Learning to make a difference:
Small-scale women farmers in social learning spaces for climate action

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by

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Declaration of originality

I know that plagiarism (using another's words and pretending that they are my own) is wrong. I, Ludwig Chanyau, therefore, declare that this doctoral thesis is my own work written in my own words. Where I have drawn on the words or ideas of others, these have been acknowledged using complete references according to Departmental Guidelines.

As additional proof of originality, a similarity report was obtained and is appended to this document.

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Abstract

How do women farmers in Africa learn about climate change? What is quality climate change learning for farmers? How do farmers interface new knowledge with their long-held and trusted traditional knowledge? How do we evaluate learning at farm level and beyond?

Using Okoli's theory mining review, I untangled a tripartite knot of social learning literature to find Social Learning Theory (SLT) suitable for a study to explore my practical and scholarly curiosity as reflected in the above questions. Wenger's theory of Social Learning emerged as the most appropriate for my research. The second phase of my study explored the climate change learning and practice terrain for small-scale women farmers, analysing the connection between learning, practice, and the resultant value in two case study areas, municipalities in the Amathole District of the Eastern Cape Province of South Africa.

In addition to a paper on SLT mining review that unravels and chooses between the strands of social learning, the two case studies resulted in three articles that responded to the study's objectives and the research questions. The thesis is introduced and synthesised through five 'book-end' chapters, as well as through these four articles.

What were my findings? In the first case study, in the drought-stricken Raymond Mhlaba Municipality, I gathered the data through individual semi-structured interviews with farmers, extension officers and representatives of the involved organisations. I also conducted a group interview with farmers and analysed documents to supplement interview data. I analysed the data using concepts of Communities of Practice (CoP) and SLT to map out the learning and practice landscape. I discovered a constellation of CoPs interconnected by the shared drive for adaptive water management. The constellation is made up of tertiary institutions, government departments, non-governmental organisations and farmers of varying experiences and competencies, with women emerging as the more proactive gender, and state-led extension services being willing but overstretched and under-resourced. SLT effectively traced the apparent fragmented learning within and outside the CoPs and the sudden and extensive shifts in the CoP boundaries, especially in the context of COVID-19 pandemic lockdowns and the increased adoption of digital learning platforms. Despite the richness and diversity brought by the emergent new learning networks that involve participants in the province and further afield, the adoption of digital learning platforms worsened the existing generational digital divide among farmers.

In the second case study, in the water scarce Buffalo City Metropolitan Municipality, I adopted the Value Creation Framework (VCF) to conduct an ethnographic evaluation that used semi-structured interviews, participant observation and document analysis of the learning experiences of women farmers in a social movement on agroecology. I found that the farmer-centred learning approach of the movement has created value for the farmers involved, evidenced by the adoption of agroecology by over 2700 members (including new urban farmers who are occupying open spaces typically used as dumpsites). The learning approach has facilitated expansive learning, enhanced resource mobilisation, new collaborations, partnerships, and seed sharing networks. Additionally, it necessitated context-appropriate and transformative changes to intersectional justice issues associated with historical inequalities in access to land and water and gender discrimination, leading to improved practices, new access to markets and improved quality yields. These are examples of immediate, potential, applied, realised, orienting, enabling and transformative as well as strategic value, as defined by the VCF.

In reflecting on how women farmers learn in these social learning spaces I elucidate the learning impact pathways and local contextual influences in shifting CoP boundaries, domains, and practices during the climate crisis as it intersects with other compounding factors. I generated insights that could be useful for stakeholders in the agricultural (extension) sector to build better pathways for emancipatory and empowering expansive social learning in contexts characterised by resource constraints, but also by strong women-led agency. Such learning could make a difference and cushion small-scale farming from collapse especially in times of unprecedented changes. The agroecology movement and associated communities of practice explored in this study create transformative social learning spaces that are able to respond to climate change, and hence a model that state-led extension might want to adopt in other resource-constrained contexts.

Acknowledgements

> "The dissertation is a labour of love requiring much work, sweat, and tears, as well as organization skills and extensive resources from others who are involved with the process. The final product is a document that one can recognize as a once-in-a-lifetime achievement." (Grant & Osanlo, 2014)

Achieving this milestone could not have been possible without a great deal of support from those around me. I would like to express heartfelt gratitude to the following:

All the individuals who believed in me and took a chance on me, giving me opportunities to prove myself.

Professor Eureta Rosenberg, my supervisor, for her mentorship throughout my PhD journey, for sharing her knowledge and skills, exposing me to the world of evaluation research and challenging me to stretch my intellectual and career boundaries.

My whole family, for the love and support since I started my education journey that enormously and consistently tested my perseverance and determination. A special mention to Talysa for being kind and patient throughout my PhD journey.

The Environmental Learning Research Centre for the Monitoring and Evaluating Climate Communication and Education (MECCE) bursary that allowed me to focus on my PhD journey without too much financial stress. I am grateful for the 'Monday Morning Meetings' and the 'PhD weeks'; they gave me the opportunities to share my research and ideas with colleagues which has enriched my research. I appreciate the efforts of all those who worked over the years to develop the ELRC into a world class open learning space.

The participants, especially, extension officers and farmers who were willing to leave their busy schedules, even during planting season, to take part in my study. I appreciate their warm reception and thank them for trusting me into their communities and working spaces and for sharing with me their experiences in the learning and practice spaces. My key informants, field assistants and their organisations, thank you for making my visits into the 'unknown' such great experiences. A special mention to Edmore Parichi, my homeboy and brother, for facilitating my fieldwork in his catchment area where livelihoods are being turned around for better.

Dedication

To my aunt,

Mwana waChanyau Agnes Harusekwi Kwindingwi,

in loving memory.

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Acronyms

CoP	Communities of Practice
DAFF	Department of Agriculture Forestry and Fisheries
DALRRD	Department of Agriculture Land Reform and Rural Development
DSD	Department of Social Development
ELRC	Environmental Learning Research Centre
FAO	Food and Agriculture Organisation
FFS	Farmer Field School
IBLN	Imvotho Bubomi Learning Network
ICT	Information and Communication Technology
MFS	Middledrift Farmers Society
NDP	National Development Plan
NGO	Non-Governmental Organisation
NPC	National Planning Commission
OZCF	Oranjezicht City Farm Market
RWA	Rural Women's Assembly
SLT	Social Learning Theory
SSA	Sub-Saharan Africa
UNSDG	United Nations Sustainable Development Goals
VCF	Value Creation Framework
WRC	Water Research Commission
ZEP	Zingisa Educational Project

Chapter 1: Introduction

1.1 Introduction

A qualitative researcher's role as the leading *instrument* for data collection, interpretation and presentation requires that researchers, from the beginning of the research, keep in check their values, assumptions, and biases concerning what is being studied to protect research integrity (Creswell, 1994; Dodgson, 2019). Against this background, in this chapter, I share my positionality and the motivation that shaped my interest in the research topic. One's positionality is closely linked to one's worldview, and as such, it is not static because we are continually experiencing new things, learning and evolving (Enosh & Ben-Ari, 2016).

The motivation for the present study stems from intellectual curiosity arising during my involvement in small-scale farming as a part-time farmer and my work in the agribusiness sector. Before enrolling for this PhD, I worked for Cape Town's Oranjezicht City Farm Market (OZCF) between 2016 and 2020. I worked closely with the founder and director to ensure smooth market operations. My duties included, among others, strategic planning and interacting with producers and customers for supply and demand balancing. During that time, I witnessed the role played by smallholder farmers in food systems and in contributing to several developmental initiatives.

I also witnessed first-hand difficulties faced by smallholder farmers in producing, finding markets, and delivering produce. This was not entirely new to me because I grew up in Chanyau village, a subsistence farming community in Bikita, south-eastern Zimbabwe. Generally, across the two countries, the challenges included insufficient resources, knowledge gaps in adjusting practices to climate change, inopportune access to context-relevant climate information, lack of cohesion among farmers to ensure collaborative climate change responses, and lack of governmental support. I observed how smallholder farmers struggled to keep up with consecutive loss-making years due to climate change. Deep into the crisis, these challenges cost them finances and their mental health, which has been observed to lead to increases in suicides, especially among emerging farmers (Berry et al., 2011; Johnston, 2018; Tom, 2020).

In 2020, I decided to enrol for a PhD focusing on the evaluation of the learning experiences of small-scale women farmers. My study sought to understand how social learning spaces for climate action can influence women farmers' adaptation choices and capacity. My interest in an evaluative study was influenced by wanting to develop my capacity as an early career Monitoring Evaluation Research

and Learning (MERL) practitioner. My interest in climate change learning and my choice of the Value Creation Framework (VCF) (Wenger-Trayner & Wenger-Trayner, 2020) as my evaluation approach lie in the recognition of their utility in building and mobilising organisations and the citizenry's capacity to engage with "new information, inquire, understand, ask critical questions and take what they determine are appropriate actions to respond to climate change" (Stevenson et al., 2017, pp. 67–68). Engaging with female participants was motivated by the fact that in my community and in most parts of the developing world, women in agriculture are key players in the developmental agenda, hence understanding their experiences is vital.

Throughout the study, I remained mindful of the potential influence of my positionality on my theoretical and methodological choices and on how I interpreted and presented the findings. My position as a researcher, a male researcher, a foreign national and a non-speaker of the local language might have impacted the integrity of my study working with women. Being a researcher working with marginalised communities meant some form of power imbalance was inevitable. Being a male researcher, working with women farmers meant that I might not have been able to observe or identify certain gender-specific issues influencing their practice. My nationality and language limitations could have limited my interactions with the participants and my understanding of the cultural issues pertinent to my study. To mitigate these challenges, I was guided by the ideas of Karnieli-Miller et al. (2009) on power distribution in qualitative research and the need for researchers to remain attached to the admirable desire to democratise the research process to mitigate chances for ethical dilemmas and serious methodological challenges. The study's methodological choices and theoretical frameworks put the participants at the centre of the research and allowed them to tell their stories with minimum guidance from the researcher. Using local research assistants and key informants helped bridge the language and socio-cultural gaps. They also enhanced my appreciation of the participants' contextual realities and the problems I intended to research.

1.2 Research context

In my quest to understand how smallholder farmers manoeuvre the climate change learning and action landscape, I adopted communities of practices (Lave & Wenger, 1991) and social learning (Wenger, 2010) as the theoretical lenses for this research. My study recognises the importance of transformative lifelong learning as a critical feature for just transitions and sustainable livelihoods and complements efforts pushing climate learning beyond the classroom and recognising communitarian learning informed by the participants' socio-culture contexts and historicity. As such, it is imperative

to identify and describe the various contextual realities that shape climate change learning and action, especially in the early stage of my thesis.

Since the beginning of 2022, I have engaged with several communities in Raymond Mhlaba Local Municipality within the Amathole District (see Figure 1.1) and the adjacent Buffalo City Metropolitan Municipality (previously part of the Amathole District Municipality), both in the Eastern Cape Province. The province is experiencing rising temperatures and changes in rainfall patterns as evidenced by decreases in the total number of rain days since 1981 (Bernado, 2020). The changes in climate affect farmers varyingly. While established commercial farmers in the province have comparatively more experience of dealing with climate change and have enabling resources, smallholder farmers lack access to resources and information about climate and adaptation choices, resulting in insufficient adaptation capacity and compromised production (Muller & Shackleton, 2014). In 2015 the Amathole District was declared a drought disaster state; efforts to reduce the socio-economic costs of the drought have yielded poor results due to the shortage of resources (Amathole District Municipality, n.d.).

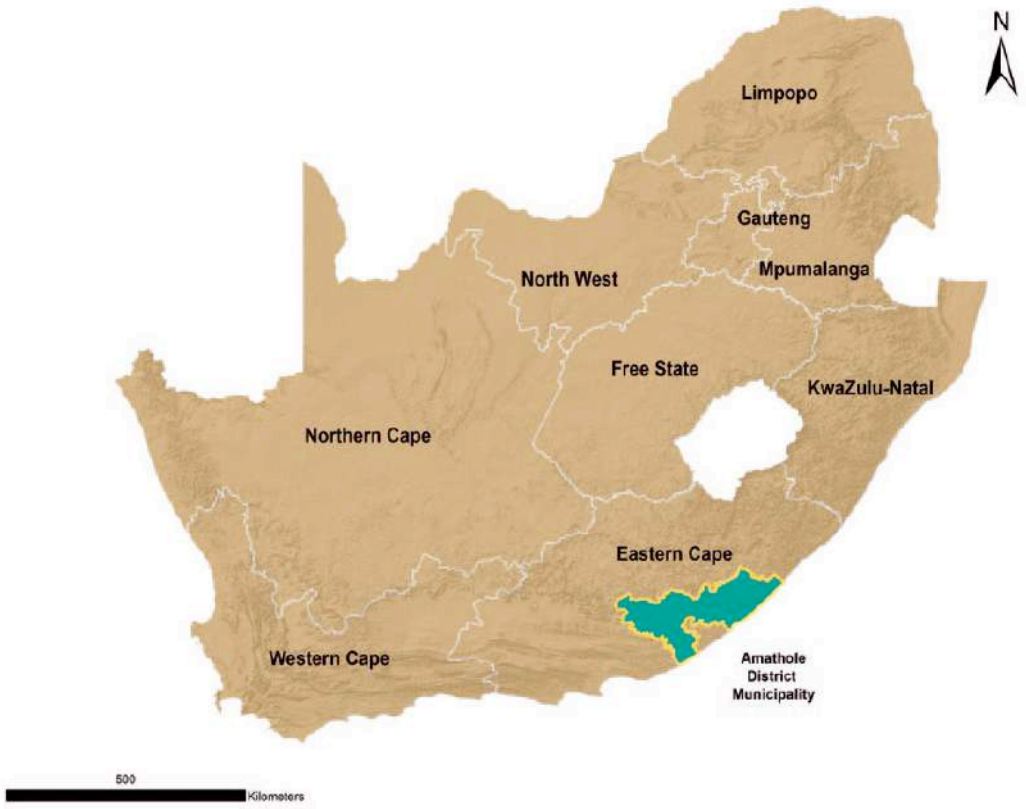

Figure 1.1: The Amathole district on the South African map (shaded green) with the Buffalo City Metropolitan Municipality (brown within the green area)

Source: Fisher(2017)

Case study 1: Raymond Mhlaba Local Municipality

The first case study was in the Raymond Mhlaba Local Municipality in the Amathole District (see Figure 1.2). I was mainly operating from Keiskammahoek, about 126km from Rhodes University in Makhanda. Using CoP and social learning concepts, the case study was geographically bound and exploratory and concentrated on contextual profiling and stakeholder mapping, identifying the role players, zooming in on the learning landscape in the post-pandemic era, contextual dynamics, the role of extension services, conflicts, and the emergence of new learning networks. Case study 1 mapped out the contours of smallholder farmers' climate change learning based on these concepts. Within this case there were various mini-cases.

