




Narratives of the future: Farmers' navigation of uncertainty in adopting carbon farming schemes

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ABSTRACT

There is growing interest in how farming practices can mitigate climate change by sequestering carbon and restoring soil health – known as carbon farming. Ultimately, the success of the carbon farming market depends on attracting farmers willing to enrol and adopt these practices. As of yet, we know little about the factors that stimulate or hinder farmer engagement with the carbon farming market. This paper contributes to filling this gap through a study of the factors that shape South African large scale farmers' narratives of the future and how such narratives impact farmers' perspectives on emerging carbon farming initiatives. Using semi-structured interviews with ten farmers, applying and modifying Vignoli et al.'s (2020) narrative framework, we examine farmers' future narratives in the South African thicket biome of the Eastern Cape province. Three future narratives are identified: 'keep fighting and innovate the business', 'stop fighting but keep the farm' and 'the future of the family farm (probably) ends with me'. Experiences, constraints, expectations and aspirations shape these narratives. Additionally, the study's findings show that environmental factors significantly impact future narratives and, consequently, the adoption of carbon farming practices. This study contributes to understanding how ecological awareness together with economic and social factors can drive agricultural decision-making.

1. Introduction

Agriculture has received increasing attention in global climate change discourse, as it contributes significantly to carbon emissions while also having the potential of being an important carbon sink (Barbato and Strong, 2023). The possibility of increasing carbon storage in soil has led to a recent boom in carbon farming – agricultural practices and associated payment schemes designed to mitigate climate change and improve soil health (Johansson et al., 2025). Practices associated with carbon farming, such as cover cropping, rotational grazing and increased precision in fertilizer and water use, are widely perceived as facilitating carbon storage in soils. They are also heralded for having wider environmental and climate adaptation benefits, as well as potential to raise productivity (Barbato and Strong, 2023; Simba et al., 2024). In addition, farmers might be able to earn extra income by selling carbon credits. There is, yet, however limited experience regarding what carbon farming projects might mean for farmers including significant uncertainty about carbon credit pricing and payment due to the market's volatile and still developing nature (Johansson et al., 2025).

Like adoption research in general (Glover et al., 2016), published

peer-reviewed research on farmers' adoption of carbon farming has mainly focused on the role of economic factors (e.g. Thompson et al., 2022; see also Figueredo, 2024). Nevertheless, taken together existing knowledge shows that many non-economic factors also influence farmers' views on and engagements with emerging carbon farming initiatives (Carmichael et al., 2023; Figueredo, 2024). Farms are not only businesses and ways of making a living. Farms are homes and bearers of culture and tradition. Farmers' practices are affected by their care about their land and their family (Grubbström and Eriksson, 2018), by what their neighbours think of them (Burton, 2004; Burton et al., 2020) and by concerns about what will happen to their farm in the future (Joesse and Grubbström, 2017). In addition, compared to many other business ventures, a farm is significantly affected by environmental dynamics (Milestad et al., 2012; Glover et al., 2016). With climate change, such dynamics have, in many places, become more unpredictable and difficult to handle for many farmers. Navigating this uncertainty is a central occupation of many farmers today (Yang et al., 2024).

How farmers construct their future has been found to influence their decision making (Eriksson et al., 2020; Joesse and Grubbström, 2017).

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Future expectations have more specifically also been found to be important for how farmers navigate uncertainty (Findlater et al., 2019; Morgan et al., 2015; Shariatzadeh and Bijani, 2022). Both climate change in itself, as well as the future development of carbon farming programs, contribute uncertainty for farmers today, and are factors that likely impact their decision making. With this in mind, this paper explores how farmers perceive the potential of emerging carbon farming initiatives by exploring their narratives of the future.

South Africa ranks among the most attractive host countries for carbon credit projects, thanks to its favourable investment conditions and significant mitigation potential (Jung, 2006). This study focuses on one specific area in South Africa where farmers have been approached over the years with proposals for carbon farming investments, the Albany thicket biome in the Eastern Cape Province. This area's semi-arid valleys face significant environmental challenges, such as severe droughts and degraded landscapes (Lechmere-Oertel et al., 2005; Clarke et al., 2012). At the same time, it is home to the succulent shrub *portulacaria afra*, known locally as spekboom. This shrub holds promising potential for generating carbon credits through its ability to sequester CO₂ in the soil, making it particularly attractive to international investors (Marais et al., 2009; Curran et al., 2012).

The farmers interviewed for this paper belong to the minority of large landholders that is still dominated by white Afrikaans speaking South Africans, descendants of the former settlers. Nationally, these land holders continue to control the majority of South Africa's farmland (Mtero et al., 2024). As a result, what they choose to do with their land significantly impacts the country's agricultural trajectory and greenhouse gas emissions. The large tracts of land owned by the farmers in our study are particularly attractive for scalable implementation of spekboom planting projects (United Nations, 2019). Whether carbon farming through spekboom planting will significantly alter the Eastern Cape landscapes and bring the promised economic and socio-ecological benefits largely depends on the decisions made by these farmers.

Our study seeks to understand why farmers in the Albany thicket biome may or may not be willing to adopt spekboom planting as an approach to sustainable farming practices and participate in the carbon market. Using the narratives framework introduced by Vignoli et al. (2020), which suggests that individuals navigate decision-making in uncertain conditions by relying on narratives of the future, the research is structured around three specific inquiries.

- (i) What narratives of the future do farmers construct and what factors influence these narratives?
- (ii) How do these narratives influence the adoption of sustainable farming practices, including spekboom planting?
- (iii) How do narratives of the future influence the decision to participate in carbon payment schemes?

1.1. The socio-political and environmental context

The large-scale farmers investigated in this study operate in family farming systems (Kritzinger and Vorster, 2002) and many of them have historical ties to the land dating back to the colonial era. A legacy of colonialism and apartheid, these farmers still hold a substantial amount of the region's land while making up only a fraction of the total number of households engaged in farming in the Eastern Cape (Department of

Rural Development and Land Reform, 2017; Statistics South Africa, 2023).¹ Despite maintaining control over the majority of the country's farmland, there is widespread concern within the white farming community about family livelihoods and the future of the country as well as a growing dissatisfaction with South Africa's (at the time of writing) ruling party the African National Congress (ANC), which at the time of this study had been in power for over 30 years.² This concern is partly rooted in the relative loss of support that former settler farmers experienced following the transition to democracy. Under colonialism and apartheid, settlers were supported with infrastructure, favourable legislation and policies, access to underpaid labour and protection against both domestic and international competition (Fischer, 2022; Mtero et al., 2024; Bernstein, 2013). With democracy, the white farming community lost its political privilege. Simultaneously, the agricultural market was deregulated. This led to a more open and globally sensitive agricultural sector, affecting large and small farmers alike (Mtero et al., 2024). These changes led to a widespread sense of lost predictability and security amongst white South Africans (Steyn, 2001).

