the amount of carbon stored in the soil, which are then converted into carbon credits that can be sold (Dupla et al. 2024). Carbon credits can then be bought by actors like companies seeking to reduce their own carbon emissions (Curran et al. 2012). In 2023, at least eight private sector companies are said to be involved in the restoration of the Eastern Cape Subtropical Thicket, who all are seemingly involved in some step of the generation, certification and selling of carbon credits, a development that has gained momentum in recent years (Mills et al. 2023; Potts 2024).

The South African Department of Environmental Affairs (DEA) views carbon credit trading as a key climate change mitigation tool, proposing an absolute baseline-and-credit trading scheme where entities can sell credits if they emit less

than their allocated carbon budget. In 2019, a carbon tax was introduced under the Carbon Tax Act, allowing South African companies to offset up to 10% of their tax obligations through carbon credits (WWF 2018). Commercial providers need to verify baseline carbon levels before a carbon farming practice is implemented, and the resulting increases in soil organic carbon content are registered to create carbon certificates which can be sold.

Programs in South Africa that plan to sell any greenhouse gas credits must be registered and approved by the Clean Development Mechanism, Verified Carbon Standard (Verra), or the Gold Standard, which oversee the project and credit issuance process (Department of Mineral Resources and Energy 2020). Carbon credit trading is hoped to financially incentivize more sustainable land use practices, potentially boosting livelihoods, creating jobs, enhancing food security, and promoting climate change mitigation and technology transfers (Soezer 2022). However, voluntary emission offsets are also criticized, for example with concerns that they may enable major corporations to continue with "emissions-as-usual approaches" (FOEI 2021: 19) and increase demand for land to absorb emissions (FOEI 2021), or because the long-term effects of carbon storage are unclear (Jones 2024). Globally, carbon trading has become central to climate policy. The Kyoto Protocol, effective from 2005, was the first major international effort to reduce greenhouse gas emissions by setting targets for signatory industrialized countries and creating a global emission permit marketplace between nations (Calel 2013). The 2015 Paris Agreement aimed to limit global temperature rise and allowed signatory countries to set their own emission reduction goals every five years, with provisions for international trading of emission credits to help meet these targets if other measures fall short (Pollitt 2019). As becomes clear, commodifying greenhouse gases, particularly carbon, has become a widely used strategy to curb emissions between nations and in the private sector.

2.4 Land Users' Perceptions and Experiences

Many questions remain regarding how private, commercial land users perceive and navigate dynamics around land use challenges and carbon farming. In the context

of this thesis' study area, one of the closest investigations into this research problem was conducted by Curran et al. in 2008 (Curran et al. 2012). Their findings indicated that land users with substantial knowledge of climate change and prior involvement in restoration were most likely to collaborate for Spekboom restoration projects. While all participants were open to implementing small test plots for research, they required assured financial incentives and collective decision-making processes, before they would be willing to commit larger land areas. Ecological benefits alone were insufficient to convince them (Curran et al. 2012). A study by Polak & Snowball (2019) focusing on the impact of Spekboom restoration projects on local economic development. They found that private landowners perceived the technical and administrative requirements to register as carbon credit providers as excessive (Polak & Snowball 2019). Some were hesitant to engage due to the high initial costs of transitioning to Spekboom farming, coupled with delayed financial returns (ibid.). Cammarata et al. (2024) studied Italian farmers' intentions to shift practices to participate in voluntary carbon markets, using an extended theory of planned behavior. Their research also highlighted uncertainties surrounding financial returns. Moreover, farmers' perceptions of environmental risks and their knowledge of climate change mitigation through agriculture strongly influenced their willingness to adapt their practices. A survey of German farmers found that perceived financial benefits, peer actions, social networks, and a sense of responsibility or moral regarding climate change were the primary motivators for adopting carbon sequestration practices. Political pressures and ecological benefits had a lesser influence on their decisions (Block et al. 2024). These factors seem to commonly shape land users' views on carbon farming, as multiple other studies reveal (Buck & Palumbo-Compton 2022). Additionally, cultural norms, for example on what farmers perceive as "good farming", were found to influence whether carbon farming practices would be implemented or not. Lastly, some farmers in Australia were not open to adopting carbon farming, since they wanted to maintain freedom and control over how they use their land (ibid.).

3. Theoretical Framework: Social Representations Theory

3.1 Social Representations Theory

The meaning of common sense

The term social representations was coined by Moscovici in 1961, as he explored how science moves into the commonsense of wider society (Wagner 2020). Moscovici describes social representations as entities of common sense in contemporary societies, which serve to make strange influences imposed from the outside familiar (Moscovici 1988; Billig 2008). These entities are understood to be collective mental models around a certain object or phenomenon, through which meaning is given to reality (McKinlay & Potter 1987; Michel-Guillou & Moser 2006). Social representations are shaped by a connected set of believes, ideas, values and practices around an object or phenomenon. They are developed and shared by humans belonging to a social group, and are simultaneously individual cognitions, cultural phenomena and relational entities (Castro & Batel 2008; Buijs et al. 2012). They are the basis for social interactions, as well as the product of it (Höijer 2011). Not having to be entirely exclusive to one social group; they can be shared to various degrees among group members and between different social groups (Moscovici 1988; Liu 2004; Buijs et al. 2012). Individuals or groups may switch between different social representations of the same phenomenon depending on the context, drawing on multiple co-existing rationalities, which is known as cognitive polyphasia (Provencher 2011). Social representations can help to understand and navigate the environment, be utilized to justify actions or stances, and even assist in coordinating interpersonal connections (Michel-Guillou & Moser 2006). Social representations theory thus studies "everyday communication and

thinking" (Moscovici 1988: 225). It is an attempt to understand societies which are characterized by a plurality of views and understandings (Castro & Batel 2008).

3.1.1 Anchoring and Objectifying

Social representations are based on cultural, macro-social, and historical factors that have shaped the context of a social group (Molinari & Emiliani 1996; Wagner et al. 1999; Marková 2008). Since the contexts of social groups can change over time, their social representations can as well, making them dynamic entities. They might reach a point of widespread acceptance or stability, but they can continuously be reshaped (Buijs et al. 2012). Communication is said to form and transform social representations through the two interrelated "socio-cognitive communicative mechanisms" (Höijer 2011: 7) of anchoring and objectifying (Selge & Fischer 2011).

Anchoring serves to link new phenomena to already established webs of knowledge, which our cultures are shaped by (Moscovici 1988; Marková 2008; Batel et al. 2016; Sarrica et al. 2019). It is as "a kind of cultural assimilation by which new social representations are incorporated into the well-known ones simultaneously as the latter ones are transformed by the new ones" (Höijer 2011: 7) or a "decoding operation" (Moscovici 1988: 235). Foreign ideas are thereby compared to similar, already-established concepts, which helps to give meaning to the new ideas (Batel et al. 2016; Sarrica et al. 2019). Anchoring has been successful once the new phenomenon has become self-evident and familiar, it thus "acquires an everyday meaning in the process" (Moscovici 1988: 235). Anchoring can for instance happen by naming something, attaching it to common emotions, connecting it to established themes, or by making distinctions or metaphors to the established social representation. The individual thus has some agency to shape this process (Höijer 2011). For example, people compared and anchored at the time newly available Genetically Modified Crops to previous themes in agricultural innovations they were familiar with, such as hybrid corn (Castro & Batel 2008).

In comparison, objectifying involves selecting information and making abstract phenomena concrete, for example "trough making an image or metaphor correspond to the object" (Batel et al. 2016: 737). They no longer only exist in the

minds of people, but are evident "in the world" (Moscovici 1988: 214). Money is for instance an objectified representation linked to a specific set of meanings around the exchange of goods. It shapes our daily interactions with society, influencing both individual actions and broader social systems (Moscovici 1988). Thereby, money can be perceived and experienced as if they were real (Buijs et al. 2012).