Figure 1.2: Location of Raymond Mhlaba Local Municipality in the Amathole District in the Eastern Cape

Source: Municipalities of South Africa (n.d.)

Case study 2: Buffalo City Metropolitan Municipality

The second case study was in the adjacent Buffalo City Metropolitan Municipality (see Figure 1.3). During the data collection period, I was based in King William's Town, about 125 km from Rhodes University in Makhanda and about 44km from my first case study area. My key informant and research

assistants were based at Zingisa Educational Project in Berlin. In the case study area, I engaged with farmers in Dimbaza, Zwelitsha, East London, and Mdantsane. Buffalo City Metropolitan Municipality has not been spared from climate change and associated droughts. Dam levels in the municipality have dropped to an average below 33% due to recurring droughts (Sitshinga, 2021).

In the Buffalo City Metropolitan Municipality, I conducted an evaluative case study of an agroecology learning intervention led by Zingisa Educational Project and Ilizwi Lamafama. The study used the VCF to trace the value created for small-scale women farmers who are part of the intervention.

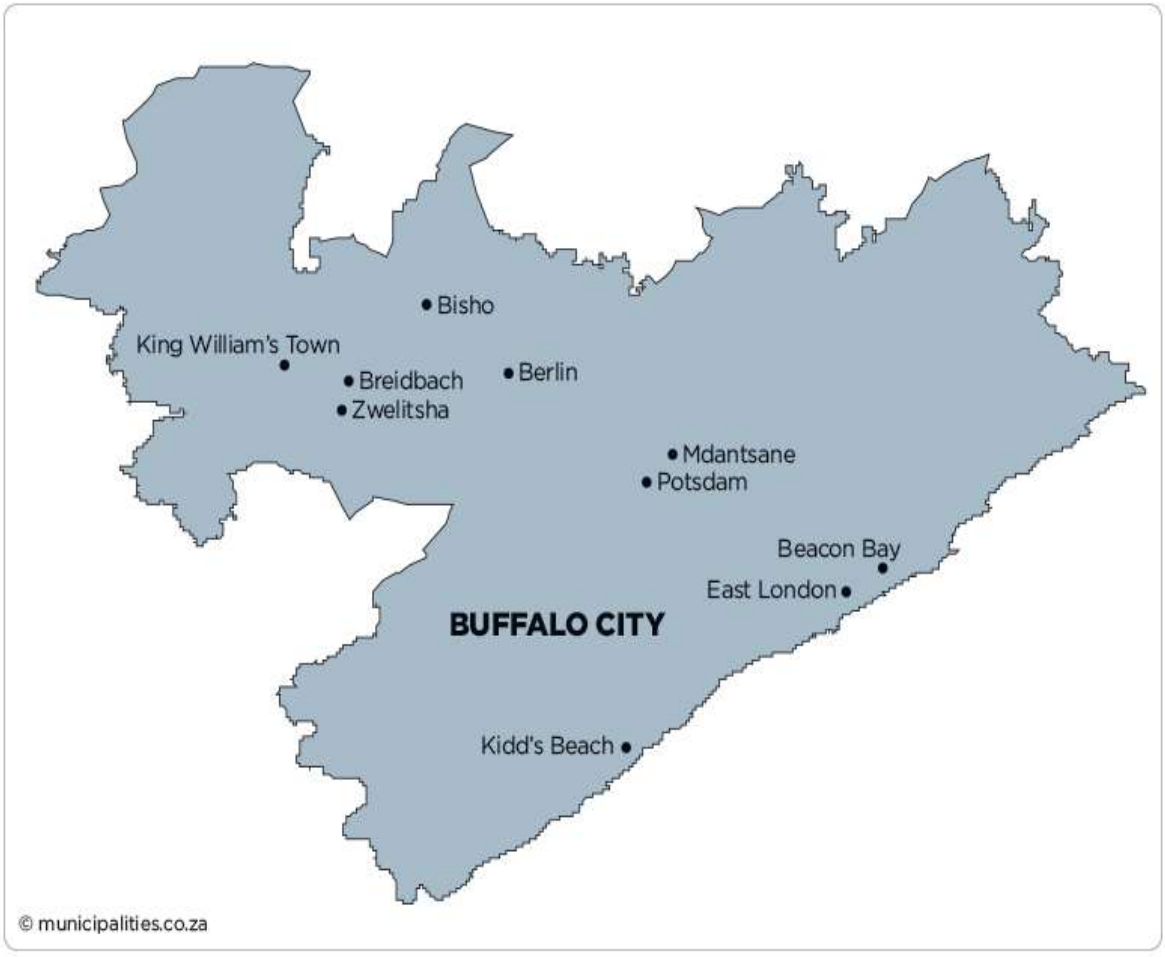

Figure 1.3: Buffalo City Metropolitan Municipality

Source: Municipalities of South Africa (n.d.)

In both case studies I engaged with small-scale farmers, NGOs, tertiary institutions, and government departments in mapping farmers' learning and practice landscapes in the two case study areas. The communities I engaged with have been part of the Amanzi for Food Project (https://amanziforfood.co.za/) a learning network focussed on sustainable water use and

conservation funded by the Water Research Commission (WRC) and implemented by the Environmental Learning Research Centre at Rhodes University, thus my work builds on the foundation laid by my colleagues and predecessors, whose work is acknowledged in the references.

1.3 Problem statement

The conduct of research in all its forms implies the quest to respond to a problem or problems, and as such, the role of the problem statement is to articulate the problem, its effects and the resultant consequences of not fixing it (Ali & Pandya, 2021). Borrowing from the work of Jacobs (2013), the problem statement is informed by my positionality, experiences and motivations, the literature I interacted with and inputs from my peers. As shown in Figure 1.4, the problem statement is made up of various human and natural factors that reinforce each other to give rise to the problem and motivate the conduct of research.

1.3.1 Overall manifestation of the unresolved problem

Climate action, especially adaptation, is a two-step process that involves the positive reception of climate change information and the associated risks, and measures to reduce them. It is imperative that one forms a perception of the challenges posed by climate change and then takes the proper steps, but if the perception is poor or wrong, then one may take inappropriate steps that may pose further damage. The chances of a positive perception and the undertaking of accurate measures depends on one's access to climate learning, cognitive capacity, and willingness to adjust one's daily practices; as well as by lack of capacity, resources, and information (Tripathi & Mishra, 2017). Farmers' perceptions are shaped by several factors that include age, gender, level of education of the head of the household, available resources, knowledge of climate change, social capital, agroecological settings, household size, livestock ownership, use of extension services, and the availability of credit (Deressa et al., 2011; Kibue et al., 2015; Thi Lan Huong et al., 2017; Wale et al., 2022). Women farmers have less adaptive capacity due to additional constraints, some of which are tied to policy frameworks and the governance of resources and financial services (Jost et al., 2011). Their burden is made heavy by institutional dominance of their male counterparts in accessing essential resources for adaptation, including learning opportunities and extension services which are critical in determining farmers' awareness and adaptive capacities (Lineman et al., 2015; Moser & Ekstrom, 2010; Mukute & Lotz-Sisitka, 2012; Popoola et al., 2020; Semenza et al., 2011). Additionally, the readily available adaptation strategies are highly labour-intensive and create enormous labour loads for women (Jost et al., 2016; Trinh et al., 2018), leaving extension services as the last line of support in finding new efficient ways that do not have a trade-off on production.

Humanity is both a contributor to and a victim of climate change, and as such, the change that the world longs for starts with human action. Critically, because of the role of farmers in the food system, it is important to understand their learning experiences and how they shape their responses to the climate change problems in their context.

Figure 1.4 provides a summary of the problem statement, with its physical climate change dimensions, socio-cultural gender dimensions, educational (extension) dimensions and economic sectoral trends (discussed in 1.3.4), and shows how these intersecting issues give rise to the research question.

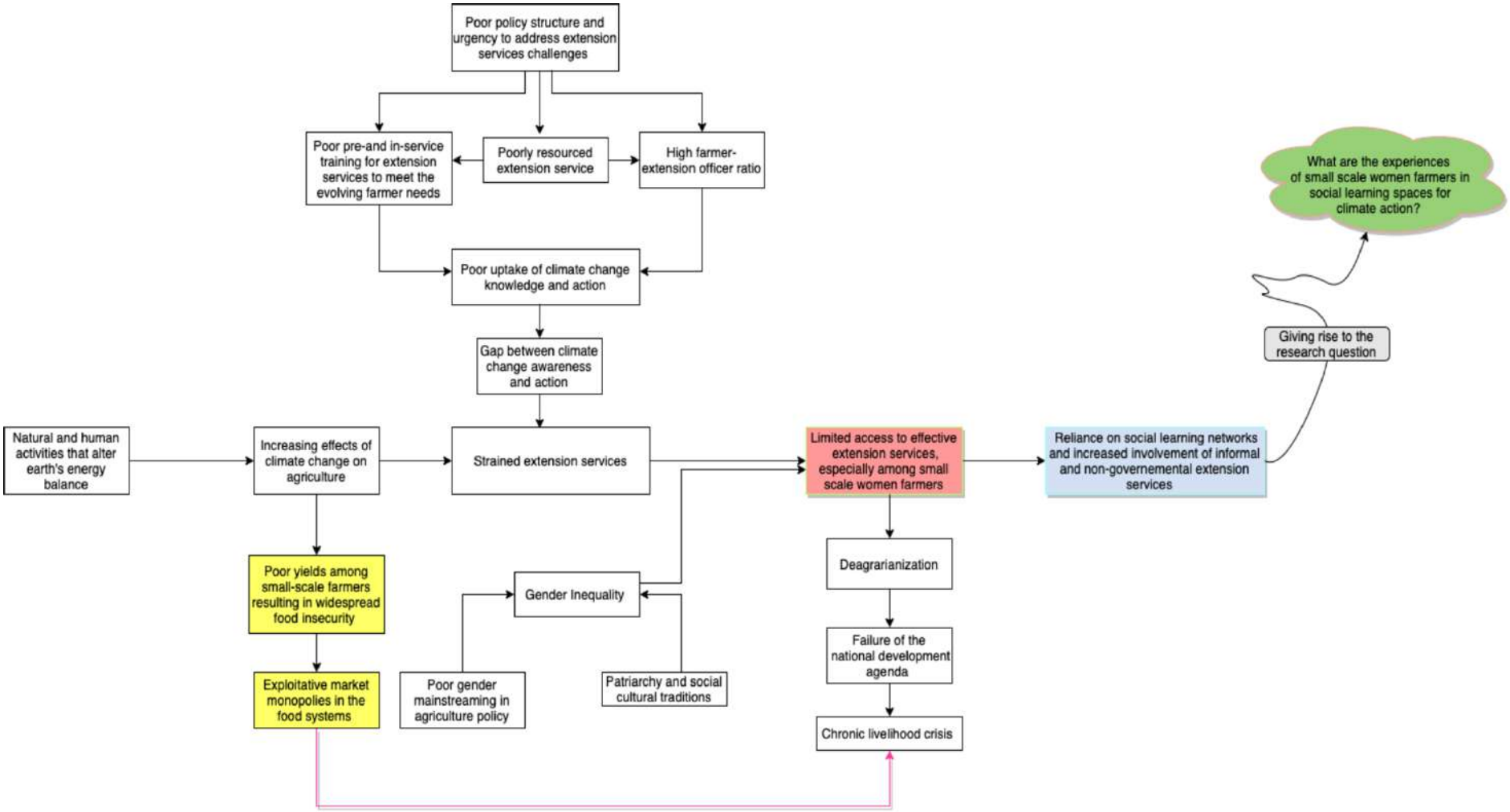

Figure 1.4 : The problem statement

Source: Author

1.3.2 Strained extension services

The Eastern Cape Province has one of the least favourable ratios of extension services to farmers in South Africa (Ngaka, 2012). Despite a comprehensive acknowledgement of the situation and the dire potential consequences it has for small-scale farmers, the province's policy structure is not urgently linking institutional services and support to improve food production activities of smallholding farmers in the province (Hosu et al., 2016). There hasn't been urgency to address the challenges compared to other parts of the country's nine provinces facing similar challenges (Mahlalela et al., 2020). The extension officers lack capacity to ensure that farmers effectively receive and exchange information about climate change and the available adaptation options. Studies on South Africa's extension services show that incapacitation is beyond the absence of climate change in their curriculum. The problem also lies in the training approaches in pre- and in-service training for extension officers. Only 9% of extension officers had received training in communication skills, 7% had completed people management and empowerment, and 11% had completed project management training (Department of Agriculture, Forestry and Fisheries[DAFF], n.d.), rendering them less skilled in dealing with current environmental and social challenges faced by African farmers who possess indigenous knowledge and learn better through interactive processes (Marinus et al., 2021). Likewise, in the Eastern Cape, Zikhali et al. (2020) raised issues with the methodology of farmer engagement; there is a lack of emphasis on social learning and community-based learning in the training of extension officers. These researchers further noted that extension officers are equipped with skills framed for commercial farmers, who were the primary targets during the Apartheid era. The new administration has not done enough to support smallholder farmers and prepare them for policy changes, agriculture sector trends, or climate changes (Muller & Shackleton, 2014).

1.3.3 Gap between climate change awareness and action

The term 'climate change' is becoming commonplace in most parts of the world, including rural areas, due to increased and improved communication that is helping the rural population, including smallholder farmers, make sense of the phenomenon, to articulate their harsh daily experiences and contribute to the sustainability discourse (Raghuvanshi et al., 2017). However, despite awareness, smallholder farmers' precarious socio-economic realities make them sceptical to experiment with climate-friendly agriculture and, in some cases, even where there is interest, their realities hinder their capacity to adopt mitigation and adaptation interventions. Compounding these factors is the fact that the science of climate change is not always urgent to everyone; it often clashes with near-and-dear daily priorities like jobs, healthcare, food, and education (Moser, 2010). As a result, the availability of information and being knowledgeable or even caring about climate change is not the royal road to

sustainable and collaborative climate action among farmers and the population in general. In reality, most farmers over-rely on conventional farming inputs, including agrochemicals and heavy machinery, to maintain their yields and protect their sources of income amid scarce rainfall and distorted climatic patterns (Tripathi & Mishra, 2017). These options are generally not available to the smallholder women farmers of Africa.