In addition to the strong sense of political and economic uncertainty expressed by this group of farmers, the semi-arid valleys of the Eastern Cape are experiencing increased temperatures and prolonged droughts (Archer et al., 2022). Recent data shows significant alterations in rainfall patterns and volumes in the Eastern Cape, resulting in water scarcity challenges (Apraku et al., 2023). Furthermore, vast areas in the Eastern Cape experience land degradation with reduced possibilities for water infiltration and increasing soil erosion (Kirsten et al., 2023; Lechmere-Oertel et al., 2005). While, historically, the dominant mode of farming in the region has been commercial livestock farming (Lechmere-Oertel et al., 2005; Statistics South Africa, 2023), farmland degradation, with deteriorating natural fodder resources has made it increasingly unviable (Kerley et al., 1995; Hebbelmann et al., 2024; Hoffman et al., 2018). The changing economic and political situation and climate change related environmental changes have made many farmers explore other land use options to diversify their income, support restoration efforts or enhance their personal enjoyment (Reed and Kleynhans, 2009; Abrams and Bliss, 2013; Von Solms and Van der Merwe, 2020).

1.2. Carbon farming in South Africa's Eastern Cape

One available alternative land use option for farmers in this area is to engage in spekboom planting. Spekboom is indigenous to the area and is one of the few species that can thrive in these degraded environments. It is highly adaptive to dry climates, potentially withstanding projected increased temperatures, droughts and fires (Kerley et al., 1995; Vlok et al., 2003), while also facilitating the growth of additional plant species (Kerley et al., 1995; Mills and Cowling, 2006; Vlok et al., 2003). Spekboom is also effective in sequestering carbon (Mills and Cowling, 2006). The study area has previously been the target of several spekboom planting initiatives from both public and private sectors. Although these past programmes did not involve local farmers in planting spekboom for the carbon market, they provided training, information and demonstration plantings that raised farmers' awareness of spekboom's climate and ecological benefits. Since then, the private sector has recognized the economic potential of restoration alongside its environmental benefits, attracting numerous investment companies offering

¹ Today, efforts at land reform and restitution aim to address these injustices by redistributing land to black South Africans, improving access and supporting agricultural development, however with mixed success (Andrew, 2020) and with, as of yet, an extremely limited amount of land having been redistributed (National Treasury, 2021). While this is not the focus of this study, it should still be kept in mind when researching land use in this specific socio-geographical context.

² During the writing of this paper, the ANC lost its parliamentary majority in a historic election and now governs in coalition with other parties.

different models for carbon farming payment schemes (Alesbury, 2024; AfriCarbon, n.d.; ClimatePartner, n.d.). Most companies currently plant spekboom cuttings on their acquired land, propagating them in nurseries until they are ready for their large-scale restoration projects. However, in the future, the companies may increasingly seek collaboration with local farmers. Fig. 1 below shows a spekboom cutting in front of a nursery, illustrating the initial stages of the restoration process.

Existing research has explored the potential for spekboom planting in restoring the thicket area, focusing on investor opportunities (Marais et al., 2009; Curran et al., 2012) and the ecological restoration effects (Mills and Cowling, 2006; Galuszynski et al., 2023). There is a scarcity of social science research on what spekboom planting would mean for farmers and how farmers view investing in carbon farming with spekboom. There are two notable exceptions. Based on semi-structured interviews with 18 commercial game and livestock farmers in the Upper Albany area north of Grahamstown (June–July 2010), Clarke et al. (2012) found, that farmers were open to the adoption of spekboom planting as a way to adapt to the uncertainties posed by climate change. Additionally, Curran et al. (2012), drawing on semi-structured interviews with 29 land managers in spekboom-dominated thicket communities of the Eastern Cape during August–September 2008, found that including human and social factors in planning restoration projects with spekboom makes them more effective, as this approach leads to a better understanding of individual farmers' attitudes and behaviours.

2. Farmers' decision-making under uncertainty: the role of narratives and the future

By combining cognitive and affective experiences, narratives help individuals construct the meaning of everyday events and their causal



Fig. 1. Spekboom cutting in front of a nursery (first author, March 12, 2024).

implications (Bruner, 1991). Studies have found narratives to have an important role in farmer decision-making (Dilley et al., 2021; Zebrowski et al., 2023). Drawing on a survey of conventional, transitioning and certified organic grain farmers in Indiana (USA), Zebrowski et al. (2023) found that narratives play a significant role in farmers' decisions to transition to organic production, with the primary narratives being environmentalism, economic factors, religiosity and farm-family legacy. O'Callaghan and Warburton (2017) examined the narratives of aging Australian farmers and found that narratives help these farmers validate their identities amidst social, economic and climate uncertainties. McMillan Lequieu, (2015) study on German-heritage farmers in Wisconsin shows that they use "patrimonial narratives" to blend cultural heritage with contemporary agricultural demands, ensuring the continuity of traditional values while adapting to modern economic realities. The narratives provided cognitive and emotional support, guiding farmers' decision-making. Focusing specifically on climate-change adaptation, Houser, (2018) identified how a climate change sceptical narrative of "inevitable 'natural cycles'" among Iowa farmers had an important role in hindering adaptation to climate change.

Decision-making in situations of uncertainty inevitably includes thinking about the future (Zimbardo and Boyd, 1999). Morgan et al. (2015) found that future-oriented farmers were more likely to adopt low-emission agricultural practices. Supporting the same conclusion, but from a different angle, Shariatzadeh and Bijani (2022) found that farmers with a past and present perspective with regard to their farming tended to focus on earning immediate benefits, which by extension led to less effective adaptation to climate change, such as water scarcity management. Among forward-looking farmers a variety of strategies emerged in response to current challenges. The study also indicates that not only economic factors influence farmers' decision-making. Shucksmith and Herrmann (2002) examined how British farmers' future-oriented strategies vary in response to declining incomes and changing policies. They categorize farmers into six main groups with diverging future behaviours. While some will likely exit farming, others plan to expand or even seek new opportunities. One group, who farmed for intrinsic reasons rather than financial gain, planned to continue farming regardless of financial returns.

2.1. The narrative framework

Vignoli et al. (2020) propose a narrative framework that, by integrating the concepts of structural constraints, expectations, imaginaries and narratives, facilitates analysis of decision-making processes in the context of uncertainty. Although originally applied to fertility decisions, we suggest the framework can also be effectively adapted to the agricultural context, as farmers also face the challenge of making significant long-term decisions amidst uncertainty with unknown outcomes. Vignoli et al. (2020:1) propose that adoption intentions can be assessed by examining individuals' "narratives of the future", constituted by structural constraints, expectations and imaginaries (Fig. 2). In practice, the boundaries between the concepts are often blurred, as each mutually influences the others (Vignoli et al., 2020). However, for analytical clarity, we will delineate these components as distinct concepts in the following sections. Importantly, Vignoli et al. (2020) emphasise that not only expectations and imaginaries are subjective, but uncertainty as such, as well as structural constraints might be both "objective" and "subjective". Objective constraints might for example be financial constraints, and subjective constraints might include cultural norms. We embrace Vignoli et al.'s (2020) emphasis on including both objective and subjective dimensions of uncertainty but suggest that it is not always easy to draw a line between these dimensions. In addition, farmers will act on perceived constraints and possibilities regardless of if they are objective or subjective. Our focus is thus on how uncertainty and structural constraints are perceived and expressed by farmers, which essentially will include both subjective and objective dimensions.