As these processes show, social representations theory can be a tool for examining the tensions between stability and change. It does not view change as replacing old ideas with new ones. Instead, it examines how old and new ideas interact, sometimes leading to social transformation, like when money or GMO crops were introduced (Castro & Batel 2008). These processes are handled differently depending on the social group and the webs of knowledge that they draw on (Castro 2006).

3.1.2 The Cognitive, Expressive and Normative Dimensions

In this study, cognitive, expressive and normative dimensions shall be applied to examine how land users conceptualize social representations of land use challenges. This approach has proven fruitful in uncovering underlying instrumental and intrinsic values of social representations (Keulartz et al. 2004; Buijs et al. 2011). The dimensions give insight on a range of factors constituting the cultural context of social representations. Understanding these is important for creating discursive processes that culturally resonate with people's social representations, and are thus more successful (Buijs et al. 2011).

The cognitive dimension is understood to involve the knowledge and beliefs people hold about land use challenges (Buijs et al. 2011). It includes how they are understood and conceptualized, or categorizing different types of challenges (Keulartz et al. 2004). In contrast, the expressive dimension relates to the emotional and aesthetic responses land users experience around land use challenges (Keulartz et al. 2004; Buijs et al. 2011). The normative dimension includes the values and ethical considerations land users draw on to navigate land use challenges. They might reflect morals that social groups have around land use challenges. Since the three dimensions are interrelated, they can provide a comprehensive framework for

understanding how different actors perceive and navigate land use challenges (Keulartz et al. 2004).

4. Methodology

Building on the social-constructivist worldview of this thesis, data is believed to only emerge through the methods that I employ as a researcher (Creswell & Creswell 2018). The purpose of the methodology is "to learn about the problem or issue from participants" (Creswell & Creswell 2018: 258).

4.1 Data Generation

4.1.1 The Sampling Process

At first, the project underwent an ethical approval process at Nelson Mandela University in South Africa. After approval, the purposive sampling process of research participants was initiated (Rapley 2013). They had to be private, commercial land users within the Eastern Cape Subtropical Thicket biome where the Spekboom plant can occur naturally. At first, an opportunistic sampling strategy was applied by making use of the connections that my South African supervisor had to private land users who were suitable candidates for the study. Then, snowball sampling was used (Suri 2011). Potential participants were invited for around one hour, in the form of a face-to-face, semi-structured interview. They were provided with information on the project and their rights as research participants, including for example the voluntary nature of participation or that their identity will not be revealed (Long et al. 2016), (see Appendix 2).

In total, 11 interviews were conducted, and 12 land users interviewed for data collection; in one case two land users were interviewed together. Eight interviews were held on the land that the interviewees work on and three at a café or office. 11 participants identified as male, and one as female. All research participants identified as white. Five of the land users had long-standing family history on their working land. In some cases, their farming history could be traced back to periods

of European colonialism, with two of the land users even farming in the sixth generation. In terms of age, they ranged from their mid-forties to mid-seventies. *Table 1* gives an overview of the participant composition. Additionally, one practice interview with an eligible land user was conducted before the official data collection had started, to test the interview guide. Three interviews were conducted with plant conservation ecologists and people involved in carbon farming businesses, to inform the background of the study. Interviews for data generation lasted in-between just under one hour to just under two hours. All participants were anonymized. In the results and discussion section, quotes are labelled with a randomly assigned number, in addition to a letter indicating their type of land use: C- commercial, W- weekend, I- implementation manager. Commercial land use means that their land use operation is the land user's main income stream and that they are on the land full-time. Weekend land use derives from the term weekend farmer, which is colloquially used in the study area to describe a land user that is not on the farm full-time, but mostly on the weekends. Their land use operations might generate some income, but they are not solely dependent on it. Implementation managers manage land for Spekboom planting businesses.

Abbreviation	Type of Land Use
C1	Cultivation of lucerne crop, Production of feed pellets
C2	Farming with cattle, sheep and goats
C3	Farming with cattle, sheep and goats
C4	Game farm, Hunting operation
C5	Game farm, Hunting operation
C6	Game farm, Hunting operation
W1	Farming with cattle and goats
W2	Farming with cattle and sheep
W3	Farming with cattle
I1	Implementation manager for a Spekboom planting operation
I2	Implementation manager for a Spekboom planting operation

Table 1.: Participant Composition, created by author

4.1.2 Semi-Structured Interviews and Observations

Right before each interview, participants received a participant information sheet restating important information on the project and their rights (see Appendix 2) and a consent form which they had to sign to participate (Robson & McCartan 2016). Additionally, they were orally asked for consent to record the conversation to aid data analysis. Detailed notes were taken during the interviews. In this thesis, interviews are believed to give the participants the chance to express themselves through language and to offer their personal account (Robson & McCartan 2016). Interviews were planned and conducted in an open manner, to avoid preconceived notions about possible findings. While I knew that I wanted to encourage conversations around land users' perceptions around land use, challenges and Spekboom carbon farming and the carbon market, I wanted to avoid approaching the conversations with a rigid theory in mind. Before conducting the interviews, I considered social practice theory as a possible theoretical lens. Only after a few interviews had been conducted and re-occurring themes around certain issues emerged, did I realize that paying more attention to social representations theory might be a fruitful way to make sense of these themes. My research questions were thus also adapted throughout the process.

The semi-structured interviews of this study were based on a loose interview guide, which ensured that topics relevant to the research problem got covered during the interview, but not all questions had to get asked (see Appendix 1). Most of the questions were open-ended, through which the flow of conversation stayed flexible (Creswell & Creswell 2018). Research participants had the possibility to bring up new themes or to elaborate on certain topics (Robson & McCartan 2016). Interviews would usually start and end similarly since it seemed to nicely frame the interview. In the beginning, interviewees would be asked to describe their daily business on the land, and the last question would be about their wishes for the future. Asking the questions openly helped minimize social desirability bias (Robson & McCartan 2016). The methodological conceptualization of this thesis has been shaped by an iterative process, with the research design being continually reviewed (Robson & McCartan 2016; Creswell & Creswell 2018).

Participant observation was used to add additional insight on how the group of land users "experiences and makes sense of their lives and their world" (Robson & McCartan 2016: 18). In this thesis, participant observation is understood as a tool to record certain behaviors of the research participants during the interviews, but for example also during walks or drives across the participants' land. The method took a complementary role as a research method, with the main method being semi-structured interviews. The application was comparatively light, since I as the researcher did not immerse myself into the group of land users and did not become a participant myself (Robson & McCartan 2016). Notes on behavior were taken whenever a certain behavior stood out.

4.2 Data Analysis

Data analysis and theorizing around the data took place during and after the interviews, with me taking notes of interesting comments or behaviors that I would like to explore further. Each interview was recorded and transcribed. Those transcripts as well as the notes taken during interviews and observations formed the basis for my analysis. First, they were analyzed exploratively and coded openly with the open-source qualitative analysis software Taguette, which allowed for themes to emerge from the data (Creswell & Creswell 2018). A theme was regarded as interesting when it occurred frequently and across different interviews (Strauss & Corbin 1990). Many transcript sections were marked with tags reflecting various themes. Challenges, such as drought impacting businesses, were frequently noted. Environmental concerns and carbon farming were also commonly tagged, along with changes impacting land use. Discussions further often touched on farming history, visions for the future, and opportunities perceived by land users both for themselves and within a broader context. Often, sections were marked with multiple tags, for example when land users talked about environmental challenges that had changed over the years.