Agriculture is also a contributor to climate change, through the production and use of agrochemicals, and industrial scale farming methods. We are already at the tipping point of greenhouse gases (GHG) concentration in the atmosphere, and climate change will continue despite global mitigation efforts (Anderson, 2012). The need now is to urgently address adaptation to the fast-increasing rate of climate change, especially in Less Economically Developed Countries (LEDC) with large populations whose livelihoods rely on climate-sensitive socio-economic activities such as small-scale agriculture (Gagnon-Lebrun & Agrawala, 2006). The Zingisa Education Project farmer learning intervention which will be shared in Chapter 3 and discussed in Paper 3 shows how the intervention is trying to mitigate and adapt through reducing the use of synthetic fertilisers and chemicals, reducing the demand for heavy energy machinery, and optimising the use of irrigation water, among other strategies.

1.3.4 Trends in agriculture

Agriculture at all levels, commercial and subsistence farming, are key contributors to the South African economy. However, agricultural production has been inconsistent; for the 2017/18 period, field crop production decreased by 9,8%, mainly as a result of decreases in the production of summer crops (maize and sorghum), winter crops (wheat, barley, oats and canola), as well as oilseed crops (sunflower seed and groundnuts) and wattle bark (DAFF, 2019). Production of maize which is a staple food for about 50% of the population (Jordan, 2022) decreased by 3,8 million tons (21,4%) and sorghum by 79 270 tons (45,4%) from 2016/17; this can mainly be attributed to the delayed rainfall in some parts of the production areas at the start of the planting season that resulted in a decline in the area planted, as farmers were unable to complete the planting process due to lower soil moisture levels. Wheat production decreased by 376 665 tons (19,6%), barley by 48 000 tons (13,5%), oats by 32 507 tons (58,5%) and canola by 11 500 tons (11,0%) from 2016/17; this can mainly be attributed to the severe drought conditions that prevailed in the Western Cape Province for a prolonged period (DAFF, 2019). The overall contribution of agriculture to South Africa's economy dropped by 13,2% in early 2019 due to a decline in crop and livestock production because of climate change (Msahabela, 2019). This reality (see Figure 1.5) paints a concerning picture for South Africa, considering that land and agriculture are key drivers of the country's National Development Plan (NDP) 2030 and

considering that agricultural activity is up to 3,2 times better at reducing poverty than non-agriculture activities (National Planning Commission [NPC], 2012).

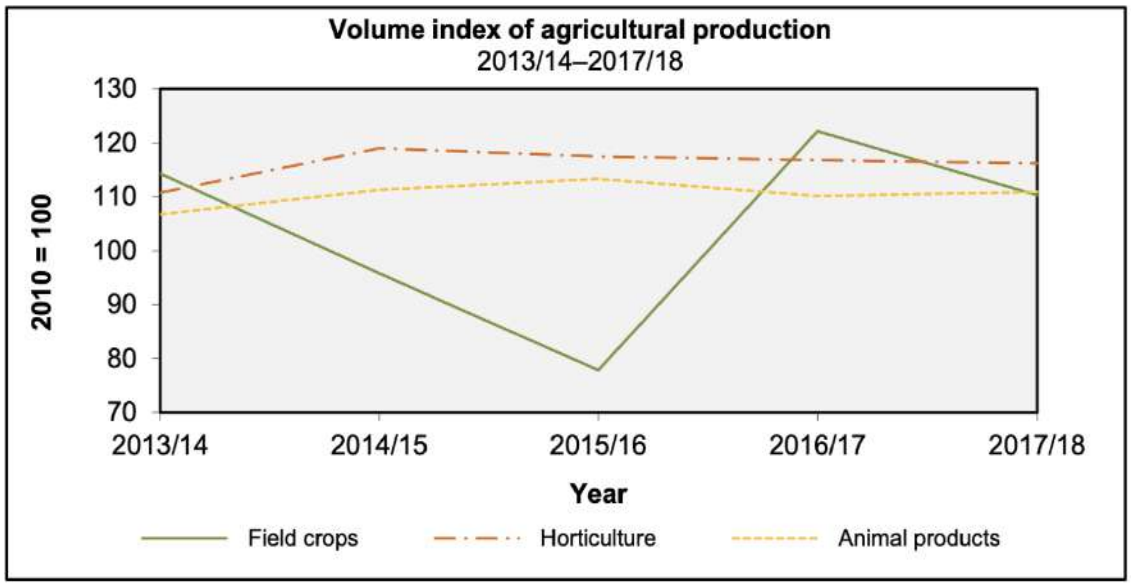

Figure 1.5: Volume index of agricultural production 2013/14-2017/18

Source: DAFF, 2019

The national situation is reflected in the Eastern Cape Province; especially its interior western Karoo region which has been experiencing severe drought since 2015 (Archer et al., 2022). The province's position is concerning because it is one of the major primary sources of agriculture and export (Arnoldi, 2021). As agricultural production is declining, it leaves the population more vulnerable to environmental and socio-economic catastrophes (Shackleton & Luckert, 2015). The dire situation has resulted in new socio-economic trajectories, shaped by the remarkable decline in agricultural production with its knock-on effect on local livelihoods, effectively leading to rampant poverty and associated social ills (Arnoldi, 2021; Mahlalela et al., 2020). Sustainability researchers are aware of this situation and have shared recommendations that question the status quo of the extension services in the province; they agree that the solution lies in offering more support and farmer-centred training that would orient smallholder farmers into commercial producers (Van Niekerk et al., 2011). However, either these recommendations are not reaching the critical role players in the province, or they lack the resources or insights to respond.

1.3.5 Contesting priorities and disruption by the COVID-19 pandemic

In addition to the compromised and concerning position of agriculture, the sector was not spared from disruptions due to the COVID-19 pandemic. Over a two-year period COVID-19 protocols globally

restricted public gatherings and close contact, forcing the agricultural extension service to use unconventional methods for farmer education such as mobile phones, radio, and television (Baffoe-Bonnie et al., 2021). In the Eastern Cape Province, farmer's access to agricultural extension services was also affected by lockdown measures which limited movement and the number of farmers who could attend training, as well as interactions among farmers (Mzuyanda et al.,2022) at markets and in cooperatives. Such interactions are considered to be one of the key possible solutions for addressing rural poverty and unemployment, especially among the youth (Kose et al., 2021).

1.4 Research objectives

The objectives of this research were based on the gaps identified in the published and 'grey' literature on climate change learning, especially among dryland farmers. My intellectual curiosity stemming from my experiences was also instrumental in shaping the scope of my study. The objectives were to:

1. Explore the theoretical landscape of social learning to identify relevant theory for my study.
2. Contextualise the climate change learning landscape for small-scale women farmers in localities in the Eastern Cape Province of South Africa.
3. Evaluate the value created for women farmers in social learning networks for climate action, in these localities.
4. Reflect on the findings to develop evidence-based recommendations for improved learning experiences and adaptation capacity for women farmers.

1.5 Main research question

What are the experiences of small-scale women farmers in social learning spaces for climate action?

1.5.1 Sub-questions

1. Which Social Learning Theory (SLT) is relevant for a study on the experiences of small-scale women farmers in a social learning space?
2. What climate change learning networks are available for small-scale women farmers in the Eastern Cape?
3. What value is created for small-scale women farmers in a social learning space for climate action?
4. What are the possible pathways for improved social learning experiences for small-scale women farmers?

1.6 Significance of the study

It is important that the present study is useful, especially considering that some of the challenges the current research sought to address are already known, and other scholars and researchers have already shared some recommendations. It is significant at this stage that the study attempts to amplify an already existing message for transformative learning and practice in the agricultural sector to buffer the primary producers from climate impacts and protect livelihoods.

Although the significance of a study often concerns its contribution to the research theory (Maillard, 2013), the present study's significance should go beyond the theoretical and methodological contributions (which will be shared in Chapter 5). In keeping with my positionality, which I shared earlier in this chapter (section 1.2), I made sure that my research was not extractive and at the same time did not raise participant expectations. Where I could contribute and reciprocate farmers for their time, I shared resources with them where I found ways to do so, in accordance with an ethnographic approach that involved spending time with participants. Against this background, the study adopted The Call's (2017) advice which noted that the significance of the study,

> should be made clear in terms of how it will benefit relevant stakeholders in the particular field of the subject or discipline and its contributions to the larger society, as well as expanding the ongoing national and international discussions in the existing literature or body of knowledge. (p. 32)

This study gave smallholder farmers a chance to tell stories of their learning and practice and experiences in relation to climate change and their adaptive capacity climate change and inadequate skills. It helped surface innovative ways farmers can work together to improve their production based on the market forces and improve their bargaining power. I am confident that my study will give context relevant insights to the involved participants and stakeholders, especially on how learning spaces could ensure effective participation of underserviced farmers to improve community resilience to socioecological challenges. Additionally, the study allowed the organisations and extension officers involved to reflect on their climate change adaptation competencies and stimulated a conversation about their training needs. The study also gave these organisations a cost-free bespoke and credible evaluation of their projects that can be incorporated into organisational documents. Furthermore, the Eastern Cape Province government can adopt some of the findings of this study to support their targets on climate change and the realisation of United Nations Sustainable Development Goals (UNSDG) 4 (quality education) and 13 (climate action).

1.7 Outline of chapters

Chapter 1 introduces the study by briefly discussing my motivation for conducting the study and provides insights into my positionality. The context of the study and the problem statement are also shared, showing the status quo in the agricultural sector in the study area and other related contexts. The chapter also outlines the objectives of the study, the research questions and discusses the significance of the study, giving readers pointers on what to expect in the thesis.

Chapter 2 discusses relevant literature from preceding studies; these include published documents and grey literature sourced from the internet, the library, and unpublished academic documents that include dissertations and reports. The chapter also shares the theories adopted for the present study and how the decision to adopt these theories was made. Parts of the chapter consider theoretical dilemmas introduced in Paper 1, which is the concept paper for the present study.

Chapter 3 discusses the methods and tools adopted in the study and my experience with putting them into practice in the study. The chapter also shares the strategies I adopted to ensure research integrity, especially regarding the authenticity of the research process and the ethical interactions with the study participants. The primary purpose of the chapter is to show how research is a value-laden process for the researcher and the participants. Besides offering a detailed audit trail of the research process, the chapter shares methodological and logistical challenges, unexpected ethical dilemmas and 'blind spots' in post-disaster situations, such as the COVID-19 pandemic which influenced the time available to undertake the study.

Chapter 4 shares the four papers I produced as a requirement for the PhD by papers. The first paper is a concept paper which shows the readers how I manoeuvred within the social learning theoretical maze to discover the social learning theoretical strand relevant to my study. The second paper carries over from paper 1; it orients readers to the practical operation of the concept of social learning in the communities of practice by mapping out the learning landscape for small-scale women farmers found in the first case study, showing the existing learning networks and the involved stakeholders. The third paper is based on the second case study; it shows how the stakeholders in a community of practice, which identifies as a social movement on agroecology, are creating value for themselves and their communities. I used VCF to trace the value creation processes. The fourth paper is complementary to Paper 3 and is based on the same case study. Through a gendered lens it shows how women farmers in the social movement on agroecology created value for themselves and their communities by participating actively and as leaders in the movement's activities; in particular it demonstrates the

enabling and orienting value that the movement provided through its approach to learning, which emerges as an effective form of extension in resource-constrained contexts.

Chapter 5 offers an overall discussion across the findings from the four papers, showing synergies and divergences in the communities of practices, the social learning networks and the process and value created for the members of the different case studies and their communities. The chapter also refers to findings from related studies by other scholars. The chapter synthesises the thesis by outlining my conclusions based on the process and the research findings. The conclusions are not closed-ended; they remain true to the co-creation philosophies, which anchor social learning and communities of practice. The chapter invites readers into a value-creation discourse on how the present and future reality of climate change can be understood in smallholder farming and addressed through learning networks that will benefit women farmers in particular, as well as the communities who depend on them.

1.8 Summary

This chapter shared how my experiences and interests influenced my decision to enrol for a PhD study in Education and the choice of the research topic. The chapter highlighted the important role played by women farmers in the development agenda and shows how their contribution is vulnerable to various socio-ecological disruptions. The problem statement traces the gap between the awareness of climate change and its effects and changes in practice among farmers because of varying factors including their precarious socio-economic realities. The chapter also introduces the contextual realities of the Eastern Cape Province and South Africa in general, including the dire state of the agricultural extension services which are so relevant to agricultural productivity and agriculturally dependent livelihoods. Lastly, the chapter introduced the study's objectives, the main research question and sub-questions, emphasising how my personal experiences and intellectual interests shaped these.

Chapter 2: Literature review and theoretical framework

2.1 Introduction

This chapter is an extension of Chapter 1 as it further discusses the problem statement, digging more deeply into what has been found by preceding research studies regarding farmer learning and practice. In addition, the discussion touches on practical social justice and environmental issues that form part of the rationale for conducting this research. The discussion is divided into themes and is underlaboured by two theoretical frameworks, Community of Practice (CoP) and Social Learning Theory (SLT) and partially by the evaluation framework, Value Creation Framework (VCF). The relevance of the two theories and the evaluation framework in my study are emphasised throughout this chapter and the subsequent chapters showing how the two provided a foundation for the literature review, the methods, and the data analysis. The connection between the theories will further be evident in the flow of the papers presented in Chapter 4. In this section, I briefly describe the two theories and their relationship; a more detailed description and analysis is shared in Papers 1 and 2. Because of the fast-paced development of theory regarding learning to make a difference, I strove throughout the chapter and the thesis in general to use the most recent literature I could find, to pace up with new developments in the learning landscapes for farmers.

2.2 Community of Practice (CoP) and Social Learning Theory (SLT)

CoP refers to the possibility of learning that emanates from the differences among changing participants, activities and circumstances (Lave & Gomes, 2019, pp. 141–142), as is usually the case in farming communities, especially among small-scale farmers (Adelle et al., 2021). The term 'community' implies an association based on a shared identity where members belong to a group (Wenger, 2010) that has been together long enough to develop into a cohesive collective with relationships of mutuality and shared understandings (Lave & Wenger, 1991; Wenger, 1998). CoP-based learning involves the interaction through exchanging knowledge and sharing practices through various networks towards attaining a shared goal, referred to as a domain in the language of CoP (Morgan, 2011). The learning process entails the gradual movement of new members from novices to experts by learning from the experienced members through situated learning, where each moment of learning is a claim to competence and the assumption of a new identity (Lave & Wenger, 1991). However, despite the shared domain and identity among the CoP members, the boundaries of the CoP are not rigid; they shift and are porous as the CoP accommodates new practices as community members move in and out of the CoP (Morgan, 2011). Such changes and differences were found to be prevalent among groups of small-scale farmers in South Africa, and they were traced to the diversity

of their learning and practical needs, which often make it complicated for the government to respond to their needs effectively (Carelson et al., 2021). The epistemic plurality in the learning communities and the decentralised nature of knowledge sharing mean that knowledge becomes a community product and "individuals are slowly enculturated into the prevailing paradigm enabling cooperation and coordination resting based on similar background knowledge (Lindkvist, 2005, p. 1207). The diversity of participants, interests, and mutual interdependence becomes the cornerstone for successful CoP-based social learning (Van Bommel et al., 2009).