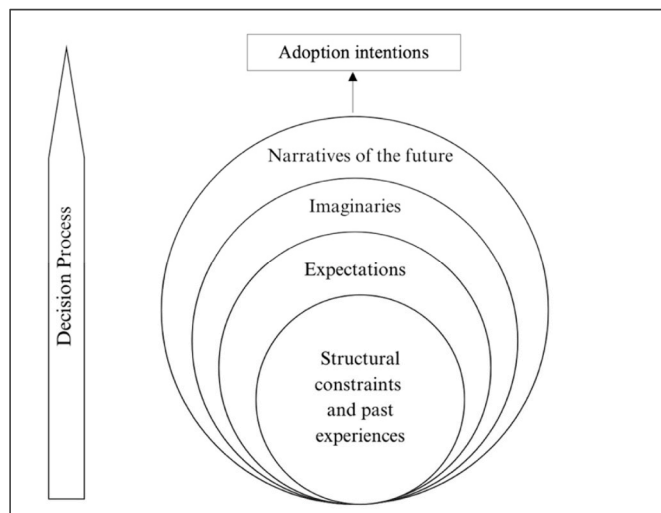


Fig. 2. Adoption decision-making process under conditions of uncertainty. Adapted from Vignoli et al. (2020).

2.1.1. Structural constraints and past experiences

Structural constraints refer to the broader social, economic, cultural and institutional factors that limit individuals' choices and opportunities. They provide the foundation on which expectations, imaginaries and narratives develop and operate. They may vary in scale, ranging from micro-level factors to macro-level conditions (Vignoli et al., 2020).

Examples of structural constraints within agriculture include economic constraints, such as fluctuations in the costs of inputs, market prices for agricultural outputs, etc., which might impact individual farmers' expectations about future financial stability and their ability to sustain their agricultural activities (Assouto et al., 2020). Cultural norms and societal expectations within farming communities can also function as structural constraints shaping imaginaries about which agricultural practices are possible or not (Fischer et al., 2024). An important dimension here is that farmers commonly strive to be a good farmer in the eyes of their peers, which might include e.g. keeping the farm tidy and weed free, and being able to run the farm with profit (Burton, 2004; Burton et al., 2020; Lindkvist, 2025). Dilley et al. (2021) found that farmers' aspirational narratives are shaped by their personal circumstances, networks of relations and the material and cultural resources available to them. Structural constraints are also closely connected to past experiences (Vignoli et al., 2020). Vignoli et al. (2020) give the example of second-generation migrants, who may deliberately draw upon traditional values from their homeland to shape their own identity, even if these go against the prevailing cultural norms in their current environment. In terms of a farm, we might see the heritage of the farm as a structural constraint, where parents and grandparents might have run the farm in a certain way and created expectations about the continuation of the farm in a particular manner.

2.1.2. Expectations

Expectations are essentially belief systems about future events or actions, reflecting what individuals expect to happen based on their current circumstances (Bazzani, 2023). Expectations link various possible outcomes to different possible decisions, shaping actors' choices beyond existing structures and past experiences (Beckert, 2016). They serve as guides in decision-making and significantly influence the choices people make (Vignoli et al., 2020).

Social science theories regarding understanding expectations have traditionally focused on the role of past experiences. These are indeed found to be important in understanding farmers' expectations in our study and are included in our analytical framework. However, limited attention has been paid in social science to the role of future

expectations (Fourcade et al., 2015; Fischer et al., 2025). Here, we can learn from economics, which has shown how future expectations are critical in shaping people's decisions in the present. Economics literature has, however, focused on economic dimensions, such as financial gains or utility (Bazzani, 2023). Here, a broader social science perspective is important to embrace the role of a wider set of expectations in shaping individual actions.

An example of how non-economic expectations might affect decision-making in agriculture would be a scenario where a farmer believes that his children will not be interested in taking over the farm. As he still nurtures aspirations for his farm's survival, he makes plans for a non-family member to take over the farm and invests time in supporting this person to become a successful farmer (Joosse and Grubbström, 2017). While important for decision-making, expectations do not guarantee specific future results, as the future holds possibilities beyond what can be expected (Beckert and Bronk, 2018). This emphasizes the importance of imagination (Bazzani, 2023).

2.1.3. Imaginaries

Imagination might be defined as "the ability to conceive and visualize new futures" (Beckert and Bronk, 2018:4). Through imagination, individuals can generate ideas or visions of the future that may not be directly derived from their present circumstances (Vignoli et al., 2020). These imaginaries serve as guiding frameworks for selecting alternative actions in situations where past regularities and known constraints fail to deduce the future, offering an anchor to navigate uncertainties (Bazzani, 2023). For instance, research has shown how farmers' productivist food security imaginaries can be a motivation for reducing fossil fuel dependency as they strive to reduce their input dependency (Eriksson et al., 2020). While imaginaries are important for shaping how individuals think and act, these imaginative scenarios need to be incorporated into a larger storyline or narrative about the future to have a meaningful impact on decision-making (Vignoli et al., 2020).

2.1.4. Narratives

Narratives, the stories individuals construct to make sense of their lives, can bridge the gap between imaginaries and present actions (Bazzani, 2023). Narratives integrate structural constraints, expectations and imaginaries into coherent storylines about the future (Vignoli et al., 2020). By assigning roles to actors and objects, narratives illustrate how the future might unfold, providing a guiding image of potential innovations and outcomes, giving meaning to actions and helping navigate uncertainty (Beckert and Bronk, 2018).

3. Material and methods

This paper draws on semi-structured interviews and participant observation with ten farmers in the Albany thicket biome, who had been introduced to the idea of carbon farming with spekboom and had farmland suitable for the growth of this indigenous plant (Table 1). The interviews were conducted by the first author together with another student, both supervised by the second author. The study was granted Ethics approval by the Nelson Mandela University Research Ethics Committee: Human (REC-H). Ethics Approval Number: 0451.

Pilot interviews were conducted with a university professor specializing in botany and spekboom, a research associate and an independent consultant on terrestrial ecosystems. An interview with the CEOs of a carbon farming project served to fine-tune the topic guide and enrich the understanding of the broader context reported on in this paper. Interviews with two land managers of land owned by international investors for the specific purpose of spekboom planting for carbon farming also improved our understanding of the locally emerging carbon market and spekboom planting initiatives, but are not used to analyse how farmers navigate uncertainty through narratives of the future. The land managers did not have a hereditary connection to the area and are considered 'outsiders' by the farming communities.

Table 1
Detailed overview of interview participants.