At this point, I had decided that it would be interesting to take a further look at the material from a social representations' perspective, since the land users seemed to share similar perceptions around similar themes, and since I wanted to further

explore how these perceptions were conceptualized. After some trial and error exploring environmental challenges specifically, social representations of land use challenges in general were chosen as a focus. The theme seemed to re-occur frequently and similarly and was thus suspected to hold a certain importance to the land users. I re-analyzed the transcripts using the cognitive, expressive, and normative dimensions of social representations of land use challenges (Buijs et al. 2011). This approach seemed to best capture how land users shared their views, often through their knowledge, emotions, and values related to these challenges. These dimensions then formed a coding scheme (Strauss & Corbin 1990). A notion would for instance be marked as belonging to the cognitive dimension, if a land user started talking about reasons for or beliefs about challenges (Keulartz et al. 2004; Buijs et al. 2011) such as "I think the bigger reason is (…)" (C6) or stating that Spekboom planting "is more accountable than REDD+ or other types of avoidance calculations" (I1). A notion would be marked as belonging to the expressive dimension when an emotional response could be connected to a certain land use challenge, such as saying that environmentalists "start becoming depressed, seeing the world go to shit" (I1) or when crying was observed (C1) (Keulartz et al. 2004; Buijs et al. 2011). The normative dimension was marked when values, norms or ethical considerations were connected to land use challenges (Keulartz et al. 2004; Buijs et al. 2011). For instance, when values of family tradition in overcoming challenges were highlighted. Importantly, it needs to be mentioned that the three dimensions inform each other and can overlap (Keulartz et al. 2004). When a transcript section was tagged as belonging to multiple dimensions, in the results it would be laid out in the dimension to which it seemed the most relevant. For example, emotional stances towards the environment are often tied to ethical opinions on how it should be managed or conserved. Two broad categories of social representations of land use challenges emerged: Namely, land use challenges as threats to livelihoods and land use challenges as threats to environmental integrity.

To gain an even deeper understanding of the meaning-making mechanisms behind the two representations, it was looked at how land users anchor and objectify

the concept of Spekboom carbon farming in relation to their representations (Moscovici 1988).

4.3 Methodological Reflections

Interviews were conducted with a fellow master's student, though we analyzed the data separately. Aligning our research interests while creating the interview guide was sometimes difficult, but the collaboration proved enriching. Conducting interviews together was effective; we rotated roles and kept the sessions flexible, with each of us leading sections aligned with our interests. During three interviews, a participant who helped connect us with others was present. Clearer agreements on their role would have been beneficial. Their connections and trust with interviewees facilitated access, but their occasional input sometimes diverted the focus. Their presence raised ethical concerns about confidentiality, though they assured us to keep it verbally. Navigating the participants' trust was challenging, especially since some had made negative experiences with outsiders before. It was crucial for me to handle their trust carefully, considering that future researchers may work with them. My goal is not to judge their views, but to understand and place them in a broader context. Additionally, I was mindful of my own biases throughout the study. It was sometimes difficult to set aside my feelings on issues like racism or climate change and focus on the participants' perspectives without letting my opinions guide the research.

5. Results

To grasp the meaning-making mechanisms behind the study participants perceptions of land use challenges, the cognitive, expressive and normative dimensions of social representations have been drawn upon. This process resulted in the identification of two social representations of land use challenges: Firstly, land use challenges as threats to livelihoods and secondly, land use challenges as threats to environmental integrity. Although there are certain overlaps between the representations, interviewees tend to lean more heavily on either one of them, while representing the other one less. For each of the representations, it will further be examined how the land users might anchor or objectify the concept of Spekboom carbon farming within them.

5.1 Social Representation of Land Use Challenges as Threats to Livelihoods
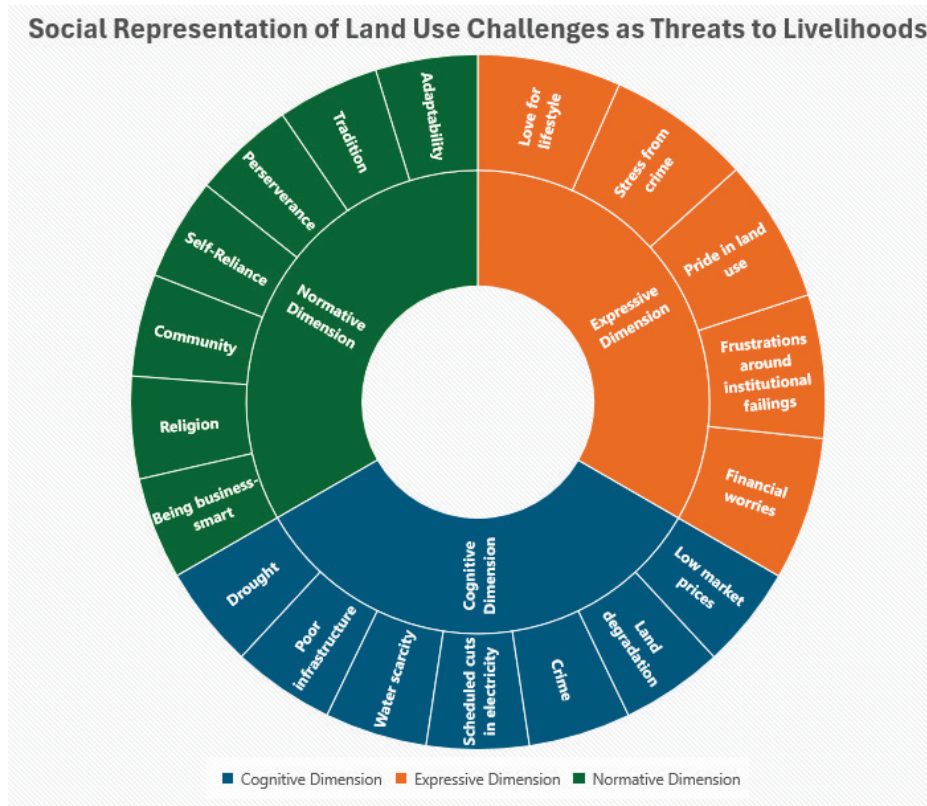
Figure 1: Illustration of the "Land use challenges as threats to livelihood" representation, created by author

The social representation of land use challenges as threats to livelihoods is the most widely held among land users (C1, C2, C3, C4, C5, C6, W1, W2, W3). However, not all land users who hold this representation identify with every aspect equally. *Figure 1* provides an illustrative overview of this mental model, highlighting key aspects that shape the cognitive, expressive, and normative dimensions. Interviewees who share this representation seem to mainly perceive land use challenges as direct threats to their livelihoods, as becomes apparent across the dimensions. It was found that Spekboom carbon farming does not seem to be an inherent part of this representation. Although probing questions such as "Do you see any way in which degraded land could be restored?" were asked, land users did not mention Spekboom carbon farming unless prompted by a more direct question. To land users who hold this representation, Spekboom carbon farming is neither self-evident nor a part of their commonsense understandings around land use

challenges. Therefore, how these land users anchor and objectify Spekboom carbon farming will be laid out after the three dimensions.

5.1.1 The Cognitive Dimension

Complex Economic Struggles

To respondents who hold this representation, land use challenges are largely defined by factors which they connect to economic struggles, as laid out under the cognitive dimension in *Figure 1*. According to this view, most land use challenges can be traced back to larger economic or governmental structures that impact how they utilize their land. Further, certain economic pressures are described as pushing land users into performing land use practices like intensive livestock farming that might lead to other challenges such as land degradation. Environmental challenges such as drought and water scarcity, are described as intense. However, while environmentally sustainable land use is perceived as desirable by most, it will not be prioritized over land use that participants believe to better secure their livelihoods. The following quote illustrates this line of reasoning, by C6 describing the challenge of land degradation and economic pressures:

> "If you look at the degradation from overgrazing, because people didn't understand what they were doing, the carrying capacities are less than what they were. (…) but I think the bigger reason is as margins have got squeezed, farmers have been forced to maintain the income streams, have been forced to increase numbers and that has put pressure on the land again." (C6).

As can be deducted from the quote above and as mentioned in other interviews, the main argument for most land users seems to be: "If it pays, it stays" (e.g. C4, C6). This reasoning could be tied to regular financial struggles that many land users report due to a decline in market prices for their products, infrastructure that is perceived as poor, crime such as stock theft, lack of government subsidies and the scheduled cuts in electricity which lead to extra costs for local backup solutions for provisions of electricity.