It is essential to mention that the SLT I adopted for this study is not from developmental psychology, which considers learning as a bidirectional process in which cognitive facilities and social factors interact through reciprocal determinism to produce a form of behaviour (Bandura, 1977). Neither is it one that relies on various facets of the learning processes, including the attitude of the community members to reflect and define and redefine their path in recurring patterns, with the attainment of sustainability goals as the ultimate result (Wals et al., 2009), a learning process in natural resources management. The SLT adopted for this study refers to a mode of mutual engagement in a social learning space which retains some of the critical elements of social learning associated with CoP – such as the focus on people and their participation, the role of a member in driving the learning agenda, that learning is rooted in mutual engagement, and this engagement pushes the participants to the edge of learning, where meaning and identity remain central, but are based on caring to make a difference rather than competence in social practice (Wenger-Trayner & Wenger-Trayner, 2020, p. 32). It is a socially embedded and developmental learning process that occurs over a lifetime rather than solely in a training vacuum (Wenger, 2010). It is an emancipatory learning theory that accommodates varying forms of learning, embraces varying knowledge and competences, and seeks effective participation of all learners in the learning space. Among farmers, it is a learning process that would recognise the home and community involvement as significant contributors to learning for work, in addition to more formal training (Kilpatrick & Johns, 2003). A thorough differentiation of the three branches of social learning and the reasons for choosing one over others is shared in Paper 1 to help practitioners and scholars identify the branch that would be relevant to their work.

Although CoP and social learning often overlap due to what Wenger-Trayner & Wenger-Trayner (2020) referred to as the lack of distinction in the early writings on CoP, the distinction between the two lies in that identity and competence are the essential defining characteristics of the CoP, while openness, pervasiveness and interest in learning to make a difference are key attributes of social learning. The two theories helped map out the streams of knowledge sharing in this study, identifying the

stakeholders and the types of knowledge being shared as well as the learning experiences and preferences of the farmers. The choice of two theories and not one is premised on the fact that the learning processes I intended to evaluate existed in different contexts, did not have an explicitly shared assumption, and required flexible learning theories that could accommodate unconventional learning processes. Combining the three was essential in developing a nuanced understanding of small-scale women farmers' learning experiences, the practicality of the knowledge regarding the value it creates for them, and finding entry points for sustainable interventions in the context of agrarian reform.

2.3 Value creation in CoPs and social learning spaces

The shared drive to pursue social learning is crucial for value creation in a community of practice (Cowan & Menchaca, 2014). The value creation framework merges with the craft of the SLT as it measures the cycles of value creation in a social learning space or network (Wenger et al., 2011). Value creation in social learning spaces is measured in the context of whether participants learned and in the value, created or not created through and by that learning (Clarke et al., 2021). Within and beyond the social learning spaces, networks, perspectives, and external influences play a pivotal role as they necessitate information exchanges and broaden learning (Wenger et al., 2011). As with the SLT, VCF recognises these webs of learning and their role in attaining the differences participants care to make (Wenger-Trayner & Wenger-Trayner, 2020). The framework explores learning and action by tracking a value creation story from the beginning of a learning activity to the assessment of several value cycles sparked by the activity, including immediate, potential, applied, realised and transformative value (Wenger et al., 2011). Wenger-Trayner and Wenger-Trayner (2020) later added orienting, enabling and strategic value. As is shown in Table 2.1, the value cycles range from general social learning functions like the hospitality of the learning environment to the complex connection between layers of values created (Cowan & Menchaca, 2014).

Table 2.1: VCF Cycles

Value cycle	Guiding question
Immediate value	What is/was the learning experience like?
Potential value	What has come/comes out of it?
Applied value	What are you learning in the doing?
Realised value	What difference does it make?
Enabling value	What make it all possible?
Strategic value	What changes have happened in the wider context?
Orienting value	What has informed this learning programme? Why are you in it?
Transformative value	Does the difference you make have broader effects?

(Source: Adapted from Wenger-Trayner & Wenger-Trayner, 2020)

In the context of small-scale farmers, value creation would be measured by whether the farmer learning space or network has provided them with a conducive learning environment that allowed them to learn effectively and to apply the acquired knowledge and skills into practice, and produce positive outcomes for the farmers and their community. However, limited value outcomes or failure to create value is not an entirely bad outcome as it can at some point result in the most valued learning (Wenger-Trayner & Wenger-Trayner (2020), like sharing the challenges with other farmers in the learning space resulting in further group learning and avoidance of widespread losses among members of the learning network.

2.4 Historical profile of the relationship between farmers and extension services in South Africa

Agricultural extension programmes are central to farmers' knowledge and skills acquisition as they bridge the gap between innovation and implementation and determine whether farmer training creates value for the farmers. Understanding their developmental journey is paramount (Danso-Abbeam, 2018) when researching the experiences of the farmers whose practices are also shaped by socio-ecological developments over time. Commenting on the impact of colonial and contemporary land policies in Zimbabwe, Maganga and Conrad Suso (2022) argue that the discourse linked to small-scale farmer's capacity to adapt to climate change is not complete unless it touches on colonial, historical independence development strategies and their effects on farmers' ability to adapt to climate change. In South Africa, extension services have their roots in the 19th century when the colonial system created a peasant class "with increased artificial wants and dependant on the colony" – this involved a transition from pre-colonial pastoralist cultivators to subsistence farmers (Bundy,

1993, p. 369). The period saw missionaries' involvement in farming advice in the National Independent States (Homelands) in the Eastern Cape. The establishment of the College of Agriculture at Fort Cox in the early 1930s and the adoption of the "betterment plan" paved the way for community development-oriented extension services in the 1970s (Bembridge, 1987). Although other training institutions were later established to bridge the gap between research and practice – innovation and farmers (Sithole, 2018), the present reality in the province does not mirror the value created by this progress, especially in the current scenario of climate change and biodiversity loss (Tumbo et al., 2018). However, this is not unique to South Africa; global shifts in pre-service and in-service training for extension officers and changes in farmer training and community learning approaches for better environmental management purposes and adaptation to ecocentric and anthropocentric challenges have generally produced mixed results (Maertens et al., 2021). These mixed results point to the lack of understanding of the nuances in the relationship between knowledge, practice and context, further limiting the opporatunity for effective intervention for adaptative agricultural practices at the local and national levels**.**

Given the generally dark history of extension services in South Africa, there is an urgent need to introduce and support suitable empowering training and learning approaches that stimulate and guide farmer learning and fulfil the critical role that extension services with relevant skillsets can play in agricultural development. In developing countries, extension agents often encounter difficulties applying new competencies because of limited farmer buy-in, because of their restricted facilitation skills capacity and resistance to new knowledge (Ramjattan et al., 2020). In Lesotho and Zimbabwe, as in South Africa, resistance emanated from apartheid and colonial tactics of sabotaging traditional knowledge to ensure labour retention in gold mines; this conbtributed to the low uptake of new farming knowledge (Thomas, 1997). There is a need for extension services to gain trust and adopt empowering learning approaches that accommodate the interests of the farmers, because farmers' learning experiences are vital in determining their awareness and adaptive capacity (De Janvry et al., 2016; Trinh et al., 2018). The traditional top-down approach of linking farmers with new scientific research information has registered poor success, especially among communities whose farming practice harnesses local knowledge, resources, and practices (Maertens et al., 2021). Institutional incapacitation exacerbated by a lack of understanding of sustainable agriculture at governance levels has resulted in fewer extension officers getting training on sustainable agriculture (Mukute & Lotz-Sisitka, 2012). Some extension officers lack people skills to facilitate farmer-based learning (Sithole, 2018) because these essential skills are not part of their training (Zikhali et al., 2020). Building relationships and trust are crucial to meeting the educational needs of farmers (Franz et al., 2010)

because positive agricultural outcomes were found to be dependent on a high degree of trust between the farmer and the organisation, between the farmer and the adviser, and between the farmer and their peers (Cawley et al., 2023). Considering the limited cordial relationship and the insufficient capacity of extension services in these small-scale farmer learning systems, as discussed above, the importance of an in-depth understanding of how the existing social learning networks and CoPs shape learning, and influence practices cannot be overemphasised. Whether they create positive or negative experiences and outcomes can depend on whether learning is balancing the historical and contemporary changes that shape small-scale farmers' learning experiences.

2.5 Farmer Field Schools as CoPs for farmer-centred learning

There have been many changes in the agricultural sectors as a result of human and environmental factors, requiring farmers to transform not only their practices but also how they learn to respond to the changes. The gains in agricultural productivity in the era of the Green Revolution (the 1960s and 1970s) registered many gains, especially in food security. The gains started to be overshadowed however by the environmental effects produced by the revolution and the inequality it brought to agriculture as small-scale farmers were being left behind, a situation which led to the emergence of participatory learning approaches like those in Farmer Field Schools (FFSs) (Waddington & White, 2014). Since then, the efforts of FFSs have been noted in supporting productivity in developing countries with limited financial means to meet the economic and infrastructural requirements and extension services demands of conventional agricultural processes (Common Wealth of Lifelong Learning, n.d.). The FFS approach involved a large-scale decentralised farmer-led learning process adopting a group-based learning process supported by government agencies and non-governmental organisations (NGOs) (Food and Agriculture Organisation [FAO], 2019)(FAO,2019). By their definition and operation, FFSs are CoPs; the group can be diverse regarding gender and experiences and focused on common goals (Braun & Duveskog, 2009). In the language of CoPs, as explained by Lave and Wenger (1991), the common goals among farmers in FFSs represent the domains that bind the groups together. The variations in experiences and competencies that exist necessitate situated learning in field situations with farmers' facilitation of learning processes in their language and practical realities creating favourable conditions for exchanging information and services within the network, and the progression of less skilled farmers towards a shared repertoire with the experienced farmer, through the process of legitimate peripheral learning. Although FFSs are championed for increasing yields, profitability, and healthy and diverse diets, traditional top-down technological approaches may also be relevant in specific situations, especially in agricultural development (Khisa et al., 2014).

Complementary knowledge of researchers, extension services and farmers is key to the improvements, increases and contextualisation of sustainable agriculture and the gradual development of trust, which facilitates the convergence of varying ideas and necessitates continuous interaction (Marinus et al., 2021). Learning from people one trusts is a crucial way in which ideas travel across much of the developing world (Mobarak, 2020). The role of extension services has, over the years, evolved and now involves a great deal of what Lave & Wenger (1991) referred to as 'boundary crossing'. They are now a conduit of information between the producers of knowledge, they share innovative knowledge with farmers and, through facilitation, draw out tacit knowledge from farmers in a group-based environment (Istriningsih et al., 2022). Farmers who are part of co-learning communities with other agricultural stakeholders who are not farmers were found to develop a richer understanding of sustainable agriculture and had better chances of adapting their practices to their changing environment and production targets, proving that changing the status quo in knowledge production and distribution towards co-creation, and a co-learning approach, can be effective for moving towards sustainable agriculture (Marinus et al., 2021). These interactive learning approaches emerge and exist when individuals interact with learners of similar profiles, goals and practices in a learning space that combines social and cultural factors that affect learning, such as ethnicity, socio-economic status, gender, power, and oppression (Franz et al., 2010).

However, the effectiveness of co-learning was found not to be instantaneous; gradual development of trust and convergence of ideas through several engagements is critical in the adoption of new practices as farmers who participated in ongoing farmer-led plot demonstrations tended to adopt more components of new multi-component activities, compared to farmers who were invited to attend only field-day events (Maertens et al., 2021). However, looking at the literature on the CoP landscape for farmers and FFSs in general, the effectiveness of these learning approaches is debatable because of conflicting results and the challenges with outcome-centred measurement and analysis (Van den Berg et al., 2020). For a nuanced understanding of the performance of these communitarian learning spaces, research should not only focus on measuring the outcomes using predetermined indicators, but could also elucidate the learning experiences of farmers by giving them a platform to share what they consider to be essential or valuable in their contexts. By doing so, the research would be aligned with the epistemic pluralism in both SLT and the CoPs, recognising learning as a means towards achieving the farmers' goals.

2.6 Social learning networks as an alternative to extension services

The preceding section has shown that extension services are in an existential crisis rooted in the conception of extension services in South Africa, and there is an urgent need for a turnaround. Lotz-

Sisitka et al .(2015) argued for a transformative and transdisciplinary approach to ecological learning to break the existing monocultural practices that hinder holistic interventions in the agricultural sector. Metelerkamp and Schiffer (2020) agreed with the submission by Lotz-Sisitka et al. (2015); however, they take one further step by arguing that the transformation needs to be adopted outside the ambits of the formal institutional frameworks that have already shown limited agency to manoeuvre around the complexities of transformation. The challenges with the extension services are many, making it difficult for them to reach all farmers, particularly under-resourced farmers who often have poor access to technological tools and live far from dissemination centres, leaving them with no option but to resort to social learning as an alternative approach to address multifaceted issues in agriculture (Leta et al., 2018). Similarly, Mukute & Lotz-Sisitka (2012) found that smallholder farmers who have shifted to sustainable agriculture are turning to each other for learning through farm-based experiments and testing agroecological innovations as well as management skills through trial and error and sharing experiences and lessons through their networks to validate their innovations (Kroma, 2006). These social learning networks are becoming prominent in sustainable agriculture research because they increasingly recognise the potential to stimulate the fundamental transformation of learning and practice (Kroma, 2006; Schneider et al., 2009). The learning approach represents a challenge to the learning and practice rooted in institutional norms that accord more significant value to objective, standardised knowledge and a dominant reward system that perpetuates the status quo in knowledge production and limits the participation of researchers and extension agents (Kroma, 2006, p. 25).

However, in these community learning groups, several factors shape participation. As in CoPs, among smallholder farmers, Morgan (2011) found that identity was crucial in determining their learning experience. Farmers were ready to associate and engage in social learning with their peers of similar attitudes, enterprise, and practice towards a shared domain. A shared identity in a farmer's learning space influences others' learning and adoption of the learned knowledge and skills. Farmers appear most convinced by communicators who share a group identity (BenYishay & Mobarak, 2019). Social learning in an informal setting is driven by the will of the learners voluntarily and mainly occurs on an ad hoc basis. It also enables farmers to adopt and implement relevant technological packages that are believed to improve their production and productivity. Therefore, bottom-up social learning through informal institutions and socio-cultural events is considered to complement the efforts made by the formal extension system. Essentially, this kind of learning is stimulated by resource and labour shortages, lack of equitable access to extension services and technologies, and farmers' resistance to formal extension. As noted, as part of the troublesome history of extension services, in some cases,

the resistance stems from historical experiences with top-down extension approaches, which have been prevalent not only in South Africa but also in other parts of the world (Leta et al., 2018).