Abbreviation used in the study	Sex	Age	Land Use Type	Size of land (ha)	Date of Interview	Place of Interview
Farmer						
F1	M	50–60	Livestock farming	4000	12/03/24	On farm
F2	M	50–60	Livestock farming	6000	13/03/24	On farm
F3 (married to F4)	F	50–60	Forage crops, irrigation scheme	700	13/03/24	On farm
F4 (married to F3)	M	50–60	Forage crops, irrigation scheme	700	13/03/24	On farm
F5	M	80–90	Game farming, international hunting tourism	9000	18/03/24	On farm
F6	M	40–50	Game farming, international hunting tourism	8000	18/03/24	On farm
F7	M	50–60	Game farming, international hunting tourism, event venue, restaurant	10,000	19/03/24	On farm
F8	M	50–60	Non-permanent farming	547	19/03/24	On farm
F9	M	40–50	Non-permanent farming	500	03/04/24	Café in Gqeberha
F10	M	40–50	Non-permanent farming	1700	10/04/24	Office in Gqeberha
Land Manager						
LM1	M	50–60	Employed by CPD	7300	04/03/24	Café in Gqeberha
LM2	M	50–60	Employed by CPD	1200	14/03/24	On farm

Fig. 3 depicts the geographical area of this study, across three municipalities within the Sarah Baartman District of the Eastern Cape. This is a semi-arid region and all farms are in areas with similar vegetation profiles, enhancing comparability in terms of ecological prerequisites for farming.

Participants were reached through snowball sampling whereby we initially interviewed one farmer involved in carbon farming with spekboom, who then put us in contact with more farmers in his network within the area. Apart from one woman, all our interview respondents were white men aged between 40 and 90, with a bias towards those in the older half of this age range, this is representative of the national average where white South African men (white South Africans making up 7 % of the total population) own 72 % of the country's farmland (Department of Rural Development and Land Reform, 2017). They had all completed higher education and manage their farms, sometimes along with additional business operations, providing them with above-average wealth by South African standards. The high degree of homogeneity in this sample offers an opportunity to gain a deeper understanding of land use within this specific demographic group that has historically held a significant portion of land in this region of South Africa.

Each interview lasted between one and 2 h. All but one - held with a married couple - were conducted individually. The interviews were based on a topic guide with open-ended questions loosely grouped into themes relating to our conceptual framework drawing on Vignoli et al. (2020) and an empirical focus on the carbon market. We continued interviewing farmers until we had reached saturation in terms of variation of responses to questions relating to the key theme of farmers' navigation of uncertainty. We judged saturation to have been reached after having performed eight interviews and we conducted two additional interviews to confirm saturation.

All participants agreed to having their interviews audio-recorded. A field diary complemented the audio-recordings, capturing the restraints of each conversation and issues spontaneously raised by the interviewee, thereby enriching the data with lived realities and personal reflections (Creswell and Creswell, 2018). In connection with four of the interviews, we were also shown the land during a farm walk. Notes taken, including observations on material artefacts, verbal exchanges, gestures and body language complemented the interview data and provided valuable insights into the interviewees' perspectives and emotional connections to their farming and the land. This allowed for a deeper understanding of their practices and motivations.

Voice recordings of interviews were transcribed using automatic speech recognition software, with the data labelled according to thematic codes using an open-source text tagging tool. The first set of codes was based on predetermined themes derived from the narrative framework components: structural constraints, expectations, imaginaries and narratives. Examples of these codes included 'culture and community', 'economic challenges' and 'personal future'. In the next step, codes were added inductively through an iterative process, cycling between raw data, coded extracts and ongoing analysis. Examples of new codes included 'environmental challenges', 'climate (change) expectations' and 'farming in the future'. The codes were grouped under the new theme of 'environmental factors'. The final themes formed the core of the data analysis.

In the results we present dominant themes from the analysis. Our findings draw on a combination of farmers' direct statements, more subtle cues in the language, and farmer behaviour analysed through participant observation. This means that it is not always clear in the text how many farmers verbally expressed sentiments supporting the different outlined themes. Nevertheless, we are confident that the themes we outline in our findings are well grounded in the empirical material. Quotations in the text are used to enrich the findings. These are direct quotations that have been refined for readability by removing filler words.

4. Results

We first present findings about structural constraints and past experiences, expectations and imaginaries. However, the analysis revealed an important new theme: environmental factors, which we subsequently describe before connecting this new theme with the components of the narrative framework, demonstrating how attention to environmental factors enhances our understanding of the framework in the agricultural setting. Subsequently, we describe three narratives of the future that emerged from the analysis. We end the results with a section on how the future narratives identified impact farmers' interests in carbon farming.

4.1. Structural constraints

Findings revealed three key structural constraints: economic pressures, inadequate institutional support (expressed as disappointment with the government and lack of clarity about the functioning of the carbon market) and family legacy. We elaborate on these constraints in this order.

All farmers perceive significant economic constraints due to their weak bargaining position in the market, where powerful retail