Environmental Challenges

All land users holding this representation believe environmental challenges to be severe, especially drought and water scarcity. One interviewee for example states that "in my 48 years I think that was definitely the driest patch or number of years in a row that I've ever known or seen" and "because of all the droughts, people started to move away from the farm to the cities" (W3) – implying major drought related changes not only to the natural environment but also to the land user community. At one point, W3 did not have any animals on his farm due to the drought. Nonetheless, he believes that the dryness also makes the land healthy by reducing parasites. He is further starting to stock his farm with cattle again. However, beliefs about the causes of environmental land use challenges and how they should be dealt with are played down by some land users who hold this representation (e.g. C2, C4, W3). For example, by describing these environmental challenges as being cyclical weather occurrences instead of climate change related incidents:

> "You definitely see changes in the climate. But it feels like the seasons are changing (…) Everyone says global warming. But I mean, that's been happening for the last 2,000 years in any case. Then I think to myself, oh, the hottest day. So, you think it's getting hotter and hotter. This was the hottest day in 50 years. So, 50 years ago, it was also blooming hot that day. So, is it really changing?" (W3).

Land users frequently perceive land use challenges as beyond their control, as reflected in their future wishes for improvements in roads, electricity, security, product prices, government support, and rainfall. While they see themselves as able to implement adaptive strategies—such as building dams and improving irrigation to combat drought—they feel less empowered to take mitigative actions. Although they understand the importance of a healthy environment for their livelihoods, conscious efforts to mitigate climate change through land use practices are rare. Only a few have even adopted more climate-resilient approaches, like a pallet machine for animal feed production that can function in various weather conditions (C1).

5.1.2 The Expressive Dimension

Worries and Frustrations

When talking about environmental land use challenges, concerns about decreased rainfall and drought evoke constant feelings of "worry" (C3) and uncertainty: "I am concerned. I mean, because... What exactly is going to happen, I don't know" (W3). Moreover, some participants describe their experiences in more extreme terms, such as labelling drought as "horrific" (W2) and using figurative speech when depicting water issues as "a constant battle" (C3).

Challenges related to seemingly institutional failings feel frustrating because land users do feel that these issues could be fixed but are not. C2 feels "negative" about regulations that have become stricter, which make being a land user harder. This often becomes apparent when land users talk about the feelings they have for their government in general: "No, we have a terrible government, according to me. They really do nothing for us, farmers" (C5).

A more specific stressor tied to structural failings is farm security and crime in general, which leads to feelings of insecurity. Some land users talk about stock theft and attacks on the lives of farmers in their area, whereas other land users feel like they are too far off-grid for security to be a concern. W2 describes how a land user in his area got shot in his home, to which he says, "that doesn't make me feel well". He later goes on to say, "the political climate will always be a worry, and the crime". C3 describes how he had felt like a "captive" in his own home for a long time, due to security measures he used to employ. As becomes clear from observing C1's posture and facial expressions during the interview, he experiences strong emotions around crime. He tends to drop his shoulders, look distressed and starts to cry when he mentions that his hope for South Africa's future is that crime will be controlled and unity amongst all people established.

Love and Pride

Furthermore, it must be considered that many land users enjoy performing their current land use practices or have sentimental attachments to them, for example due to long-standing family traditions. Land use challenges are experienced to threaten these emotional bonds. W1 expresses this strong emotional bond to his land use

practice by stating that "All South Africans, Afrikaans speaking, in our genes we want to farm. We need a farm". Similarly, W2 also expresses that he is emotionally connected on his farm:

> "It's a place where you go to just not get depressed, not handle the stresses of life. It's also for your children and family. It's medicine for the soul, I think. So that's mostly it, and the love for animals and farms, just to play farm." (W2)

During the visit to his land, respondent C5 proudly showcased his hunting operation. He drove us across his property, highlighting the giraffes he introduced for guests to hunt, and showed us his family's hunting trophies, from small birds to an elephant's head. He explained the animal processing steps in detail and shared his enthusiasm for running the hunting business. Inviting us to a traditional South African braai, he introduced his hunting guests, and conversations centered around their shared enjoyment of hunting and being in the wild. In contrast to what has just been described, C6 questions the usefulness of having emotional ties to the land entirely. He states that "you need to avoid being emotionally tied to the land" because if you are, "you're not going to make sound business decisions". He also mentions that "there's no emotional shit in farming nowadays". However, he feels like land is nonetheless "a very emotive subject in this country".

5.1.3 The Normative Dimension

Between Adaptability and Tradition
Many land users sharing this social representation emphasize the importance of adaptability and innovation in farming practices (e.g. C1, C3, C6). They recognize the need to constantly experiment and adapt to new circumstances to uphold their livelihoods. For example, C3 emphasizes how important it is for land users to try new things, by stating that "if you don't try new things, you're going to get into a rut". C1 seem to share the same principle, by describing that "lots of the farmers that have inherited and inherited, they talk about what their grandfathers did. But you can't live in that time". They further directly state that "You must be adaptable". These values appear to stem from land users' experience with land use challenges as described previously.

In contrast, some land users connect more value to ancestral practices and adherence to time-tested methods in securing their livelihoods in the face of land use challenges (e.g. C2, C4, C5). Due to farming in the sixth' generation on his land, C3 can identify with both value sets. About his goats, C2 says that "Well, my grandfather had a stack, so I've just kept it going. We've always had the goats. So, you'll never get rid of them". They do not want to be "the one that sells" (C5) and mostly hope for their children to take over the operations one day.

Perseverance, Self-Reliance and Community
Perseverance and resilience represent further values that are closely connected to the need to endure challenges and continue striving despite difficulties, such as environmental ones: "You farm for the average. And if you get a boom, very nice. And if you get a crash, you grit your teeth until you get through it" (C4). This sentiment is for instance also shared by C1: "If there is a drought (…) you just carry on, and you've just got to persevere". These virtues are strengthened by communal and collaborative values shaping the land user community, following the motto: "Put your pride in your pocket and ask" (C1) or "Arrogance will kill you. You mustn't think you know everything" (C4). There is a strong sense of asking your neighbor and helping each other out, as opposed to relying on governmental structures or other institutions to help secure their livelihoods. In the study area, perseverance and community are strongly shaped by religion. The Christian community in the area is strong, with some of the interviewees, like C1, even organizing their own church events for land users and farm workers. C3 feels that "if you don't have faith, you're not going to make it". W1 and W2 explicitly highlight that it is their faith that gets them through land use challenges. How important religious community is to the land users could also be observed during a walk with C1 across their property, during which they made a point of showing us the small church building they had installed for the community to come together in. Additionally, land users connect these values of self-reliance to being business-smart to secure livelihoods and to "live within your means" (C3). C6 takes this further, highlighting that a shift in guiding values might be necessary to keep securing livelihoods:

"It doesn't matter which agriculture you're in, it's a business, and there are business principles to apply. I think that historically too many farmers are farmers and not businesspeople. Nowadays you have to be a businessman" (C6).

5.1.4 Making Sense of Spekboom Carbon Farming

Land users who hold this social representation of land use challenges as threats to livelihoods have not deeply incorporated the concept of Spekboom carbon farming within the representation. The concept does not seem to have acquired an everyday, commonsense meaning to them. However, by prompting them to share their perceptions around it in relation to land use challenges, insight was given into how they approach attempts to anchoring and objectifying the concept within the representation. The factors that hinder Spekboom farming from becoming self-evident to these land users seem to outweigh the ones that might successfully anchor and objectify the concept. Below, an overview of these factors is given. As they are still negotiating the concept of Spekboom carbon farming, capacities and barriers to the successful integration of the concept are often intertwined and in tension with each other. The following sections are thus sorted by themes that seemed relevant in these processes.