Social network-based learning among smallholder farmers typically involves information exchanges, hands-on participation, observation and other informal means (Leta et al., 2018). However, the social learning process is not only among farmers; it also happens in CoPs that include extensionists and other stakeholders; these CoPs have been crucial in building resilient food systems (Mazur et al., 2000). In Vietnam, a developing country, social learning was found to have significant effects on farmers' adaptive capacity; those with a higher level of social learning were likely to demonstrate higher adaptive capacity (Tran et al., 2020). However, because informal learning sources are more difficult to measure than formal learning sources, there is a case for a new approach to measuring farmer learning experiences and competencies and the value they create for the farmers (Kilpatrick & Johns, 2003). The evaluation approach should provide a good understanding of the learning experiences not only for farmers but also for extension officers, and trace how these experiences and the value created shape the broader community's response to climate change and other social justice issues.

2.7 Increased technological access and changes in learning networks and practice

Although the SLT was conceived without social media or digital communication, emerging social media technologies are closely aligned with the tenets of SLT because it is the social nature of human learning that makes these tools so relevant today, and potentially transformative, not the tools that make human learning suddenly social (B. Wenger-Trayner, n.d.).

Extension services are potentially the most efficient way to disseminate new technologies to increase the adaptive capacity of small-scale farmers and boost productivity to alleviate rural poverty in sub-Saharan Africa (SSA). However, they come at a substantial financial cost. As such, it is key to explore sustainable ways to disseminate technologies to farmers and disseminate them to non-trained farmers (Nakano et al., 2018). More so, because of the overstretched state extension services, there has been an increase in non-state players introducing technology to small-scale farmers to necessitate learning (Leta et al., 2018). Modernising climate change learning by piggybacking on trending technological advancement to disseminate simplified and contextually relevant information has received considerable attention (Nisbet, 2009). The increased access to technology has led to a rise in its adoption by smallholder farmers (Dlodlo & Kalezhi, 2015). However, limited resources and misconceptions about technology products, gender, age, and socio-economic status have slowed the

uptake and influenced how farmers and extension agents interact with Information Communication Technology (ICT) (Tata & McNamara, 2016). The location also determines one's access to ICT; rural populations have limited capacity and infrastructure to adopt innovations into agriculture practice (Metelerkamp & Schiffer, 2020). Farmers attending training on technology use in different agro-climatic zones were found to be less interested in adopting new technology, especially if they were not convinced in advance that the technology would increase yields and if the training was short, even if convinced about the technology's yield-increasing attributes (Maertens et al., 2021). In these circumstances, they are utilising existing social learning networks and mainstream media to champion local interventions that match the ever-changing realities of farmers and bridges the digital gap (Kibue et al., 2015). Additionally, combining experiential and social learning approaches and including local knowledge effectively stimulated the interest in new technologies and the socioecological interactions that affect their production (Tafesse et al., 2020). However, since it is prohibitively expensive to provide direct training to all the farmers in SSA, it is critically important to examine the extent to which the emerging new forms of social learning and technologies have influenced the farming practices of small-scale farmers to inform interventions (Nakano et al., 2018), because questions remain regarding whether the content itself is accessible to the farmers, its availability, and equitable distribution.

2.8 Approaches to farmer learning in changing times

The increase in community vulnerability to socioecological hazards requires transformative approaches rooted in the dynamic and unique needs of different livelihood systems. In the farming sector, the conventional extension models of one-way communication based on broad recommendations have failed to protect the livelihoods of farmers and their communities (Khisa et al., 2014). The prevailing call is to adopt learning approaches that let farmers lead the learning processes in determining their learning needs, the learning environment, the content, and the facilitation of the learning process (Maertens et al., 2021). Sustainable agriculture practice is multidisciplinary, versatile, and complex for conventional extension services. As such, the need of the hour is for new extension approaches that facilitate critical learning and negotiation among diverse stakeholders that, in turn, can foster farmer innovation and build and strengthen existing social networks that tap into research and build competencies for farmers to fix the agricultural-environmental relations, and can enhance socioeconomic vitality (Kroma, 2006, p. 25). However, as we strive towards that, we should be cognisant of the effectiveness of farmer learning, and the shared content depends on the model of extension employed (Maertens et al., 2021). That is, there are higher chances of successful development and delivery of learning and adoption of the acquired knowledge if the learner prefers the instructional style used for learning; as such, it is vital to understand how

people prefer to learn (Davis, 2006). For Franz et al. (2010), effective farmer learning can only be realised when educators combine an individually designed learning approach and the contextually relevant approach. However, despite these pronouncements, there is still a common challenge: extension services researchers have not realised the best ways to help farmers learn (Peters, 2006). Even if they do realise the 'best ways', there is no universally accepted way of learning; hence case study-focused research to understand existing learning methodologies and farmer learning preferences forms is the basis of my study, considering that in CoPs there are changes in the domain, the practice, the composition of the membership of the CoP and the continuous changes in competences.

2.9 Climate change learning experiences of smallholder farmers

In the fight against climate change and the associated havoc, especially in agriculture, extension services are essential in planning appropriate corrective measures and re-orienting their advisory services to mitigate climate change-related risks and uncertainties. Extensionists work closely with farmers and their communities in crafting localised and need-based information for farmers, which will help in decision-making at the grassroots level. However, information is insufficient; the urgent need is to empower the farming community to evolve suitable mechanisms for short-term and long-term adaptation strategies to address climate change-related risks and uncertainties (Raghuvanshi et al., 2017). Farmers' adaptation responses are influenced by their framing of climatic trends and the multiple benefits provided by local agricultural systems. Thus, to improve food security in the face of climate change, farmers' perceptions and the multi-functionality of farming systems need to be explicitly recognised by agronomic adaptation research, and adaptation policymaking should involve detailed vulnerability assessments (Trinh et al., 2018).

Mukute and Lotz-Sisitka (2012) found that "farmers have several ways of learning to enhance productivity, this learning is scaffolded by diverse actors, including scientists, extension workers, and fellow farmers" (p. 353). Although networks of this nature have improved awareness of ecological sustainability, the understanding has not always resulted in changes towards sustainable practices (Wals, 2011). There remains a stubborn disconnect between what people know about climate change and their practices (Chang & Pascua, 2017); this can partly be attributed to the lack of synergies between universal scientific and indigenous knowledge (Chirisa et al., 2018). Although the studies have found the disconnect between scientific and traditional knowledge and between what people know about climate change and their actions, it is unclear how the scientific knowledge is conveyed

to the farmers and how they interface it with their long-held and, in most cases, trusted traditional knowledge.

2.10 The nexus of learning and adoption of adaptation strategies

The farmer's role in engaging, learning, and applying newly acquired knowledge is critical to achieving positive impacts at the farm level (Cawley et al., 2023). Although climate change is one of humanity's significant threats, its impacts are not gender-neutral; women are exposed to more challenges, especially rural women who rely on rainfed agriculture as their capital (Musuwo, 2017). Despite their first-hand experience, there exists a gendered climate change knowledge gap favouring men due to cultural norms prioritising science education for boys and home-economics-related subjects with minimal connections to climate science for girls (Sammie et al., 2021). However, the disparities reflect the bias for scientific knowledge; evidence shows that women are also taking adaptive steps based on their experiential understanding of natural ecosystem knowledge (Clancy, 2019). However, besides gender, institutional and socio-economic factors include education, age, access to information, and locational variables (Saguye, 2017). Although some smallholder farmers are deploying farm-based adaptive measures such as crop diversification, changing fertiliser, and planting shaded trees to minimise the impacts of climate changes, these adjustments have not produced the desired results, as evidenced by consecutive lower yields (Trinh et al., 2018), showing and strengthening the delink between the production of new knowledge and its adoption.

The type of land tenure, the influence of peers, the user-friendliness of the new knowledge and the turnaround time for positive outcomes were key determinants for farmers in adopting new knowledge and skills (Cawley et al., 2023; Ruzzante et al., 2021). High levels of knowledge do not mean that farmers will apply this knowledge in practice, though, and therefore for effective learning the recommendation is that technical training programmes use participatory approaches so that farmers accumulate knowledge in practice which will encourage them to adopt new practices (Istriningsih et al., 2022, p. 8).

Farmers' experiences are not homogeneous; however, the heterogeneity is more apparent between smallholder farmers and commercial farmers. Extension services therefore ought to customise their teaching strategies and content to meet the needs of farmers in terms of different domains, practices, and communities (Franz et al., 2010). Farmers operate in contexts of continual change, which require up-to-date, complex and varied skills to meet the new demands, knowledges, and abilities (Kilpatrick & Johns, 2003). Although smallholder farmers have widely shared experiential and traditional

knowledge, religious and cultural strategies are often shared in local and broader support networks (Harmer & Rahman, 2014), while commercial farmers have better access to scientific knowledge of climate change shaped by better access, which lessens their vulnerability (Yaro, 2013). It is, however, essential to note the importance of other forms of knowledge, particularly experiential knowledge, especially considering its interdependence with the belief that climate change is happening; those with more years of farming experience and who have experienced changes have a greater awareness of climate change and this can be a significant driver of adaptation behaviour (Ricart et al., 2018). However, as has already been shown by Kilpatrick & Johns (2003), it is difficult to measure informal knowledge, including experiential knowledge. Therefore, there is a need for a new approach to mapping out the learning landscape, learning experiences and the value that is created for the participating farmer; in this thesis I propose a combination of CoP as a mapping tool and social learning as a tool to trace learning and the VCF as a methodological framework to measure the value created for the participating farmers.

2.11 Summary

From the literature discussed in this chapter and partly in Chapter 1, there appear to be two gaps that are closely tied to my main research question:

- Few studies have examined how learning networks and approaches adjust to socio-ecological changes and how farmers experience the changes.
- Despite the abundance of participatory research studies in agricultural extension and farmer learning, few studies have researched the learning experiences of the farmers in terms of the learning environment, the content, the learning methods, and the resultant transformation beyond the farm level and across the broader community.

The discussion in this chapter has laid the foundation for my methodological plan to contribute towards closing the gaps as mentioned above and to contribute insights for crafting pathways of intervention for emancipatory education that could save small-scale farming from a further collapse through effective education and learning approaches for extension services to remain effective in times of unprecedented changes.

Chapter 3: Methodology, design and methods'

3.1 Introduction

This chapter builds on the theoretical base established in the previous chapter. The relevance of the theoretical frameworks in a research study is succinctly captured by Grant and Osanloo (2014) who noted that "a theoretical framework permits the researcher to identify the design and the evaluation of a problem in a way that will allow the theory to be measured, tested, and extended to serve as a guide for the design of a study" (p. 20). Drawing the linkages with the theoretical foundation presented in the previous chapter (and in Paper 1), this chapter discusses the adopted research design and reasons for the choice, and it further shares the research approach and its appropriateness to the present study. The present chapter provides a step-by-step account of the research process, including a research timeline showing when I fulfilled various institutional requirements including registration for PhD, proposal defence as well as the approval of my proposal and the research ethics.

This chapter also shares the methodological decisions taken in the two case study areas showing how the study inquired what it intended to inquire and whether the inquiry adhered to the expected ethical conduct, and, most importantly, how the study preserved its rigour and integrity. The chapter also shares how I analysed the data sets from the two cases studies using inductive and deductive processes that are informed by the concepts of CoP and social learning for the Raymond Mhlaba Local Municipality and by the VCF for the Buffalo City Metropolitan Municipality. Taking the previous chapter further, this section describes how the Value Creation Framework " is born of the work on communities of practice" (Wenger-Trayner & Wenger-Trayner, 2020, p. 31). The section shows how it was used to evaluate whether the agroecology movement enabled smallholder women farmers and the associated stakeholders to create value for themselves as they engaged in learning and practice processes. This discussion is premised on the understanding that methodology decisions and processes are political because they juxtapose what other scholars have done and subsequently influence our findings and recommendations (Childers, 2008); this is even more important in evaluation studies because of their influence in informing policy and strategy and guiding resource allocation.

3.2 Study approach: Qualitative research

My interest in understanding the experiences, thoughts, and feelings of the smallholder women farmers as they engage in learning about climate change and adaptation required a research approach that captured these experiences in the form of nuances on the values being created or not created. I

needed to understand how individuals and groups view their own vulnerability and the role of different capitals and how these shape their choices of climate action. A qualitative research approach would effectively accommodate my research interests and enable me to contextualise and respond with clarity to the research questions and the aims and objectives of my study. Importantly, qualitative research is in accordance with the democratic values and the situatedness of CoP, social learning and value creation stories. A qualitative approach is suitable for investigating a phenomenon in its natural settings with limited intrusion (Creswell & Poth, 2018; Yin, 2011), as advised by Yin (2009), I worked with the principles in ways that ensured minimum intrusion to allow participants to continue with their normal daily routines without being unduly influenced by my presence or research related activities. The limited intrusion was also a way of avoiding taking much of the time of the farmers as they are often laddened with heavy workload

3.2.1 Research design: Multi-case study approach

Qualitative research is a generic term that refers to a group of methods and ways of collecting and analysing data that are interpretative or explanatory and focus on meaning (Noble & Smith, 2014) rather than large-scale measurement; accordingly and mindful of the considerations and the issues raised above, and the contextual nature of CoP and social learning, I found the case study design most appropriate for my study. Generally, in this thesis I introduce each of the critical components of the research by providing a definition and a description of what they entail, but there is no consensus on the definition for a 'case study design'. Several leading scholars have offered different definitions and descriptions of a case study. All the definitions had some relevance to my study, primarily because of the common use of the words "phenomenon" and "context". I found a combination of the definitions by Breslin and Buchanan (2008), Johansson (2007) and Yin (2009) worked best for my study: a case study captures the complexity of a phenomenon by investigating it in its contemporary natural context with a multitude of methods that show the complex transition between the world of theory and the experience of practice. In the Buffalo City Metropolitan Municipality, the case 'phenomenon' would refer to the agroecology learning intervention by Zingisa Educational Project, while in Raymond Mhlaba Local Municipality case study, the 'context' implies geographical location and the learning landscape that I explored.

3.2.2 Case study research in practice

Good qualitative research uses a systematic approach to answer questions about what something is like (Seers, 2012, p. 2). This section's purpose is to share the systematic processes I followed in conducting my research in the two case study areas. The full research process is depicted in Figure

3.1, which shows the timeline of my study. The section takes a form of a monologue in which I raise and respond to methodological questions around the conduct of case study research.