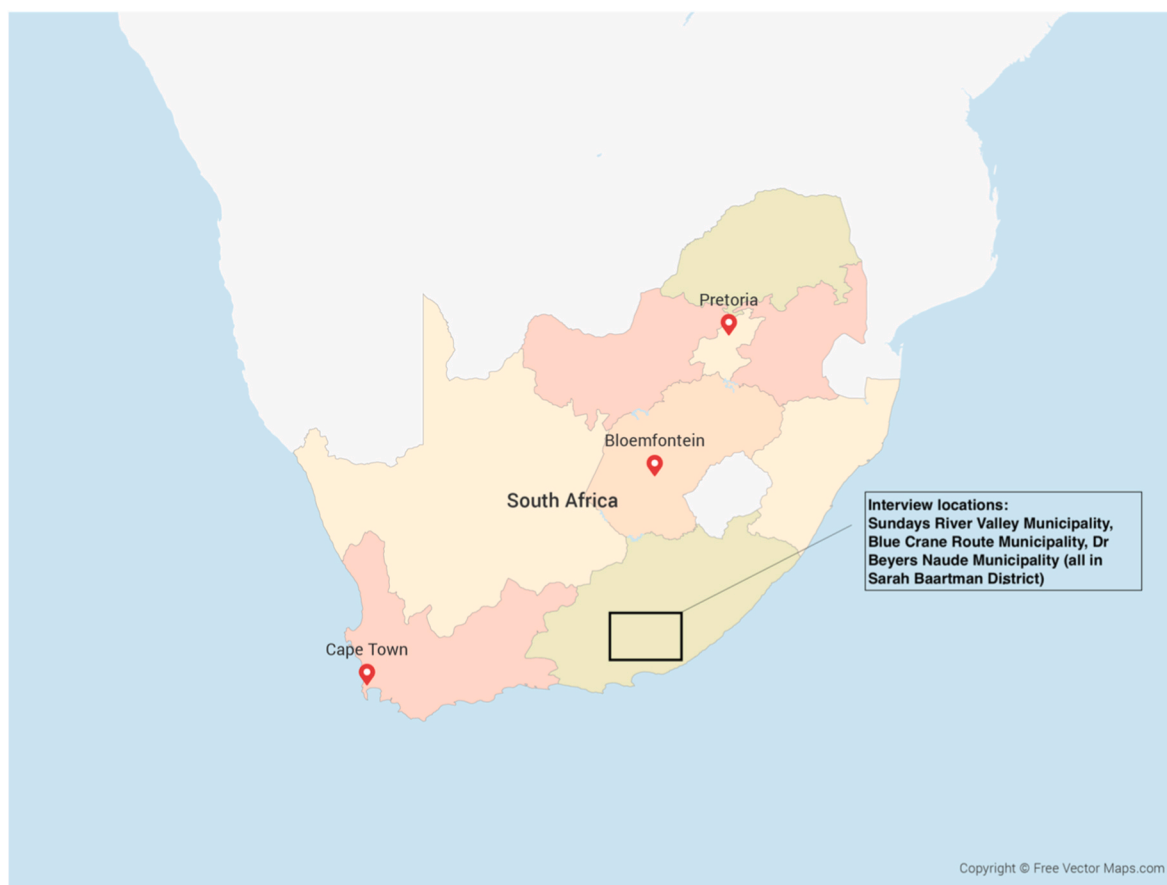


Fig. 3. Interview locations (from FreeVectorMaps, accessed 12.05.2024, edited by first author).

companies and fibre trading entities dictate prices, squeezing farming profit margins. While, relative to the average South African farmer, these farmers are wealthy and privileged, they face similar challenges as many other large-scale farmers around the world, being squeezed from both ends by the supermarkets and agroindustry (Bowman, 2025; Clapp, 2025). These economic pressures undermine the viability of farming operations, making some farmers consider abandoning farming. Farmers experience unfavourable market structures forcing them to invest increasing amounts of capital to secure the economic viability of their farms, covering costs such as predator management and farm labour wages. This financial burden compels farmers to focus on what is economically feasible, limiting their choices. As Farmer 2 states:

I'm not farming with goats because I want to farm with goats. I'm farming with goats because I have to make a living.

Farmers with sufficient capital can diversify their operations, such as through irrigation schemes if they have sufficient access to water or through transitioning to game farming. Another solution is upscaling by purchasing neighbouring farms (F2, see more on this later).

The interviews also revealed that farmers feel left out of the conversation about the emerging carbon market (*"They [the carbon programme developers] don't talk to us", "It's not the market where the farmers play"*, F2). Lack of transparency about how the market works led to rumours and a sense of uncertainty and suspicion towards investors and credit buyers. Farmers expressed how actors with insight into the market hold *"their cards close to their chest"* (F10), which limits farmers' bargaining power and market access. Four farmers (F1,F7,F9,F10) explicitly expressed uncertainty about how connecting their farm to the carbon market actually works. Another farmer (F2) suggested that a farm needs to be registered on the stock exchange to sell carbon credits. A quotation from Farmer 1 expresses the widespread scepticism well:

I've got my friend in Texas who says, 'How many carbon credits do you want? I'll print them out for you now.'

Beyond economic constraints and the lack of transparency of the carbon market, the political climate in South Africa imposes perceived structural constraints on farmers. Many farmers feel let down by their government, citing a lack of institutional support and frustration over the absence of farming subsidies their grandfathers received. During the colonial- and apartheid era, white farmers benefited from substantial support and lower labour costs due to the exploitation of black workers. Today white farmers often feel unfairly treated, as the government has refocused on supporting black farmers in an effort to address past injustices.

Farmers cited deteriorating infrastructure, including roads, schools and electricity, to exemplify their sense of a highly dysfunctional government. Frequent power cuts that severely impact farming operations are attributed to corruption within the state-owned energy provider Eskom. Six farmers have installed, or are in the process of installing, solar panels on their farms to reduce their reliance on Eskom.

Lastly, family legacy and tradition were identified as structural constraints, as they embed deep-rooted cultural norms and expectations that dictate life choices for the farmers, as Farmer 1 explains with the example of his education:

Look, my grandfather also went to the big agricultural college in [nearby city]. He was there, my dad was there, I was there, and my son was there.

The farmers in our study are descendants of the Dutch farmers who settled in the Cape from the mid-17th century onwards (Fourie, 2014), with farms being passed down through generations, reinforcing cultural norms and expectations. The traditions impose inherited responsibilities

and create pressure to conform, possibly limiting personal aspirations, as Farmer 2 emphasized:

I've got a big responsibility living here on the farm that's kind of handed down from generation to generation. [...] The last thing I want to do is something stupid and lose the property.

Farmers often mention their sons, fathers and grandfathers when discussing inheritance, with patrilineality historically playing a significant role. However, this is evolving, with daughters now included in family trusts. Still, many male farmers feel a responsibility to uphold the family legacy. This family heritage can shape their identities, manifesting in a deep connection to farming and evoking strong emotions. Farmer 8 noted, *"Because it's in our genes. We want to farm. We need to farm."* The legacy aspect is also mentioned among game farmers, *"Hunting is a thing that sort of sits within our blood."* (F5). This feeling of getting something from the previous generation and handing it over to the next generation can be a driver to keep the farming business in traditional ways: *"We always had goats, we never gonna get rid of them."* (F1).

4.2. Past experiences

During the interviews, several past experiences were mentioned that can be connected to future decision-making. Six farmers described having gone through the *"boom-bust"* (F5) economy, referring to cycles of highly profitable opportunities followed by steep financial downturns. Examples include investments in wildlife, such as ostriches and sable antelopes, and the *"mohair boom"* (F6), a period of rapid growth and high demand for mohair wool. When the boom turns into a bust, financial difficulties can prompt a shift in agricultural practices. For instance, Farmer 6 decided to start international hunting tourism after losing previously invested money in such a crash. This *"jumping onto the bandwagon"* (F1) sentiment was also referred to when discussing potential participation in the carbon market. It helps to explain farmers' hesitancy to participate in the carbon market, as many still vividly remember their experiences with past boom-and-bust cycles. Selling carbon credits is viewed as jumping onto the bandwagon all over again.

While the farmers largely describe past experiences of being shown the benefits of spekboom planting in positive terms, these experiences did not include information about the carbon market or how carbon trading works. More recently, carbon credit companies have reached out to farmers about future possibilities of engaging in the carbon market. One South African based carbon farming company focusing specifically on restoring degraded thicket has been more deeply involved with the farmers interviewed and has even become a member of local farming associations to build trust in the community. However, at the time of the interviews, the company seemed to have left the area without notice, sowing seeds of distrust among some farmers who feel abandoned by the company before they even had a chance to engage with them, as expressed by Farmer 1:

And then two weeks, two years later they're [the carbon farming company] missing; they're gone. So that makes the people scared as well.

4.3. Expectations

Navigating the structural constraints and building on past experiences, farmers expected the future to be even more competitive and a constant struggle for survival. Farmer 2 openly stated:

I'm not going to say this to my neighbours, but we're definitely in competition. Remember, the best one's going to survive.