Finances

These land users start anchoring Spekboom carbon farming by connecting it as a potential financial opportunity to the economic pressures that they experience as threatening their livelihoods, via the cognitive dimension of their social representation of land use challenges. This leads to some of them experiencing a certain "openness" (W2) and "interest" (C5) towards the practice. The main reason for this is the feeling of hope that carbon farming could generate "money in the area" (W2), and that they might "make a living" (C3) from it "in the long run" (W2). C6 even feels that "it's got massive potential" and has already started to investigate how carbon markets function. Spekboom farming might thus also anchor to the expressive dimension by seeming like an opportunity that could soothe feelings of stress around financially threatened livelihoods. However, some land users also express concern and uncertainty around the financial side of carbon farming schemes. This is anchored in the cognitive and expressive dimensions

through feelings of inequity and frustration that they express related to beliefs about the distribution of financial benefits from potential carbon credits, for example:

> "Well, it's, you know, it's like the big axe can make money out of carbon credits, the small axe can't. You're getting a penny out of the pound, and the other's taking the pound" (C3).

This sentiment reflects a common belief that the carbon credit system disproportionately favors larger, wealthier entities, leaving smaller land users with minimal financial gain. Adding to this is widely spread confusion on who would pay for certain investments should a land user choose to get started with Spekboom planting, such as the costs for fencing around the Spekboom plots or machines needed (e.g. C2, C5, W2). Eliminating these uncertainties would be important for some land users to seriously consider participating in Spekboom planting. The value of being business smart as expressed in the normative dimension plays into the fact that transforming land use to implement a measure such as Spekboom carbon farming, "needs to be a business case" (C2) for commercial, private land users to consider it:

> "It also depends on who's paying for it. (…). It's easy to talk about restoration. I'm going to do it because I get money. The restoration is costly." (C2).

> "Money makes the world go round. If it doesn't generate income, why would you do it. You have to be a very financially strong farmer that could spend lots of money to restore land, because it's expensive" (W2)

Trust and Involvement
Further, there still seems to be a palpable sense of skepticism and disillusionment among land users about the effectiveness and honesty of carbon credit initiatives, although these have been around in the study area for in between 15 to 20 years already. Although Spekboom carbon farming is not necessarily a new concept to many, it has not become very familiar or anchored positively:

> "Carbon's been around for about a good 15 years, and there's no good results yet. I mean, there's not a thing that gets super rich out of the carbon market" (C3).

In general, "people are scared to get involved with new stuff" (C3). As C4 reports, this skepticism is further compounded by reports of carbon credit companies decreasing operations due to funding issues and selling large amounts of their equipment in the area, or the carbon credit company South Pole having a REDD+ (Reducing Emissions from Deforestation and Forest Degradation)-related scandal around the credibility of tree planting for carbon credits in Zimbabwe (Twidale 2023). This contributes to doubts about the long-term viability of such projects. C2 also expressed frustration with carbon farming companies that had already tried to start operations in the area around 15-20 years ago, got land users interested and then "disappeared" (C2), which creates the perception amongst land users of the carbon farming implementation efforts as scary as "scary" (C2). Indeed, this observation is shared by multiple other land users who have been in the area for a long time. Spekboom carbon farming has previously been objectified and made evident in their area, but instead of increasing trust, this is anchored negatively in the expressive dimension. Other land users express frustration with the complexity and perceived unfairness that they describe as objectified in the contracts associated with carbon farming implementation companies. One interviewee described the contracts as "very iffy" and "stupid" (W2), highlighting concerns about long-term commitments that favored the carbon farming companies over the land users. Other land users felt neglected and uninformed about opportunities and processes around carbon farming implementation, which contributes to a lack in trust in carbon farming initiatives. For example, they state that "no, as I said about the carbon market, we, us farmers, aren't really into the carbon market. They don't talk to us" (C3) or "they keep their cards close to their chests" (C6).

Emotional Bonds and Community
Further, participating in Spekboom planting practices is perceived to possibly threaten emotional bonds that some land users connect to their lifestyle, just like some of the land use challenges that threaten their livelihoods do as laid out in the expressive dimension. Emotional attachments to a land use practice and related skepticism towards Spekboom planting are further illustrated by C5, who works in the hunting industry:

> "I cannot sit and watch those things grow every day and do nothing else. I meet different people from all over the world every week. I love what I do. So, I can't see myself going in that direction, but I would support it."

In turn, the love for what he does is deeply anchored and objectified in his land use practice. By support he means that he could see himself helping by supplying Spekboom planting businesses with Spekboom cuttings, since he has a lot of Spekboom on his land. Emotional barriers that might be in the way of successfully anchoring Spekboom carbon farming seem to tie back to the historical and cultural traditions connected to many land users' land use practices. For example, C5's family has been running the game farm for generations, C4 has spent his whole land use career running his game farm, C3 is the sixth' generation of farmers on his land and C2's family has been farming with goats for decades. They would be the ones to break long traditions, which they take pride in, by transforming their land use.

Further, possible "social jealousies" (C6) amongst those who will benefit from carbon farming and those who will not, could threaten the local land user community and possibly their values, as expressed in the normative dimension. During a farm drive, C5 showed me that he has a lot of naturally occurring Spekboom on his land. He said that he feels like it is unfair that he who has healthier land than others cannot make profit from the current Spekboom planting carbon credit schemes. To him, his healthy land, rich with Spekboom, seems to objectify the perceived unfairness of Spekboom carbon farming schemes.

Restoration Potential and Implementation
Beliefs about the power of Spekboom carbon farming to restore the landscape were sometimes acknowledged but secondary and not well developed. While some land users thought that it would be great if Spekboom carbon farming could restore their land and provide other environmental benefits, they did usually not know how this could work. In fact, some were rather skeptical of the science behind carbon farming. These doubts tie into a particular skepticism towards the factualness, neutrality and trustworthiness of environmental scientists, expressed in the cognitive dimension, as the following quote illustrates:

"It is the scientists that will be able to answer - if you can find an honest scientist. He mustn't have vested interests in carbon credits or anything (…). That's emotive; a lot of that is based on subjective opinion from scientists who have taken sides" (C4).

These land users did further not give many details on how implementing carbon credit schemes would work. However, some display great interest in acquiring more knowledge on the topic, preferably through community members that are more involved in such schemes already. The large majority is convinced that they would have to see if the carbon credit involvement successfully works for others, before they get involved themselves.

5.2 Social Representation of Land Use Challenges as Threats to Environmental Integrity

Only two land users seem to largely socially represent land use challenges as threats to environmental integrity, namely the implementation managers of Spekboom carbon farming companies (I1 & I2). Nonetheless, understanding this alternative meaning-making mechanism is relevant, because it provides insight into the varying perceptions and ways of navigating land use challenges among land users in the study area. It further highlights how differently land users make sense of Spekboom carbon farming. The concept is already an established part of and self-evident within the social representation of land use challenges as threats to environmental integrity. How they make sense of it is therefore already integrated in the presentation of the tree dimensions of their representation of land use challenges.

5.2.1 The Cognitive Dimension

Unique to this representation is the notion that there is a greater focus on connecting land use challenges to climate change. The main association is that land use challenges are a threat to environmental integrity, rather than to the livelihoods of those who hold this representation. Talk about global warming and climate change related land use challenges takes up greater space than other challenges relevant to

the previously discussed representation. The focus seems to be on a scientific, theoretical or academically informed view on land use challenges, especially in relation to the environment, rather than practical, lived experiences.

The two land users who hold this representation the strongest are implementation managers for different Spekboom carbon farming operations, which means that they oversee the implementation processes mostly on the ground on a particular plot of land where they also live part-time. They have long personal histories working in environmental professions and share developed beliefs about the possible environmental benefits of Spekboom planting. For example, I2 believes that the private sector "can make a change" and "restore" the landscape, by planting Spekboom as an "eco-engineer" plant that will eventually introduce "the whole suite of species" that was originally to be found on the land. He is further certain that by participating in voluntary carbon credit schemes, a landowner "can actually get more by doing this than what he can get from his livestock". I1 thinks that the voluntary carbon credit market is a "more mitigation than adaptation kind of project" and "is more accountable than say REDD+ other types of avoidance calculations". Nonetheless, when asked more specifically what he thinks about certain dynamics of carbon markets like companies that emit a lot of carbon buying carbon credits to offset these emissions, it becomes apparent that he also holds conflicting beliefs that are in negotiation with each other:

> "It's a perverse incentive in a way, because now they get the sort of go-ahead to create more pollution, because you can offset it with your carbon credits (…). But understanding what the biodiversity in this region, in South Africa and in Africa as a whole, can mean for the rest of the world in terms of development and creating jobs and those kinds of things…maybe it's a way in which we can endeavor to get back to a balance between human consumption and nature's needs" (I1).