3.2.2.1 How I planned for the case study research

Planning to conduct the research commenced when I registered for PhD studies and started reading extensively about my preferred topic and the various research methodologies and theories that I could use. My ideas on the topic were tested and refined through presentations to my colleagues about my topic and regular meetings with my supervisor. Further refinement happened during the review of my full proposal by the Education Faculty's Higher Degrees Committee after my presentation in one of the quarterly PhD weeks where academics and students converge to learn more about each other's work and offer support and guidance where necessary. My planning process also involved ethical clearance by the Education Faculty's Research Ethics Committee.

3.2.2.2 How I picked the sampling process and decided on the number of case studies

Sampling in qualitative research entails sample size and sampling design considerations (Omona, 2013). The study's main aim was to gain rich insights from each case; as such, the sampling was non-probability sampling – purposive sampling (Simons, 2009). For Adeoye-Olatunde and Olenik (2021), the trustworthiness of case study data is determined by the participant's knowledge of the subject matter. When the research aims to understand and gain insight into the case, purposive sampling is the most suitable approach, as it allows one to identify instances and participants that can bring out more about what one is researching (Simons, 2009). I adopted a three-layered purposive sampling strategy to identify case study areas, key informants, and farmers involved in climate change learning to maximise my chances of learning more about climate change learning and action. The sampling process is further explained in the following section, where I share more about my experiences in the field.

I adopted a two case study approach to surface rich contextual insights that align with the research objectives and effectively respond the research questions and maximise what could be learnt from each case**. I** nitially, I planned to include a third case study; however, I had to abandon the idea because of limited access to the third case study and running out of time due to Covid-related delays at the start of my research. The fieldwork schedule in the third case study coincided with the rainy season; farmers and extension officers were preparing for the farming season and did not have sufficient time to accommodate research activities. Additionally, the road network in the case study area is gravel and becomes inaccessible during the rainy season. In consultation with my supervisor, we agreed that

the data from the two case studies was enough for me to produce a report that would meet the academic expectations.

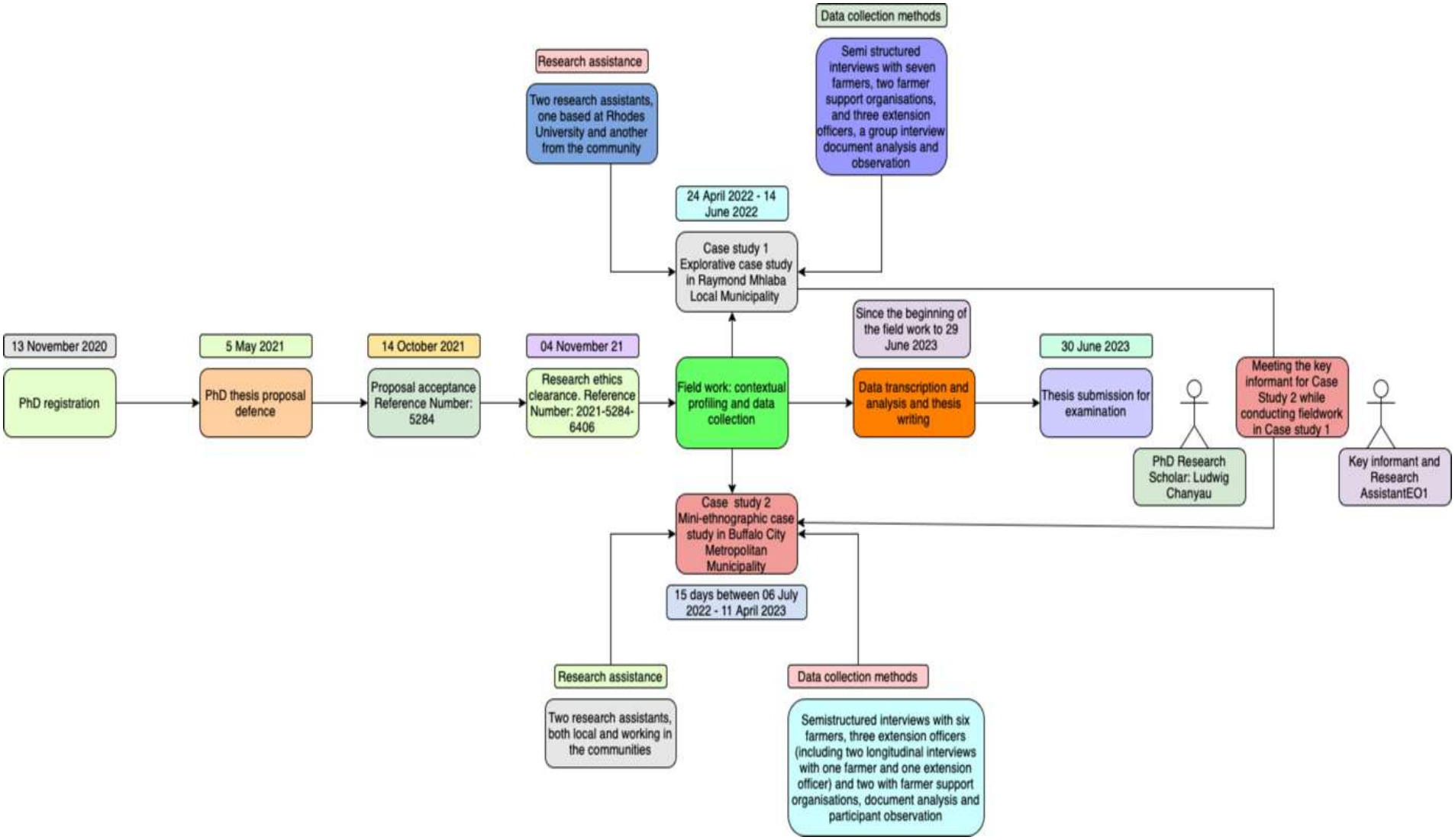

Figure 3.1: Research timeline

Source: Author

3.2.2.3 Conducting field work

Case study 1: Raymond Mhlaba Local Municipality

In the Raymond Mhlaba Local Municipality, I conducted a pilot study with the help of a key informant who had previously worked with some of my colleagues in the Environmental Learning Research Centre (ELRC). The key informant was a senior extension officer in the Department of Agriculture Land Reform and Rural Development (DALRRD). In line with the explorative nature of my research the key informant travelled with us to different communities in the municipality to meet potential participants and farmer organisations to include in the piloting process. A research assistant from the university whom I engaged to help with translation and interpretation of community dynamics was also part of this exploration and his prior knowledge of the community was useful in the sampling process. We met with farmer organisations who introduced us to formal and informal extension officers who then introduced us to the farmers with whom they work.

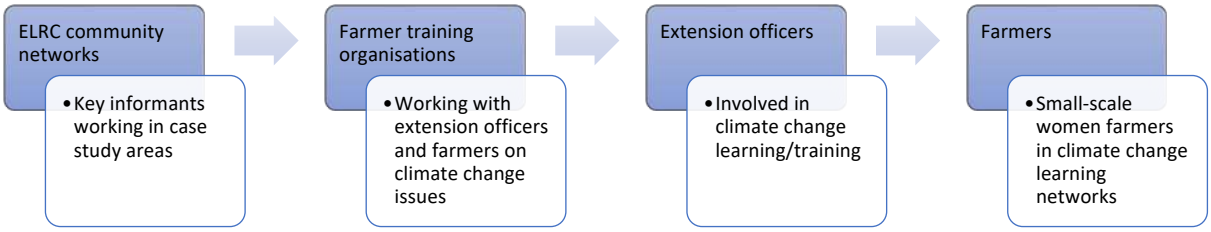

Figure 3.2: Sampling process in Case study 1: Raymond Mhlaba Local Municipality

Source: Author

The aim of the pilot study was to gain a 'snap' understanding of the potential case study areas, logistical demands, local contexts, and the relevance and clarity and phrasing of my research questions. Although the pilot study with the farmers aimed at testing the feasibility of the study, I obtained good quality data that I later combined with other data sets from other rounds of field work. Using the pilot study data was also based on the advice of the key informants who advised that because of the COVID pandemic uncertainties, the onset of the rainy season and pressing field work as farmers tried to recover from losses during the pandemic, we should take advantage of the 'small window of opportunity' we had been fortunate to find in the field.

The timing of the piloting stage presented some challenges regarding trust as farmers were worried about contracting the COVID-19 virus from people coming from outside their communities. This

worried me considering the importance of trust in qualitative research which Norman et al. (2020) saw as the key ingredient to gaining good data; they noted that the degree of trust one has in the person telling the tale has much to do with the degree of trust attributed to the telling (p. 26). Indeed, the history of social science enquiry has constantly showed the importance of establishing rapport and trust in data collection processes associated with qualitative approach (Brimbal et al., 2020); collecting data through face-to-face contact requires the establishment and maintenance of trust between the researcher and the participants (Meyer, 2001). Trust in research is seen as a smooth, positive interpersonal interaction essential in stimulating the emergence of more quality information; an increase in trust "produces more cooperation, and faster agreement in negotiations" (Abbe & Brandon, 2014, p. 207). To establish this essential trust, I relied on the key informant whom the farmers have worked with for a considerable time and who is seen as part of the community through his agricultural extension work and involvement in other community development initiatives.

The second phase of trust building involved meeting extension officers at their DALRRD offices in Xesi (also known as Middledrift) which was also the main focus area for my first case study. I presented my study, answered questions, and received advice on how to sharpen the focus, especially around the framing of the climate change concept which may have been challenging to potential participants. The extension officers gave me lists of potential case study areas as well as suggestions for farmers and organisations with whom to conduct interviews. As with the farmer participants in the pilot study, I also shared with them my research access request letter and the informed consent form. The access letter (see Appendix 1) had the details of Rhodes University, including the contact details; this assured the key informants and local authorities about the authenticity of the letter and my project. The informed consent (see Appendix 2) acted as a form of introduction by sharing my full name, student number, university, and the department I belong to, and the role of participants and the conditions of their participation. The consent form also shared the contact details of the Research Ethics Officer at Rhodes University and the contacts of the Research Ethics Coordinator. The university name was important because, when working in communities, especially marginalised ones, participants often place their trust in research institutions because of their reputation, prestige, and standardised systems of research ethics; in less marginalised communities participants are said to be more convinced by the researchers' attributes and trust is often built at face value (Guillemin et al., 2018).

Case study 2: Buffalo City Municipality

This case study was identified through a key informant whom I met at a training workshop while conducting fieldwork for the first case study. The key informant was a leading extension officer in a

social movement on agroecology led by Zingisa Education Project (ZEP). ZEP, located in one of the towns under Buffalo City Metropolitan Province, Berlin, is involved in several projects in the province and is part of an international social learning network. In this second case study I conducted mini-ethnographic research that evaluated this agroecology programme that focuses on climate adaptive practices for food sovereignty. The key informant helped me identify a new research assistant amongst the interns in their organisation. I selected the research assistant mindful of challenges of translation that I faced in the first case study.

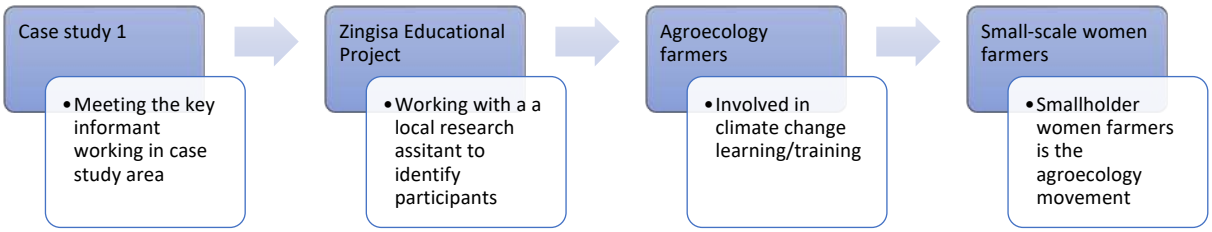

Figure 3.3: Sampling process in Case study 2 (Buffalo City Municipality)

Source: Author

At the time of the research, the research assistant was involved in several outreach projects and had established networks and good working relations with farmers; this resulted in high levels of trust and acceptability for participation farmers, extension officers and the organisations involved. The research assistant introduced me to several farmers; though some did not meet my preferred sample characteristics, they were helpful with the contextualisation of the various learning networks in their communities and in locating other more suitable participants (snowball sampling).

Figure 3.4: Author (left) with field assistant and Lady, the farmer's dog , at one of the farms in Cambridge, Buffalo City Municipality

All the potential participants we met during the contextualisation and piloting process were available for the interviews on the same day and were keen to 'get it done'; for some, this was because of their interest in participating, while for others, limited availability due to farm work, training workshops, and the onset of the rainy season, meant more farm work and limited time for my research.

3.2.3 Data collection methods and tools

In both case studies I adopted the three most common data collection tools in qualitative research, particularly case study research: document analysis, semi-structured storytelling interviews, and observations (Simons, 2009). In addition, in the Raymond Mhlaba Local municipality case study I conducted group interviews to supplement the data. The three methods are discussed concerning their relevance and how they were used in the study following Meyer's (2001) detailed approach to data collection in case study research. Chapter 2 has shown that farmers are not a homogenous group and their experiences with climate change and learning about it vary, indicating the importance of the adopted theoretical framework throughout the study. Mäntysaari (2017) viewed theory as a strategy for handling data in research and noted that the research tools must reflect the point of view (knowledge interests) of the discipline. Based on this claim, the tools I used were streamlined according to the methodological processes. I crafted the data collection tools carefully based on the ideas of the adopted theoretical frameworks and the conventions for using the adopted methods.

3.2.3.1 Semi-structured storytelling and group interviews

In case study research, a great deal of what we cannot observe, or experience is experienced and observed by others; thus, qualitative research prides itself in its ability to discover, document and narrate multiple views of the case (Stake, 1995). The aim of semi-structured interviews is to ascertain the participants' subjective experiences about a particular phenomenon (McIntosh & Morse, 2015), while allowing the researcher to explore emerging pertinent issues that may or may not be closely related to the subject matter (Adeoye-Olatunde & Olenik, 2021)**.** The overall study wanted to gather stories on the subjective experiences of the women farmers and stakeholders involved in learning networks for climate adaptation. Each category of participants had their own specific interviewee schedules (see Appendices 3, 4 and 5). The conversational nature of group interviews allowed participants to share their stories in an interactive process similar to their engagements in their learning networks. The original plan was to conduct interviews with five small-scale women farmers, three extensionists and two organisations involved in farmer training in each case study area, however, as will be shown in the next section, I made changes while conducting the field work, to respond to conditions as I found them.