Despite a sense of camaraderie within the community, fostered by longstanding neighbourly relationships and mutual assistance, when it comes to surviving through expansion, farmers have purchased each

other's land (F2, F5). To sustain his livelihood amidst declining profits from goat farming, Farmer 2 dramatically increased his farm size from 3000 to 10,000 ha; the only perceived way to survive with livestock farming in the region is *"to grow bigger"* (F2). This, which aligns with the global trend of farmland concentration (Lowder et al., 2021), is expected to result in the farming sector being run by *"mega commercial farmers"* (F10), who acquire more land, thereby displacing smaller farmers. Farmer 2 sums this up: *"In 10, 15 years there going to be less and less of us."* With us, he refers to livestock farmers. Other interviewees voiced similar expectations about a trend continuing into the future, saying if those farming with livestock stay in agriculture, they will turn into subsistence farmers or convert to game farming, which is an industry expected to grow in the future. Additionally, many farmers foresee an ongoing depopulation of the area as smaller farmers³ are pushed out.

Regarding the carbon market, farmers expected persistent uncertainty due to the market's volatility. They worry that long-term contracts (respondents mentioned contracts of 30–40 years) could prevent them from benefiting from future market price increases. Farmer 7 raised the following question:

What happens if carbon goes to \$400 and the farm is still getting the equivalent of \$10? What happens if the dollar collapses? [...] 40 years, in today's changing environment, is a massively long period for anybody to commit to. So, they may make money now, but inflation, etc., you may not make a living there in 10 years' time.

Additionally, the farmers expected that significant initial investment is needed to participate, for example to cover the labour costs when starting to plant spekboom on a large scale. None mentioned that carbon farming companies could cover these initial costs, despite land managers interviewed indicating that they do. This suggests either that farmers are unaware of this possibility, or they do not trust that this will happen. Ultimately, farmers believe that the financial reimbursement from carbon farming will be insufficient to sustain their operations.

But the amount of money they're paying us isn't sustainable really. It's just too little. I'm not 100 % sure how this works, but someone said it could be like 30 years before you get your money. (F2)

Farmers also expected a grim social and political future for South Africa, primarily driven by concerns over crime and security. They connected these issues with the country's high levels of inequality, high unemployment rates and a lack of education. Many farmers held the current government (at the time of data collection, March–April 2024) responsible for these problems. Repeated disappointments with the ANC had led them to question the political will to make meaningful changes.

It definitely changes a hell of a lot and going forward with unemployment rates in South Africa and there's no political will to try and get not only crime, violent crime, all crime whether it's corruption, whatever it may be. There's no political will to really try and change that. [...] In fact, it will just get worse. (F9)

Seven farmers explicitly expressed wishes to see crime better contained. Yet, the epicentre of crime is perceived to be in the bigger cities. The farmers expressed a relative sense of security on their land, which can be a reason to keep their farms.

4.4. Imaginaries

When asked about a preferable future, farmers envisioned fulfilment and joy derived from a lifelong dedication to farming and a peaceful retirement. This reflects the desire for a stable, rewarding career that allows them to end their working years with a sense of accomplishment

³ When these farmers refer to 'smaller farmers', they are referring to other comparatively large and previously privileged farmers, not the smallholders who numerically dominate South Africa.

resulting from providing either for one's children, *"It's nice for me as an old man to know I supply my children with something"* (F8), or for the country's food security, *"If you take the farmers away, there won't be food"* (F4). There is an intrinsic passion for farming apparent in the interviews which goes beyond financial considerations and extends to a deep-rooted connection with the land, as Farmer 1 remarked:

That's my way of life. You're not gonna get very rich out of it, but at least it's a way of life.

For many farmers, leaving their farms is inconceivable. As Farmer 5 expressed, *"I love it here. I won't go. I hope I die right here."* When speaking about their future, most of the farmers want to spend it in peace on their land. Even those who currently do not live on their farms imagine spending their last years out of the city and on their farms.

4.5. Environmental factors

4.5.1. Experiencing droughts and getting constrained by nature

The analysis of the interviews reveals significant environmental constraints and experiences that influence farmers' decisions and practices. Farmers have observed substantial changes in rainfall patterns, with the rain's distribution shifting, resulting in severe water shortages and altered farming practices. Additionally, an increased severity in extreme weather events, such as droughts (*"We were running away from the drought."* F7) and floods (*"We had a river running through the farm, broke its banks and washed everything away."* F5), was repeatedly mentioned. The droughts in particular, are so impactful that all farmers can recall significant droughts, most recently the one spanning 2016 to 2022. Furthermore, rising temperatures have made the environment hotter and more challenging for farming. Farmer 4 showed a photograph of a thermometer reading 52.2 °C, taken a few weeks before the interview, to demonstrate the increasing severity of temperatures. Due to droughts and water scarcity heavily impacting livestock health and the availability of fodder, some farmers, like the farming couple (F3 and F4) who decided to sell their livestock, opted to change their farming practices to avoid the high costs of purchasing external fodder. Even game farmers are not spared from the financial impacts of droughts, as they must also provide feed for the wild animals when they do not find food themselves. Indeed, soil erosion and land degradation, exacerbated by the lack of vegetation during droughts, are major concerns, leading farmers to implement measures like planting erosion-controlling plants and constructing dams to restore land.

4.5.2. Expecting worsening environmental futures and promising carbon farming effects

Eight farmers described how they expect a harsher climate in the future. Farmer 5 explains, *"There's more droughts going to come. And that's the reality of it."* The farmers offered different explanations for this perceived trend. Some farmers explicitly mentioned CO₂ emissions as a factor driving global warming, thereby acknowledging the anthropocentric influence. Others were less certain about attributing observed climatic changes to human impact. For example, farmer 9 emphasized that he is not a *"flat-earther"* and, hence, did not want to be seen as irrational or a *"conspiracy theorist"*. However, like some other farmers, he had doubts about whether climate change is manmade at all or rather just cyclic and unavoidable.

For the future, a lot of farmers see their only option as being adaptable and question traditional farming practices, as indicated by Farmer 3:

[...] because the seasons have changed, the temperatures have changed, the water levels have changed, we must adapt.

4.5.3. A nature-centred imaginary

When imagining an ideal future, farmers express an environmental vision which departs from current expectations. They envision a healthy

and beautiful land with a stable climate and more predictable rainfall patterns, allowing for better water management and reduced drought impact. In this future, their land can support their farming operations and contribute to a balanced ecosystem. Yet, 'healthy land' means different things to different farmers. Some see it as an opportunity for positive financial outcomes, believing that restoring the land to its 'original' state will allow them to increase stocking rates and grow their business. Others focus on the environmental benefits and the satisfaction of leaving the land in a better condition for future generations. For Farmer 8, who does not farm full-time, improving the land is driven by aesthetics and the desire for a pleasing environment around their homes.