This reflects his awareness that carbon markets are complex and might not always be easy to navigate, even for people like him that work with them. The more tangible, local effects of carbon markets, such as increased biodiversity or job creation, seem to ace out less directly tangible aspects, such as possibly more

pollution. Results that can directly be seen on the land that they work on seem favorable to both implementation managers.

5.2.2 The Expressive Dimension

Frustration
Some emotions are evoked when land users represent land use challenges as threats to environmental integrity. I1 describes the landscape's severe transformations as a cause for sadness, emphasizing the emotional toll that these have on him with repeated mentions. He characterizes the landscape as "very emotional" and "in distress" due to climate change. He even resorts to a cuss word to describe the despair felt by environmentalists witnessing environmental degradation – they seemingly "start becoming very depressed, seeing the world go to shit.". I2 expresses that it is "messed up" how humans have degraded the land surface, emphasizing the "serious" erosion problems that have been caused. He further highlights the drastic transformation of vegetation, from lush landscapes to open expanses, reflecting on his distress around the profound changes caused by human activity. Negative emotions towards other land use practices were for example expressed by calling goats "the white cancer" (I2) of the area and that he feels sad and frustrated when driving past degraded landscapes.

Figure 2: Spekboom seedling, photograph taken by author with permission

However, I1 also describes his previous work in climate change as "fun," something that brings about positive emotions. What further became clear from observations made during walks with him across the land on which he works as an implementation manager, is that he feels a sense of pride and passion in his work. He took the time to show the fellow master's student and me the Spekboom nursery and the rest of the property, explaining the different parts of his operation in detail. While showing us the Spekboom nursery, he referred to Spekboom seedlings as "my babies" (I1) (see *Figure 2*), which further indicated the emotional attachment he feels to this work. For I2, positive emotions included pride, passion and satisfaction over what his team and he accomplish with this work. These were mostly observed when he showed us his respective Spekboom nursery, introducing us to multiple employees and showing us the Spekboom seedlings. He further took the time to explain and show nearly each step of the process of his Spekboom planting operations. Further, he invited us master's students to a drive across the land to one of his favorite sunset spots to experience "the beautiful nature" (I2).

5.2.3 The Normative Dimension

Environmentalism

Land users who hold the social representation of land use challenges as threats to the environment recognize the value of smart business principles, but they have even stronger values connected to environmental idealism. They display a vision of land use that goes beyond profit concerning their Spekboom carbon farming practices, emphasizing the idealistic values of environmental restoration and social good, quite similarly:

> "I'm a conservationist first, not a businessman. For me, the restoration work is primary. And the co-benefits in terms of the financial, the carbon finance and those kinds of things; obviously that enables more restoration to take place in my view. It's not as if I'm in it for the money or anything" (I1).

Or as I2 puts it:

> "I'm a passionate guy. I'm brave enough. I don't worry about money anymore (…). To, me it's not about the money side of things. It's really to restore as much as possible land before I fall over one day" (I2).

I2 further sees it as "the right thing" to get money "from restoring, from sequestering carbon" from Spekboom planting opposed to "getting money from livestock farming" – highlighting the strong environmental values he possesses. While business models should be competitive, he deems it as important to collaborate so that as much restoration as possible can be achieved.

6. Discussion

6.1 Interpreting the Results: Between Stability and Change

This section hopes to answer research questions one and two together, as they build on each other and are interrelated. As the data indicates, the social representation of land use challenges as threats to livelihoods broadly encompasses two meaning-making trends, which shall now be discussed.

The first one is more oriented towards relying on what is established and traditional to navigate land use challenges and thus protect the land users' livelihoods, and the second one is more open to exploring new ways to that purpose. Land users who tend to follow the first trend often seem driven by family tradition and cultural values to protect their established livelihood systems and resist significant changes, even when faced with severe land use challenges, as emerged from examining the cognitive, expressive and normative dimensions (e.g. C2, C3, C4, C5, C6). The data thus connects to literature showing that socio-cultural factors are often drawn upon to cope with land use challenges in land use systems with deep local histories. Traditional land use practices are often maintained due to pride and strong cultural ties, even when they might not be fit to overcome land use challenges. This is said to be due to land users' identities often being deeply intertwined with and not separable from their traditional land use practices (Hausermann 2014; de Jong et al. 2021; Hodel et al. 2024). The data might thus indicate that research participants who follow this first trend do so to also protect their identity, not just their livelihood systems. The meaning-making mechanisms behind this first trend might therefore connect to the notion that cultural traditions and social interactions commonly play a key role in the re-production and

transformation of social representations (Castro & Batel 2008). As the results indicate, these factors might further be decisive in preventing the concept of Spekboom carbon farming from becoming self-evident as a possible solution to land users who follow this first trend (Moscovici 1988). As these factors are largely socio-culturally informed, this might mean that Spekboom carbon farming does not culturally resonate with large parts of the representation or does not speak to these land users' identity. Thereby, the concept is prevented from being anchored and objectified positively. The findings on the first trend thus add to Buijs et al. (2011)'s work on how cultural resonance can be understood through social representations, by exploring the role that cultural resonance and identity play in the processes of anchoring and objectifying. They further add to previous studies on how land users perceive Spekboom initiatives in the Eastern Cape, by uncovering the influence that cultural factors might have on the fact that ecological benefits of such practices are rarely enough to convince land users to transform their land use (Curran et al. 2012). This connects to findings by Buck & Palumbo-Compton (2022), which already found cultural factors to be decisive in how land users perceive such processes in various western contexts outside of South Africa.

However, the second meaning-making trend shaping the representation seems less informed by cultural factors and even somewhat contradictory to the first trend, thus leading to tensions within the social representation. Cultural factors do not seem to be in the way of transformation to the same degree as within the first trend. This might partially be due to some of the land users that follow this trend not having long historical family ties to the land, sometimes even being the first of their family members to inhabit it (e.g. C1, W1, W2, W3). This sentiment might further be expressed in their increased openness towards engaging in land use transformations, such as implementing Spekboom carbon farming to protect their livelihoods, which is mostly driven by economic reasons. However, my findings also showed that land users engaging in this second trend still perceive more barriers than capacities to implementing Spekboom planting, which overlap with the first trend.

Across both trends, financial incentives alone are not perceived as enough reason for land users to participate in Spekboom carbon farming. Financial incentives need

to be backed up by clear information on how and by whom the costs of transitioning to Spekboom planting would be financed, and financial returns would have to be received sooner. These findings thereby connect to a range of previous studies on how land users perceive Spekboom carbon farming practices (Curran et al. 2012; Polak & Snowball 2019) as well as other carbon farming initiatives (Buck & Palumbo-Compton 2022; Block et al. 2024; Cammarata et al. 2024), which all found the potential financial benefits of carbon credits to be a main motivator for land users to consider transforming their land use to accommodate such practices, but also that uncertainties and skepticism around the finances are common and decisive in many land users not making the final step to implementation. Additionally, across both trends, a lack of examples or land users who have successfully implemented such practices contributed to land users being hesitant to get involved, which connects to studies by Cammarata et al. (2024) and Block et al. (2024) who have made similar findings in other contexts. Furthermore, some of my study participants described the contracts and administrative work required to participate in Spekboom initiatives as absurd, a finding that Polak & Snowball (2019) have previously made in the context of Spekboom initiatives in the Eastern Cape. Additionally, my findings add to these previous studies by identifying lack of trust in the honesty and communication of carbon farming initiatives as a significant barrier in land users successfully anchoring and objectifying Spekboom carbon farming, and the concept thus not becoming self-evident.