Interviewing process

Interviewing process in case study 1: Raymond Mhlaba Local Municipality

In Raymond Mhlaba Local Municipality, I conducted face to face storytelling interviews with seven small-scale women farmers, two farmer support organisations (Department of Social Development and World Vision) and three DALRRD extension officers. I conducted one of the two interviews with farmer support organisations telephonically because the participant was not available for a face-to-face interview due to work commitments. However, later I visited the organisation's offices for further discussions and observations. Telephonic interviews are widely disregarded because of the apparent assumption that compared to face-to-face interviews, they lack non-verbal cues, which are essential in data analysis and interpretation, affecting the quality of research findings (Novick, 2008). I found however that the telephonic interview generated good quality data. Trier-Bieniek (2012) also noted that telephonic interviews have the potential to generate trustworthy data because, due to the increased adoption of electronic communication, people have become more accustomed to 'virtual' communication.

I conducted a group interview with ten farmers who were members of an agricultural cooperative supported by DSD and DALRRD who were participating in the launch of the Middledrift Farmers Society (MFS), a farmer-led *stokvel* aiming at pooling resources together and supporting each other during times of need. Xolisa, the youth leader from the community who had invited me to the event, later became my research assistant on the day. I took the opportunity to conduct a semi-structured group interview with ten farmers after consultation with my supervisor and a local research assistant who advised that if I had to interview one representative or all of them individually, some might feel left out or may have doubted their peers' contributions. Additionally, I considered that group interviews would, in many ways, be effective in generating diverse narratives.

After the meeting and the interviews, the owner of the property where I had parked told me how it was unethical to park a car at someone's house without their consent. He used the common isiXhosa phrase used when one disapproves of a child's behaviour: *"ungumntwana kabani wena!"* loosely translated as "whose child are you?". I apologised and told him I had been directed to use the parking. Later, he wanted to know more about my presence in the village and why he had not been invited to the meeting and wanted to be invited next time. Upon reflection and consultation with my field assistant, we realised the issue was one of mistrust rather than anger.

Seed sharing took place after the meeting with the same community to improve our seedbanks (as I was also actively producing vegetables on my plot back at university). The process involved sharing information on the varieties, planting seasons, associated diseases, type of manure, etc. A follow-up message in the WhatsApp group to which I had been added, tasked me with scouting for banking service providers with facilities MFS could use to keep their savings. I gave them some options and connected them with a banker who helped them choose the most suitable bank account option. This showed how the sense of trust in the community had developed during my field work since the piloting stage.

(absa)

ACCOUNT CONFIRMATION DETAILS

Customer Code
Customer Name
Product Type
Opening Reason
Account Number
Domicile Branch
Domicile Branch Code
Sales Consultant
Bank Clearing Code

Club Account
This term sheet must be read with our Business Client Agreement.

Description of the product
You are an informal body (club or stokvel) of 3 (three) or more members who save together by depositing money into your account. You can withdraw your savings at any time.

What are the features of the product?
Minimum balance
Fifty rand (R50.00) to open your account.

How you can transact with the product
You can deposit money into your account by transferring from another account, or by making a cardless cash deposit at cash-accepting ATMs (Cash Acceptor) or at one of our branches. Your authorised signatories can make withdrawals at one of our branches.
You can transfer money to and from your account by using Absa Online if you have registered for our online banking service.

Notifications
Account statements are available on request. You can save money by opting to receive your statement via email or view your statement on your Absa Online profile.

Tip: You can save money by choosing the best value option to transact on your account

Accidental death insurance benefit
While you have an account balance of R50.00 (fifty rand) or more, you will have the benefit of R2 000.00 (two thousand rand) insurance cover with Absa Insurance Company in the event of your accidental death. This benefit covers up to ten members nominated by you and registered as beneficiaries for this benefit.

Pricing structure
Interest
We inform you of the interest rate when you make your investment. Interest is calculated daily on your investment and paid to you monthly.
We may change the interest rate from time to time. The new interest rate will be shown on our website at absa.co.za and at our branches when the change comes into effect.

Figure 3.5: MFS bank account certificate

Although the group interview was impromptu, it was helpful in filling in gaps in the data that I had already collected through individual semi-structured interviews where participants were mostly considering learning events retrospectively because of the COVID-19 pandemic. The group interview allowed them to help each other remember their experiences and formulate one collective story, especially as the group belonged to one farming cooperative. Additional gaps emanated from the fact that all the participants were isiXhosa speakers, and although I partially understand the language, using it for my study without the help of an interpreter was impossible. However, although my first research assistant helped with translation, there were instances when the translation did not fully

capture the words of the participants. From experience, I realised that translation in research goes beyond changing words from one language to another; it needs to also capture emotions and non-verbal cues to complete the story. I addressed this issue by additionally securing the transcription services of an isiXhosa language primary speaker who listened to the recordings and made amendments to the original translations where necessary.

Group interviews are praised for improving research's trustworthiness because of real-time triangulation that gives rigour and 'good practice' and because of the importance of maintaining the heterogeneity of experiences and epistemologies (Freeman, 2006), as recognised using the theories and evaluation framework in the present study. However, based on the research assistant's knowledge of the community dynamics and his experience interacting with the participants, we remained cognisant of the varying levels of participation by participants in the group interviews. Our experiences and the critical informer's advice are corroborated by Stake (1995) who noted, "getting acquiescence to interviews is perhaps the easiest task in case study research. Getting a good interview [on the othr hand] is not easy" (p. 64, brackets added).

Interviewing process in case study 2: Buffalo City Metropolitan Municipality

In the Buffalo City Metropolitan Municipality my field work stretched over 15 days between 6 July 2022 and 11 April 2023. I conducted interviews with six farmers, five women and one man, three with extension officers, and two with the representative of DSD and the Rural Women's Assembly (RWA). I also conducted follow up interviews with one of the two extension officer and one farmer. Participants narrated descriptive value creation stories in all interviews that captured their experiences in climate change learning spaces. The genre of the stories were guided by prompts that were loose enough to allow participants to tell their value creation story about how they experienced the social learning spaces and what was important to them (Wenger-Trayner and Wenger-Trayner, 2020), thereby allowing room for the stories to follow topical trajectories as the conversation unfolded, different from a process where the interviewer reads an interview schedule word for word and in the same order for each interview (Adeoye-Olatunde & Olenik, 2021; Magaldi & Berler, 2020).

Use of audio recorder

Although getting the meaning of what the participants say is more important, recording the exact words can help with accurate story recollection and provides the opportunity for member checking (Stake, 1995). The recorder was handy in instances where the interview needed to be translated. The use of an audio recorder in the study was premised on its role in accuracy checking and its ability to

free up the researcher, allowing the latter to concentrate on the interview processes (Simons, 2009). Although the use of the recorder was based on personal preferences, the recorder certainly provides the most accurate rendition of any interview (Yin, 1994). Where possible, I conducted walking interviews around places of practice, with the participants wearing a lapel microphone, allowing them to point to any features contributing to their stories. The lapel microphone allowed participants to walk freely also ensuring adherence to the COVID-19 regulation on social distancing. The use of the microphone was part of the process of seeking consent, and in one instance, a participant opted not to be recorded because the recording would make her "lose her story".

Direct and participant observations

The importance of observations in research is often overlooked by scholars who downplay the importance of observation as a data collection tool, citing lack of depth and generalisability (Lincoln & Guba, 1985). Although interviews and documents can generate authentic data, they may not capture some of the nuances that the researcher may need to complete the story (Humphrey & Lee, 2004). The ethnographic nature of my study observations was vital: I wanted to witness and experience aspects of the learning and practice activities in natural settings which gave different perspectives to the accounts of the participants. As noted by Stake (1995), this allowed me to execute interviews differently, with context-relevant questions and to hear remarkable stories based on unique experiences. I recorded observational data as field notes and combined it with other data from interviews and document analysis.

I adopted two forms of observation – direct and participant observations. Direct observation means the observer observes certain events of interest, such as meetings and other activities (Yin, 1994). Direct observation in the Raymond Mhlaba Local Municipality included observations of training: I was interested in understanding how training was conducted and the type of content covered. On 7 April 2022 I attended a workshop on the promotion of organic farming at a training centre in Mxumbu village. This was part of a programme called Participatory Guarantee System (PGS) which is found in several sub-Saharan countries (https://www.pgssa.org.za/). The programme encourages farmers to adopt new farming methods for improved ago-ecological relationships (see Figure 3.6 for an illustration of the training material used).

Figure 3.6: A page from the booklets on PGS distributed at the training workshop

I used participant observation in the Buffalo City Metropolitan Municipality because of the ethnographic nature of the study which, according to Yin (1992), assumes that

> An investigator cannot maintain objective distance from the phenomenon being studied. Inquiry is value bound not value free. Rather than trying to create this objective distance from the topic of inquiry (through use of instruments) the investigator's goal is in fact to experience directly the phenomenon being studied. Such direct experience arises from the conduct of fields work, with participant-observation therefore being the preferred data collection technique. Only such a technique enables the investigator to represent fairly the various multiple realities. (p. 125)

On 3 October 2022, on my way to meet with the research assistant, I had a car breakdown that required the car to be towed to the nearest garage for fixing. The research assistant informed the participants waiting for us about the breakdown, and we had to reschedule the interviews for a later time.

Figure 3.7: Helping the ZEP team load manure into a bakkie

After taking the car for fixing, I hitchhiked to ZEP to meet with my research assistant. On arrival at ZEP, a team of extension officers was travelling to pick up manure for the demonstration site at ZEP in a village where one of the potential participants stayed. I joined the travelling team and as shown in Figure 3.7, I helped the team load manure into the bakkie. However, upon arrival, I realised that my research assistant had organised a participant who did not meet the sampling criteria; he was a male farmer. The farmer was enthusiastically ready for the interview. To avoid disappointing him and avoiding emotional harm, I interviewed him. The data gave me a deeper contextual understanding of the agroecology movement because he was one of the early members of the movement. His successful agroecology project has inspired other community members to establish home gardens.

Upon returning to ZEP after travelling on the back of the bakkie, as shown in Figure 3.8, and helping with offloading the manure, the research assistant and the team at ZEP took me to Khayelitsha in Zwelitsha, about 20 km from ZEP, where I interviewed a group of four women farmers who practise agroecology on an unoccupied piece of land in a residential area. The farm was established and fenced with the help of funds donated by a community member. Their farming practice is temporary, and

there are chances that they might lose it; this affects their practice as they are hesitant to establish long-term adaptation interventions such as digging water reservoirs and planting trees for wind shields. Although they have been offered alternative land, it is not close to their households and the market. These farmers supply local stores, and community members can buy vegetables directly from the farm.

Figure 3.8: Travelling from fieldwork on the back of a bakkie

On 5 October 2022, I attended some farm-based training in Mdantsane at a community garden where I was introduced to and shared with the attendees the reasons for my visit and how the outcomes of my research would contribute to understanding farmers' learning and practice experiences. During the training, the team of extension officers from ZEP did demonstrations (see Figure 3.9). After the training, I interviewed a community member who had started the community garden. She mentioned that she began on the farm without any farming experience after she was retrenched from a government job during the COVID-19 pandemic. She invited community members that included men and women. The garden is a reclaimed open space that was fast becoming an illegal dump site; despite

the continuous use of the space as a community garden, the local authorities might decide anytime to use it for other purposes. The uncertainty of land tenure for the women farmers and how it affects their learning and practice experiences became prevalent in this case study as will be shared in Paper 3 and Paper 4.

Figure 3.9: Extension officer demonstrating plant spacing to farmers in Mdantsane

The training was based on land preparation: planting, mulching and furrows as water and moisture preservation strategies. Farmers, especially those who had recently ventured into farming, asked questions, and requested the trainer to do practical demonstrations on several occasions. The training was conducted in isiXhosa, the local language, ensuring full participation. Participants included members of varying age groups and non-farmers interested in understanding the concept of

agroecology and how they could be part of it. Simplified descriptions and idioms were used to ensure the understanding of the farmers. The importance of inclusion of local linguistics in farmer training is well known: Syngenta Foundation for Sustainable Agriculture (2018) noted that, 'Agri-Culture' is closely linked to many other forms of culture. Language is among the most fundamental". This is illustrated, for instance, in mulching as shown in Figure 3.10 being described as *"ingubo yokufudumeza imifino"* which translates to "the blanket that keeps vegetables warm" that protects the crops weather conditions resulting from climate change.

Figure 3.10: Mulched bed at an agroecology plot in Mdantsane

The "three sisters" approach to farming was also introduced. The approach involves strategic mixed cropping of butternut, corn and climbing beans. The butternut spreads on the ground helping to preserve moisture and helping the ground withstand severe temperatures and heavy rains, as well as reducing the growth of weeds. The green beans are essential for retaining nitrogen in the soil. The cornstalk serves as a trellis for the climbing beans ultimately also fortifying the maize in high winds. After the training, I conducted interviews and interacted with farmers who were interested in my research, were curious about my own farming practice, and wanted to hear advice based on what had transpired during the training.

On 6 October 2022, I interviewed Nkuli, a new farmer and an intern at ZEP. Nkuli's double participation role allows her to practice what she teaches. Nkuli is a graduate of Fort Cox Agriculture and Forestry Training Institute. She practises farming in her backyard and is developing a rainwater harvesting system that includes a water reservoir. Nkuli took me on a farm tour, showing me how water harvesting furrows worked. At the end of the farm tour and the interview, Nkuli stressed that I should use her real name and not a pseudonym because she wanted her story to be heard: "Please when you write, don't call me Susan, call me Nkuli, because I want people to know me and my story".

It is imperative to mention that not all observations were made by myself; in some instances, my key informants directed me to focus on specific non-verbal cues among the participants, especially during a training session when the facilitators were making demonstrations. In participant observation, the researcher is not a spectator of events as a passive observer; they are involved in the activities and assume varying roles in the events taking place (Yin, 1994). Through visits to the farms and training observations, I got a fuller picture of the study site, and other contextual insights that provided prompts to explore further in the interviews.

Cohen et al (2007) noted that the researcher's rigorously active (reflexive) role in participant observation is essential in guarding against threats to validity; in Table 3.1 below I list four critical threats mentioned by Cohen et al, showing how I avoided them.

Table 3.1: Threats to validity and how to avoid them
(Source: Adapted from Cohen, Morrison and Manion, 2007)

Threats to validity in participant observations	**How I avoided them**
1. The researcher may not be aware of antecedent events.	Working with local field assistants and critical informants with knowledge about the case study areas
2. Informants may be unrepresentative of the sample of the study.	I conducted a group interview in the first case study to allow more participants to share their stories. In both case studies, the key informants were vital in identifying representative samples
3. The presence of the researcher might bring about different behaviour – reactivity and ecological validity	In both case study areas, I prolonged my stay, and by the time I conducted my study, I was familiar with the participants
4. The researcher might go too native, become too attached to the group, and distort findings.	I only got involved in the group's activities related to my study. I also turned down requests to take up a leadership position in the Middledrift Farmers Society.