All farmers hoped that the widespread adoption of sustainable practices would significantly improve soil health, effectively mitigating land degradation and helping them survive dry periods. Hence, farmers agreed that a good farmer must *"farm as sustainably as possible"* (F2). This involves practices such as planting cover crops and trees to prevent soil erosion or implementing water-saving irrigation systems. Additionally, the two livestock farmers have adapted their grazing systems. They referred to holistic and regenerative grazing, described as strategies where livestock are moved between pastures to prevent overgrazing, allowing vegetation time to recover. This aligns with the shared narrative among the farmers that historic overgrazing has resulted in severe land degradation and soil erosion. While no one blames their ancestors for this situation, they agreed that degradation stems from a lack of knowledge about sustainable grazing practices in previous generations, a situation that has changed in modern times (*"everything has gotten more scientific."* F6). This change is realized through changing contents in agricultural college education or through specific training programmes. For example, Farmer 2 attended a course to improve his grazing management and noticed a marked difference in the condition of his land compared to his neighbours who did not attend the course. The farmers' efforts to reverse degradation reflect a deeper sense of responsibility for the land rather than being driven by hopes for immediate financial gains.

4.6. Narratives of the future

It was possible to distinguish three narratives of the future amongst the farmers interviewed (Table 2), building on different dimensions of structural constraints and past experiences, expectations and imaginaries, as well as perceptions of the impact of wider environmental factors. These are summarized in the sections below.

We keep fighting and innovate our business - The adaptive farmers (F1, F3 & F4, F6)

This narrative reflects farmers' resilience, adaptability and proactive approach to their future, emphasizing their determination to overcome challenges and persist, despite economic, environmental and political obstacles. Innovation is central, as these farmers continually evolve their practices and adopt new technologies. For instance, the farming couple (F3 and F4) exemplify progress by being the first in the area to

Table 2
Farmers narrative of the future-three typologies.

Farmers	Typology/Narrative	Core Characteristics
F1, F3, F4, F6	Adaptive farmers/"We keep fighting and innovate our business"	Resilient, proactive, and innovation-oriented; aim for long-term survival and growth; prioritize keeping the farm in the family.
F8, F9, F10	Holiday farmers/"We stop fighting but keep the farm"	Part-time farmers with secure off-farm income; farm for lifestyle, family legacy, and attachment to land rather than profit.
F2, F5, F7	Uncertain legacy farmers/"The family farm's future (possibly) ends with me"	Doubtful about farm succession; discouraged by risks and instability; hesitant to involve children in farming.

implement a rotational irrigation method. Their aim is economic survival and growth, making strategic decisions for long-term financial stability and prosperity.

Healthy land is seen to improve stocking rates and expand business. A crucial aspect of this future narrative is ensuring the survival of the family farm. For instance, instead of selling, the farming couple and their son are considering investing in new ventures to generate additional income, showing a strong commitment to keeping the farm within their family. A forward-thinking vision drives those farmers' continuous improvement and innovation, integrating diverse skills in business management, marketing and agriculture to navigate the complexities of modern farming. As Farmer 1 explains:

But there's a lot of modernization that's coming. With the laptops and the communication and information sharing now. It's so easy [switching] over to this digital media.

4.6.1. *We stop fighting but keep the farm - The holiday farmers (F8, F9, F10)*

This narrative was used by one specific group, the holiday farmers – a term used by the farmers themselves. These farmers were labelled as 'non-permanent' earlier in this paper, since they do not farm or live on their farm full-time. These farmers combine their passion for farming with financial security from non-agricultural incomes. They typically own land and a farm not primarily for economic but for other reasons. These reasons include keeping the farm in the family or wanting to keep a close attachment to the land and the countryside. While one of the holiday farmers inherited a farm spanning 1700 ha, the other two manage farms of around 500 ha in size, which according to them is way too small to sustain a farming business.⁴

The holiday farmers mentioned a strong connection to farming, often stemming from their upbringing on a farm or their connections to a farming family. The farm is:

the place where you go to relieve your stress. It's the place where you go to just not get depressed and handle the stresses of life, I think. Also, for your children and your family it's like medicine for the soul. (F10)

All three holiday farmers have university degrees and have pursued careers outside of farming, for example, in mechanical engineering (F9). Due to their employment in bigger cities, all holiday farmers reside closer to urban areas.

Although their farms are not intended to be viable as commercial ventures ("It's like a sponge, it just sucks up money" F9), the farmers still prefer to use the land productively to some extent, such as by keeping livestock. For example, Farmer 10 decided to raise cattle on his land again, not for commercial purposes, but because "it gives me a reason to go back".

4.6.2. *The family farm's future (possibly) ends with me – The uncertain legacy farmers (F2, F5, F7)*

This narrative reflects a profound sense of uncertainty and concern among farmers about the continuity of their farms. This sentiment is intertwined with parents' different desires for their children's involvement in agriculture. While some farmers following other narratives are eager to pass down their farming legacy ("It [the farm] will stay in our family." F1), the farmers in this group are reluctant to do so due to the overwhelming uncertainties in the industry. Farmer 7 encapsulated this reluctance:

I have shied away from encouraging my children to get involved in anything agricultural in this country because I think the uncertainties are just too many and too huge. So, my children are both professionally qualified and effectively I don't think they will ever be involved in agriculture.

For some farmers, the situation is more nuanced. They would like to see their children take over the farm but prefer to leave the choice to them and even encourage their children to pursue careers outside farming. When asked if he would like his children to take over the farm, Farmer 2 responded:

That would be great. But I think that's because people feel a son must farm. I don't feel like that. Even if this farm has a manager one day, that's also fine. They don't have to farm. [...] I enjoy farming, that's cool. But if they don't enjoy it, then they must do what they enjoy.

These sentiments are shared not only by the 'uncertain legacy farmers', but also by some holiday farmers. For instance, both groups expressed doubts about whether the next generation will remain in South Africa, as some family members have already emigrated. Both groups pointed to the unstable political situation in South Africa as a source of uncertainty, highlighting the upcoming elections and their potential impact on the country's future stability. Worry about the country's future stability and critique of the sitting government has been widespread amongst white South Africans since the end of apartheid. Farmer 8, who fits both the holiday farmer and 'uncertain legacy farmer' narratives, captured this sentiment:

Luckily, my one son, his wife and three children has got [sic] French passports. They stayed there for 13 years. So, if this country collapses completely, then they can go there.

4.7. *How do narratives of the future shape interest in carbon farming?*

Irrespective of which future narrative a farmer held, all were positive about spekboom planting and have already adopted other sustainable practices to different degrees within their respective farming practices. Examples include building dams, practising rotational grazing, implementing conservation management and culling, planting trees and cover plants and attending courses on sustainable practices. Farmers expect that carbon farming using spekboom planting will improve the carrying capacity of the land, allowing it to support more livestock and healthier vegetation, and facilitate reaching long-term conservation goals, creating a more sustainable and resilient agricultural environment. However, none of the farmers interviewed currently participates in commercial carbon farming.