By uncovering these two trends, the data demonstrates that not all land users who hold the social representation of land use challenges as threats to livelihoods share all aspects of it to the same degree, which is common for social representations (Buijs et al. 2012). They do further not necessarily follow solely one of these trends. While some tend to lean more heavily on either one of them, it is also common that they draw on both at times. Some land users might therefore be in a state of cognitive polyphasia, which allows them to navigate the complex realities of land use challenges, by drawing on different cognitive frameworks depending on the social situation and context (Provencher 2011). This exploration of the co-existing, contradictory aspects of the social representation through anchoring and objectifying might serve to provide land users with insight into

diverse perspectives on land use challenges and possible transformations, thereby contributing to clarification (Moscovici 1984, 1988). The tension can thus be regarded as productive, implying that the social representation of land use challenges as threats to livelihoods is dynamic and involved in dialectical processes of negotiating a plurality of understandings (Castro & Batel 2008; Buijs et al. 2012)The tension between maintaining traditional cultural identities and evolving those understandings in the light of land use challenges as threats to livelihoods, further sheds light on how social representations can be shaped by the co-existence of stability and change which might lead to their transformation (Castro & Batel 2008). Furthermore, because it appears as if these dynamics are challenging the socio-cultural fabric of the land user community, they might even indicate possible social transformation (Moscovici 1988; Liu 2004; Castro & Batel 2008; Buijs et al. 2012).

In comparison, the social representation of land use challenges as threats to environmental integrity seems to contain less tensions and be more stable. It seemed to contain only one major trend in meaning-making, shaped by environmental idealism, thus hoping to overcome land use challenges and protect environmental integrity. This suggests that the representation may be more stable, as the reduced plurality of understandings minimizes tensions that could otherwise lead to transformation of the representation (Castro & Batel 2008). The environmental idealism aspect further seemed like a cornerstone to these land users' self-understanding, as became clear through how they describe themselves as conservationists or their values connected to restoration within the normative dimension. Land use thus seems to carry a different meaning for them; instead of primarily being a way to secure their livelihoods, it seems like a way to fulfill some bigger, better purpose. Challenges to land use might thus not be experienced as an immediate threat to their livelihood systems or cultural identity. Instead, engaging with land use challenges might offer personal fulfillment by engaging with ideas that are meaningful to them. Generally, the data revealed that these land users had successfully anchored and objectified Spekboom carbon farming, viewing it as a self-evident solution to land use challenges threatening environmental integrity

(Moscovici 1988). In other words, Spekboom planting resonates with their social representation (Buijs et al. 2011).

Overall, the data revealed that land users with backgrounds in ecology, mostly implementation managers, view land use challenges in broader terms of environmental integrity. In contrast, those with deeper local ties tend to primarily focus on the impacts on their livelihoods and culture, although they have various ways of navigating those impacts. These findings thereby align with other studies on how ecologists socially represent environmental threats, such as a study by Gervais (1997) through which it was found that ecologists viewed an oil spill's impact in broader environmental terms, while locals focused on immediate effects on their livelihoods. In this regard, my findings further align with a previous study by Curran et al. (2012), who found that land users who have previously been involved in restoration work were more likely to participate in Spekboom initiatives aimed at restoration, and expands on the work of Cammarata et al. (2024) on land users in Italy by demonstrating that knowledge on climate change mitigation might also increase willingness to participate in carbon farming practices.

6.2 Implications for Implementing Land Use Transformations

It shall now be discussed what the above findings might reveal about implications for implementing land use transformations to overcome land use challenges in this thesis' context, thus exploring the third research question. Based on the literature that has been reviewed for this thesis, I suggest that instead of seeking a unified consensus on how to combat land use challenges and convincing other land users of a specific viewpoint, embracing diverse perspectives could be more effective (Marková 2008). Recognizing and validating the coexistence of different perceptions among land users might lead to more innovative and context-sensitive solutions (Moscovici 1984; Provencher 2011). I therefore propose adopting a stance of "equal coexistence" (Keulartz et al. 2004: 95) of different viewpoints among land users and accepting that conflicts involving values are not likely to be resolved through seemingly rational consensus. In contrast to interests, values cannot be

negotiated (Keulartz et al. 2004). Land users in the area seem to prioritize, perceive and navigate land use challenges differently. As the analysis and interpretation of the cognitive, expressive and normative dimensions of land users' social representations have shown, their meaning-making mechanisms around land use challenges are to large parts anchored in different values. Ignoring these differences when navigating land use challenges could lead to resistance and ultimately ineffective interventions (Marková 2008). This might explain why Spekboom carbon farming operations have not come to large-scale success, although they have been present in the area for around 20 years.

Nonetheless, although some land users hold distinct social representations of navigating land use challenges, they also do share some overlapping characteristics. For example, they mostly feel pride in their land use and realize that the environment being in a healthy state is in their favor. Based on my findings, I propose to embrace commonalities like these as common ground from which discussions around land use challenges between actors can depart (Keulartz et al. 2004). I recommend that stakeholders in the local land use challenges, such as government officials or ecologists, should prioritize understanding other actors' perspectives, instead of instrumentally trying to persuade them of specific viewpoints. This approach could lead to a more genuine understanding of opportunities and challenges in sustainable land use, resulting in more effective solutions (Juana et al. 2013). Thereby, more culturally resonant approaches to land use challenges might be explored, which could possibly contribute to a higher acceptance of possible solutions (Keulartz et al. 2004; Buijs et al. 2012).

My thesis demonstrates that showcasing the benefits indicated through natural science and possible financial benefits alone does not seem to be enough to motivate land users to adopt more sustainable land use practices, as for example also Block et al. (2024) found. Even if the natural science for Spekboom carbon farming would add up, which this study does not aim to judge, it would still be unsure whether it could suffice to overcome implementation challenges rooted in socio-cultural factors. In any case, not only the natural environment is transforming. Social transformations in the area are significant, with the land user community shrinking and new players entering the field. Examining how these changes affect land users,

and how they might influence their decision-making processes, is an important added value of the present thesis. This knowledge will further be beneficial when designing appropriate policies and when making judgments about the future of land use practices.

7. Conclusion

This thesis has demonstrated that understanding how farmers perceive land use challenges is essential for understanding the factors that influence the implementation of practices like Spekboom carbon farming. By uncovering the social representations of land use challenges as threats to livelihoods and as threats to environmental integrity, it was found that a diverse mix of social, cultural, emotional and economic factors play crucial roles in whether farmers will adopt these practices. These seem to currently be underestimated by ecologists.

The issue of land use challenges and sustainable transformations in the study area is a complex one, and this study alone cannot display all the dimensions. Land use dynamics in the study area and South Africa as a whole are more complex than this thesis might let on. Land users that were interviewed and observed were also all white and of European ancestry, as well as identifying as male except for one interviewee identifying as female. They are part of a social group that has historically been privileged compared to other groups of land users. The findings of the thesis must be read in this light. Within this focus on privileged land holders' perspectives on carbon farming, there are still multiple limitations of the present study to be explored through future research.

More interviews and observations should be conducted, especially on the side of carbon farming implementation managers. This could provide better understanding of capabilities and barriers along the value chain, as they have more power to impact carbon farming. It would be interesting to talk to land users who have already switched to Spekboom carbon farming. This would allow to more clearly study material implications of Spekboom carbon farming. This study could be expanded by operationalizing social practice theory, which more equipped to provide insights into the role that structural components and materiality play in the way that land users perceive and navigate land use challenges (Sarrica et al. 2019). In particular,

social practice theory can offer more insights in understanding how actions, such as traditional land use or Spekboom planting, become routinized and stable (Batel et al. 2016).