Exemplifying this wider sense that spekboom planting is good for the land, farmer 6 plants spekboom on his land and sells cuttings to a carbon project developer, expressing a strong belief that this leads to soil improvement and wider environmental benefits. Yet, this farmer has decided not to expand beyond providing cuttings. This is because more extensive plantations of spekboom on his own land, necessary to connect his land to the carbon market, would require additional investment and land use changes, such as fencing, which would disrupt the roaming environment for his hunting tourism clients. He also explains that converting his land to spekboom planting would make him too passive and it is not the type of farming he is interested in:

I cannot sit and watch those things grow every day and do nothing else. I have to see people. I meet different people all over the world every week. I love what I do. (F6)

Other farmers also prefer active land use, fearing that a carbon contract would make them more passive. This indicates a preference for active management over passive restoration. Farmer 8 expressed reluctance due to negative past experiences with a carbon project developer, rather than being influenced by future expectations. Further

⁴ It is important to note that the average farm size per individual landowner in the Eastern Cape is 7 ha, nationwide even just 6 ha. Many South African farmers have access to less than 1 ha of land (Department of Rural Development and Land Reform, 2017).

reasons mentioned not to engage in carbon farming was the lack of clarity about how the market works and the sense of not being well informed about this by investors (as discussed earlier), and uncertainties about establishing baseline measurements and potential threats, such as fire that could jeopardize the investment.

Overall, the adaptive and holiday farmers expressed more interest in participating in carbon farming schemes. For the adaptive farmer, it represents a business opportunity, but only if it proves to pay enough and can remove further uncertainties in the future. The holiday farmers are not as dependent on the income from the market – they would still like to see their investments covered – but are more motivated by the prospect of regenerating the land. Uncertain legacy farmers do not view carbon farming as viable due to its future-oriented returns.

5. Concluding discussion

This study indicates that large-scale South African farmers in the thicket biome express many sentiments found among farmers across the globe who face narrowing profit margins and environmental challenges. Like farmers in other parts of the world, there are those who keep, or even start, farming mainly for reasons such as being close to the land, being able to produce their own food or contributing to agricultural sustainability. Our findings thus support conclusions from other studies that there are many other motivations for farming than economic ones, even amongst farmers who mainly farm for profit (Author et al., 2020, 2; Hajdu et al., 2024; Sandström, 2023; Shucksmith and Herrmann, 2002; Reed and Kleynhans, 2009; Abrams and Bliss, 2013). Among the farmers in our study who strive to keep their farm as a viable livelihood option, their concern about the future of their family farm resembles family farmers' concerns in many other parts of the world, as farming is squeezed for profits and farmers worry about whether their children will want or be able to take over their farm (Kuehne, 2013; Joosse and Grubbström, 2017). Like in other studies, our findings also show how wider sentiments in and support from the local farming community (Kragt et al., 2017; Burton, 2004) as well as the broader political and economic situation (Fischer et al., 2019) influence farmers' choices about adopting new practices. Importantly, unlike the purely financial motivations suggested in some previous research (Morgan et al., 2015), our findings reveal that farmers who show interest in carbon farming are also significantly motivated by environmental and social concerns. This finding supports claims for broadening adoption research in general (Fischer, 2016) as well as research on carbon farming practices (Galvin and Silva Garzón, 2023; Figueredo, 2024) to go beyond economic concerns only.

The narrative framework proposed by Vignoli et al. (2020) was found to be a useful tool for understanding the narratives that farmers construct about the future of their farms. However, our study expands this framework by integrating environmental dimensions, which are found to be essential for understanding how farmers navigate uncertain futures through narratives.

We conclude that farmers narratives of the future in this study are shaped by the interplay of personal values, structural constraints and environmental realities. Even though the three narrative groups identified in this study envision different future scenarios for their farms, an overall desire for land improvement and a shared concern for sustainability issues were apparent among all three. By acknowledging the significance of environmental factors within the construction of future narratives, we recognize that farmers narratives of the future are impacted by environmental realities, such as water availability and climate variability, which significantly shape their imaginaries of the future. Environmental considerations are not only constraints, but also part of how farmers imagine positive futures, where improved ecological conditions play a central role.

The expanded narrative framework provides insights into the practical decisions farmers make, such as their adoption of carbon farming practices. Findings show that farmers are significantly concerned with

climate change and environmental degradation, which has already led to changes in their farming practices. All farmers in this study recognized the value of spekboom planting, and other land management adaptations, in helping to achieve climate and environmental goals. While being positive to carbon farming methods, there was however widespread scepticism amongst the farmers in this study to carbon farming projects. This finding resembles other recent studies on farmers perspectives on carbon farming which show that while farmers in general are positive to the practices included in carbon farming, they are sceptical to enrolling in carbon farming projects. The market is perceived as unclear and uncertain, and projects are perceived as requiring investments with uncertain returns and potentially locking farmers into certain land management practices, which could limit future autonomy and adaptability (Barbato and Strong, 2023; Figueredo, 2024). These are legitimate concerns. Research has shown how the evolving market for carbon farming is extremely dynamic and hard to grasp, with a variety of initiatives with very different motivations, designs and terms for participation, resulting in a potential variety of (positive and negative) outcomes for participating farmers (Author et al., 2025). In addition, there are strong indications that proposed designs for carbon farming do not ensure long term climate change mitigation (Galvin and Silva Garzón, 2023; Paul et al., 2023).

Drawing on our findings, we propose a modified version of the narrative framework by Vignoli et al. (2020) where structural constraints also encompass environmental factors, expectations include environmental uncertainty, and imaginaries incorporate ecologically prosperous futures. Fig. 4 illustrates this adaptation, showing how environmental factors influence each component of the framework. This broader framework can more effectively capture the complexity of farmers' narratives and their responses to uncertainty in general, including uncertainties surrounding environmental dynamics and the evolving carbon farming market.

The present study was limited to ten farmers in a specific area of South Africa. Future research could test our suggested framework on different and larger datasets and could further explore the detailed mechanisms through which environmental factors interact with other structural and social dimensions to shape farmers' narratives and practical decisions.

CRedit authorship contribution statement

Maria Senftl: Writing – original draft, Visualization, Methodology, Investigation, Conceptualization. **Klara Fischer:** Writing – review & editing, Supervision, Project administration.

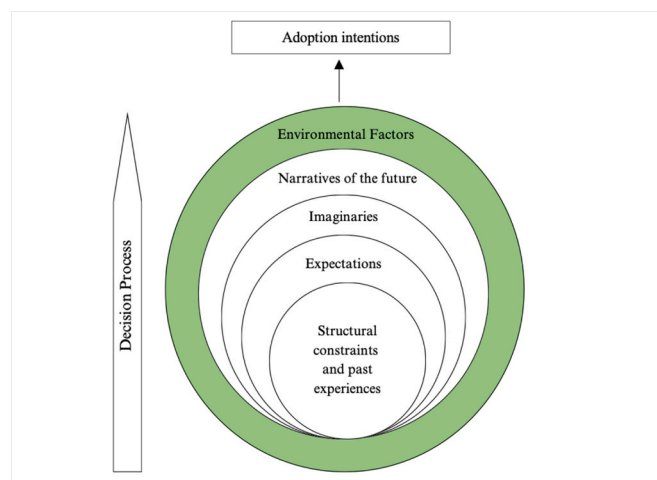


Fig. 4. Adapted Narrative Framework by Vignoli et al., (2020) by the component of Environmental Factors.

Declaration of competing interest

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Data availability

Data will be made available on request.

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