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Popular science summary

South Africa's commercial, large-scale agricultural sector is vital for securing food security and economic stability. At the same time, it is a major contributor to global warming and climate change. However, environmental challenges such as land degradation are also increasingly affecting agriculture. Sustainable solutions to these complex problems are thus urgently needed. One potential solution is carbon farming by planting Spekboom, a succulent plant, which is used to capture carbon dioxide from the atmosphere and store it in the soil. This is hoped to boost the environment's health, while ensuring land users' livelihoods through carbon credit initiatives.

The study found that commercial, private land users in South Africa's Eastern Cape are somewhat aware of the environmental challenges they face, such as droughts and soil degradation. Their perceptions of Spekboom farming are mixed. Some see it as a potential solution to both environmental and financial problems, while others are skeptical about financial returns, administrative difficulties, and a lack of successful examples. Many feel that clearer financial incentives and practical support are needed before they will consider changing their land use.

Understanding how farmers perceive these challenges is essential for understanding the factors that influence the implementation of practices like Spekboom carbon farming. The research highlights that it's not enough to just promote the potential ecological benefits of Spekboom planting. Social, cultural, emotional and economic factors, such as trust in carbon markets, play crucial roles in whether farmers will adopt these practices.

The findings can be used to improve communication with farmers around land use challenges and to develop policies or initiatives that better engage with their understandings. This could improve land use sustainability in South Africa's

Eastern Cape but might also start broader conversations on efforts to combat climate change.

In summary, while Spekboom carbon farming seems to hold promise for environmental restoration and financial gain, the path to its broader adoption will require addressing the social factors and economic uncertainties that influence land users. This thesis is thus an important contribution in bridging the gap between social science and natural science in environmental research. It achieves this by exploring the perceptions that private, commercial land users in the Eastern Cape, South Africa, hold around land use challenges and Spekboom carbon farming. Semi-structured interviews and observations were conducted, and social representation theory drawn on to analyze them, which helps explain how land users' everyday knowledge and beliefs shape their navigation of land use challenges and responses to ideas like carbon farming.

Acknowledgements

Appendix 1

The following is the interview guide that was used to loosely guide the semi-structured interviews that were held for this thesis. Depending on the individual interview, not all questions might have been asked, or the order of the questions might have been adapted, as if further explained in the theory section. Some questions that turned out not to be relevant to my research were deleted from the original interview quide to shorten the appendix. They might be included in my fellow master student's appendix, who conducted the interviews with me.

Section 1: Farming

General
- To start, can you tell me a bit about your farm? What is your daily business? Who currently lives and works here at the farm?
- What are your goals for managing your farm?
- What are the biggest challenges in managing your farm?
- What brings you the most joy?
- Can you tell me about why you are a farmer/rancher? / What does it mean to you to work there?
- Can you describe what in your opinion makes a "good farmer"? Do other farmers share your view on that?

History and land use change
- Could you provide a brief history of your farm?
- Did you grow up on this farm, and has it been in your family for a long time?
- Have you always used your land this way, or have you changed your land use practices?
- Can you describe some significant changes in land use practices over the years?
    - In your opinion, what are the reasons behind these changes? Which factors influenced you in deciding to change your farming practices?
        - Were they voluntary, or caused by other factors?

- - - Do you think that any of these changes were caused by climate change or specific land use practices?
  - What were the consequences of these changes to your farming operations?
    - - Were they positive, or rather negative?
  - What about these changes stood out to you? Was something about these changes significant to you?

- How do you plan to adapt your farming practices to stay economically viable in the coming years?
- Where do you see your farming operations in the next 10, 20, 30 years?
  - In an ideal scenario, what would you like your farming operations to look like?
- Would you say that you generally look positively or more skeptical towards the future?
- After you retire, do you think that your farm will stay in the family?

Relationships:
- Where do you get help or assistance when managing the farm? Are you part of any professional organization/association related to your farm?
- When you think of your community more broadly, the place that you feel connected to, what do you think of?
- What do you see as the role of farming in your community? Is that important to your community?
- What, if any, changes do you see taking place in your community?

Section 2: Policy and market change, environmental change and restoration efforts

Policy and market change
- How has the wider economic and policy landscape in South Africa changed over the time that you have been a farmer?
- Do you feel supported by the government?
- What improvements or changes would you like to see in government policies related to agriculture?
- Do you discuss agricultural politics with your fellow farmers?

Environmental changes and restoration:
- What, if any, changes do you see taking place in the surrounding landscape/ on the land?
- How do you generally feel about landscape restoration efforts? e.g. to combat drought,...

- Are you aware of any in your area? – which ones?
- Are you currently employing any restoration efforts or would you be open to starting them on your land?
- Have any people from the outside approached you to discuss landscape restoration or to conduct research on your land?
- In that context, how do you think about carbon farming with Spekboom?

Section 3: Carbon Market/ Carbon Sequestration Projects
- In recent years, the market for carbon credits has grown significantly. Are you aware of this?
- How did you become involved in a carbon credit program (how did you hear about it) and what motivated your participation?
- What are the advantages you associate with program participation?
- What are the disadvantages you associate with program participation?
- Can you describe your experience participating in that program? Did you learn anything new (e.g. skills, knowledge, techniques,…)?
- Did you talk with your neighbors/ fellow farmers in the community about the program?
- How do you think the program could change your community lastingly?
- How do you think the program could change the landscape where you farm?
- What do you think could a growing carbon market mean for South Africa in general?
- How do you view the broader influence of such initiatives/programs for agriculture and the environment?
- How do you see carbon markets developing internationally?

Last Question: If there is one thing you could wish for the future, what would that be?

Ending the interview: Do you have any further thoughts, remarks, or questions?

Appendix 2

The following is the participant information sheet that all research participants received and signed before their participation in the research for this thesis. Since it was written before data generation had started, it uses very broad terminology. It was mostly informed by Robson & McCartan (2016) and Creswell & Creswell (2018).

1. What is the Project About and Why Should I Participate?

Project Title: Understanding Carbon Market Perspectives in the thicket area.

This research project aims to explore the perspectives and experiences of large-scale commercial land users in the thicket area in general, regarding carbon farming as a climate mitigation strategy as well as the carbon market. Your participation is crucial in providing insights into the challenges, motivations, and opportunities related to these topics. Your valuable input will contribute to a better understanding of the role of carbon farming in addressing climate change and agriculture in South Africa.

2. How Will the Project Be Conducted?

You will be invited to participate in a semi-structured interview where you can share your experiences, views, and perspectives on the topics mentioned above. Your identity and responses will be kept confidential throughout the research process.

3. Possible Consequences and Risks of Participating in the Project

There is a potential risk that discussions may touch upon personal, political, or philosophical beliefs. However, you are under no obligation to disclose such information, and any sharing of personal beliefs is entirely voluntary. Some questions may pertain to your experiences and challenges in farming, which could have emotional implications. Please feel free to share only what you are comfortable with.

4. How Will My Personal Information Be Handled?

Your personal information, including your identity and contact details, will be kept strictly confidential.The research team will take measures to ensure the secure handling and storage of any personal information provided.

5. Collection, Processing, and Storage of Data

Data will be collected through semi-structured interviews and participant observation. Your responses will be processed and analyzed in a way that ensures pseudonymity. Data will be securely stored in compliance with data protection regulations put forward by Nelson Mandela University.

6. Access to the Data

Your personal data will only be accessible to the research team.
The data collected will be used solely for research purposes.

7. How Will I Be Informed About the Study's Results?

You will have the opportunity to receive a summary of the research findings.

8. Participation Is Voluntary

Your participation in this research is entirely voluntary, and you can choose to withdraw at any time without explanation. You will not be pressured or influenced to share personal, political, or philosophical views. Your comfort and autonomy in participating are of utmost importance.

Contact Information:

If you have any questions or concerns about your participation in this research project, please feel free to contact Maria Senftl at masl0015@stud.slu.se or Karen Schellhase at knse005@stud.slu.se .

Your willingness to participate in this project is greatly appreciated. Thank you for considering being a part of this study.

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