It is essential to mention that although I had anticipated my positionality as a male researcher engaging women farmers to affect the research process and outcomes, it did not have any effects primarily because of the strategies above that I adopted to avoid threats to validity.

As Simons (2009) discovered, the importance of observational data was that it triangulated and validated the value creation stories and the secondary data from the documents. The VCF refers to this data as 'contribution data' that confirms the plausibility of the value creation stories (Wenger-Trayner & Wenger-Trayner, 2020).

3.2.3.3 Document review

The goal of data collection in qualitative and, to some extent, quantitative research is to understand the subjective social nuances that exist in the study context and in the relevant existing publications (O'Keeffe et al., 2016). The potential usefulness of the relevant documents needs to be gauged beforehand (Stake, 1995). Thus, the process of purposive sampling of the documents was guided by three critical preconceived questions relating to: the importance of the chosen documents, what informed their choice and how they were helpful. I reviewed documents as part of both a pre- and post-data collection process. Before the data collection process began, I analysed documents that included reports, theses, websites, and social media pages. The process was guided by an interest in exploring the terrain of learning and agricultural practices in the case study areas. The ELRC has been involved in the region through the Amanzi for Food projects and other varying activities. As such, there were many resources to orient me to the study area and the learning activities and practice around climate change action in these areas. The analysis of documents contributed to the design of observations and interviews as it mapped out the issues that required further exploration.

I conducted document analysis again after the field data collection phase, focussing on documents I could not access online, most of which were provided by the research participants, these included pamphlets and newsletters that were informative in terms of my further understanding the learning and practice landscape as covered by other scholars and writing filling in gaps in my data, especially regarding the history of the learning networks, the inolved stakeholders and the general interest of the communities. This analysis helped with building on the interview data and earlier document analysis. It deepened my understanding of the historical and socio-economic context of the case study areas concerning smallholder farmers in general and their agricultural practice. Additionally, though it is not the aim of the data from the document to be generalised (Altheide, 2000), it is the use of varying documents in the present study that contributed to strategic sampling of the data and verification processes. The review of all the publications by the key participants contributed to the study's overall validity.

3.2.4 Data analysis and interpretation

The data analysis process does not have a starting point because the analysis includes formulating a first impression or giving meaning, doing compilations, and drawing convergences and divergences in data (Stake, 1995). The process of data analysis is about assembling or reconstructing the data in a meaningful or comprehensible fashion, in a transparent, rigorous, and thorough way, while remaining 'true' to participants' accounts (Humphrey & Lee, 2004). Simply put, analysis in qualitative research is a matter of "pulling it apart and then putting it back together again more meaningfully (Stake, 1995, p. 75). However, this is not a straightforward exercise; qualitative researchers have to manoeuvre between the two 'polar clashes' in data analysis: (a) the commonly accepted epistemological practice of interfacing findings with previous insights and already existing knowledge (deductive analysis); and (b) the plurality and emergence of new meanings, actions and structures while remaining cognisant of the risk that arises from such openness (inductive analysis) (Kelle, 2014).

3.2.4.1 Deductive and inductive data analysis

In qualitative research, data analysis processes include deduction, induction, and abduction. To choose the strategy to adopt, Kennedy and Thonberg (2018) advised researchers to draw links between the data collection strategies, the analysis and, in the case of my research, between the two theories and the evaluation framework. The use of several data collection tools, interviews, observations and document review meant generation of large volumes of data, some of which was not core to the research questions, adopted theories and evaluation framework. For a thorough analysis, I utilised deductive analysis which is a top-down approach that involves the analysis of data based on pre-existing theory, methodological frameworks, preceding literature, or the chosen aspects of the research question (Gale et al., 2013). The advantage of the deductive approach is that it allows the researcher to identify and attend to nuances in the data that an unbounded analysis might otherwise overlook. However, the analysis may be blinkered by the theory and overlook aspects of the data that do not fall within the scope of the theory (Kennedy & Thonberg, 2018). There is also a risk of constricting the data into pre-existing concepts (Glaser, 1998). I therefore also used an inductive approach because, as was found by Gale et al. (2013), a combined system allowed me to leave space to discover other unexpected aspects of the participants' experience that the existing literature, theories or the evaluation framework might not have covered.

3.3 Conducting data analysis

3.3.1 Using the CoP and SLT for data in the Raymond Mhlaba Local Municipality

The first step to analysing the interview data was transcribing audio recordings into text. I transcribed the audio-recorded interview data as soon as possible after the interviews, before the end of the data collection process, for early follow-up on unintelligible parts. Reducing the gap between interviews and transcription is essential to avoid memory bias, especially regarding non-verbal or environmental context issues critical to data validity (Sutton & Austin, 2015). I manually transcribed the data; however, in some instances, I used an online transcription tool called Otter. For interviews that I conducted with the help of a translator, I hired a transcriber who speaks isiXhosa and English. I spent time with the transcriber, talking about my research and what the participants were talking about.

After transcription and verification, the second stage was the coding process to classify the data so that it could be compared systematically with other parts of the data set (Gale et al., 2013), including field notes and observations. As shown in Appendix 6, the coding process involved perusing the transcriptions to make sense of the key topics, issues, convergences, and divergences in participants' narratives in relation to my research question. Essentially, coding is combing the data for themes, ideas and categories and then marking similar passages of text with a code label so that they can easily be retrieved later for further comparison and analysis (Taylor & Gibbs, 2010). As shown in Table 3.2, the process was deductive and was guided by the two theories and the analytic frameworks adopted for each case study. The table shows how the concepts of CoP and social learning were adopted to analyse the data, starting with how these attributes manifested in the case study followed by the codes that emerged from the noted manifestations of the conceptual attributes. I started to make sense of the participants' experiences concerning their contexts by reading transcripts. While doing this, and as shown in Appendix 7, I started the third process of theming which involved clustering the data codes that were related to each other and giving them corresponding titles (themes) and then added the raw data extracts to the various themes.

Table 3.2: Data analysis table (Source: Author)

Theories	Theoretical concepts	Codes	Themes	Examples of empirical data from interviews
Communities of Practice (CoP) and Social Learning Theory (SLT)	Shared domain (CoP)			
	Legitimate peripheral participation (CoP)			
	Situated learning (CoP)			
	Cross-boundary learning (CoP)			
	Practice and competence development (CoP)			
	Lifelong and socially embedded learning (SLT)			
	Pervasive learning space with various networks (SLT)			
	Interest to make a difference (SLT)			

3.3.2 Using the VCF to analyse value creation stories in the Buffalo City Metropolitan Municipality

The VCF, as an evaluation tool, offers a comprehensive toolkit for participants to construct and share individual and collective value-creation stories that reflect their experiences in a social learning space (Bertram et al., 2017). As with the SLT, VCF values the bottom-up emergence of participant-based indicators because they complement the existing indicators and increase the chance that the indicators are meaningful to participants – "because they know what counts as a value in their varying contexts" (Wenger-Trayner & Wenger-Trayner, 2020, p. 199). The use of bottom-up indicators is connected to the concept of inductive data analysis (Thomas, 2006). Thus, when Wenger-Trayner and Wenger-Trayner (2020) discussed the concept of agency and its role in creating value in a social learning space, they noted that it is not a matter of unrestricted freedom to do as one desires because power, historical development that has shaped interests and value and access to resources can all limit the exercise of agency as an individual or as a collective – however, it is important in the following, creating modes of learning in a social learning space:

- Generating value: participating in a social learning space will generate value, with the value ranging from good learning environment to critical insights;
- Translating value: when participants convert the generated value towards the difference they care to make;
- Framing of the creation of value: participants enter a learning space with a pre-conceived idea (solid or fragmented) of what counts as value, the value they intend to make and the indicators of this value; and
- Evaluating: relates to measuring whether the difference one cares to make has been made and the extent of its effectiveness. (pp. 62-63)

Taking into consideration the role of agency in shaping learning, my data analysis accommodated emergent collective and individual modes of learning inherent in the social learning space for farmers; VCF honours the agency of the participants (Wenger-Trayner & Wenger-Trayner, 2020). Although the theories and the framework remained quite connected to my study, I was also conscious of Simons' (2009) caution on the dangers of false consensus, of making the data fit the frameworks. Hence, the importance of an inductive approach to analyse the value creation stories from the Buffalo City Metropolitan Municipality case study, taking into consideration what the participants considered to be value rather than sticking to the common VCF indicators, as thoroughly captured by Wenger-Trayner & Wenger Trayner (2020):

> Most of the time, evaluating is not explicit, or called evaluating. Often it is just a way of paying attention. But sometimes evaluating is organised as a separate activity to collect and analyse data. It can be done by participants themselves or with the help of a professional evaluators.

> **What matters is that the process remain meaningful to all participants. The visibility of an evaluative activity should not detract from the fact that evaluating happens all the time as an essential part of social learning itself.** Learning to make a difference means getting better at assessing what creates value, what makes a difference, and what does not. (p. 64)

3.3.3 Consolidating and integrating data

The adoption of an ethnographic approach which generated loads of §al data (referred to as 'contribution data' in the language of VCF) and the lengthy detailed value creation stories presented the dilemma often faced in the use of VCF and qualitative research: how to present a cohesive representation of the data, which can be 'vast' and 'messy' and needs to be knitted into a comprehensive narrative that allows readers to make sense of the study (Azungah, 2018; Wenger-Trayner & Wenger-Trayner, 2020). Commenting about the dilemma, Seers (2012) lamented that "there is sometimes a fine line between being immersed in the data and drowning in it" (p. 2). As experienced by Heale and Twycross (2018) and true to the VCF, adopting a multi-case study produced a huge volume of data that needed a carefully thought-out and thorough process of data analysis. I refined, consolidated and integrated the data set using Wenger-Trayner and Wenger-Trayner 's (2020) four-stage iterative process:

1. *Organising and cleaning data*

After transcription of the interviews, I consolidated all the data into one place labelling names and places of the interviews. As shown in Appendix 8, I went through the interview transcripts iteratively, reading them and labelling the various value creation indicators and plotting them into their relevant value cycle in a value creation matrix as shown in Appendix 9.

2. *Reviewing and refining value creation stories*

Despite briefing the participants in advance about the purpose of the study, their stories were broad including many aspects of their practice which were not pertinent to my study; this confirmed Wenger -Trayner and Wenger-Trayner's (2020) finding that good value creation stories are often elusive. However, the example in Appendix 8 shows how I managed to sift through the stories and identify the various indicators of value. Placing them in a value matrix as shown in Table 3.3 (the completed value creation matrix is presented in Appendix 9) made it easy to check the gaps and ensure completeness of the story. It should be noted, however, that the term 'completeness' does not imply the presence of indicators for all the value cycles. Because of my prolonged stay in the case study area, it was easy for me to expand and sharpen some of the stories with the participants I met regularly. Participant

observation and interviewing members of the same agroecology movement several times proved critical for plausibility in terms of missing critical information; I may, otherwise, have overlooked or contradicted details without doubting or challenging their stories.

3. Integrating effect and contribution data

The use of multiple data collection methods and tools generated diverse data that needed to be interfaced and integrated. Although there were limited documents to analyse, the documents that I interacted with, especially the reports on the seed sharing practice, were critical in completing the seed sharing stories and in triggering follow-up questions or seeking clarity on the practice. Observation data (referred to as 'effect data' in VCF language) was important in referring to various artefacts and farm development when asking questions which in turn helped participants to own their stories. The combination of all the data was key in finding convergence between the stories and in identifying the common indicators that mattered to the participants, thereby contributing to the causality and connection across the value flow.

Table 3.3 : Value creation matrix

(Source: Adapted from Wenger-Trayner and Wenger-Trayner, 2020)

	Immediate value	**Potential value**	**Applied Value**	**Realised value**	**Enabling value**	**Strategic value**	**Orienting value**	**Transformative value**	**Notes (Contact details, issues to follow up on)**
Guiding questions	What is the experience like?	What comes out of it?	What are you learning in the doing?	What difference does it make?	What makes it all possible?	What is the quality of stakeholder relations?	Finding yourself in the broader landscape	Does acquired value have broader effects?	
Participant 1									
Participant 2									
Participant 3									
Participant 4									

4. Developing the themes

Although VCF studies often utilise themes to contain the stories (as I did in Paper 4) in Paper 3, I used value cycles to share and discuss the findings because the stories were interwoven into a collective evaluation story that represents the varying experiences of the women farmers, the extensions, and the various stakeholders and shares how these experiences helped the team and individuals make specific differences in their agricultural practices and changes beyond the farm level.

The end of the analysis and synthesis process led me to the final process of writing papers and thesis overall. However, like the data analysis process, the writing of the papers and thesis involved considerable sifting through the data and the literature and discussing the two to produce coherent documents. The process is well captured by Stake (1995):

> For a while we worry about having enough to say; before we know it, we have too much. For the reader's sake, for the case's sake, for the forest's sake this research situation's best story needs to be found. It is an effective author who tells what is needed and leaves the rest to the reader.

3.4 Ensuring authenticity and research integrity

The rigour of a case study is determined by various forms of validity and reliability (Yin, 1992). Establishing accuracy and discussing the generalisability of a study are essential procedures in authenticating a study. Although traditionally, qualitative researchers have used reliability and validity as quality control mechanisms in research, these terms and associated processes have been scrutinised by leading qualitative researchers like Creswell and Miller (2000) and Lincoln and Guba (1985), mainly because of their roots in positivism. Because of this critique, in my study I adopted the qualitative metrics of trustworthiness and authenticity to ensure research integrity and authenticity.

3.4.1 Research accuracy

This concerns the extent to which the findings and their interpretation match reality (Creswell, 1994). Interviewees are often dismayed by how their contributions are interpreted for two reasons: the researcher may not have captured their submissions properly, or they realise that they did not convey themselves as they intended (Stake, 1995). To ensure accuracy, I shared draft papers with some participants, including key informants who had been involved in all phases of the research process, for member checking. They shared their thoughts on whether the themes and findings were accurate and presented in ways that represented the participants' experiences. In most cases, feedback was

in the form of voice notes because of limited time to write comments due to field work. Accuracy is also ensured in this report through detailed description of the research process and the decisions made. Internal validity was ensured by adhering to three strategies determined by quality, quantity, and time frame. These three were adopted in the present study to act as signposts for the study's internal validity.

3.4.2 Quality and quantity

All research methods and approaches have varying strengths and weaknesses. Some are more relevant to specific situations and combining them can allow them to build on each other's strengths for a fair picture of the phenomenon under study (Diefenbach, 2009). Case studies are by nature multi-perspectival; the researcher considers the participants' perspectives, the relevant groups of actors, and the interaction between them (Tellis, 1997). Interviews with one participant may leave gaps in the data; however, interviews with different participants do not necessarily guarantee the quality and sometimes cross-referencing is required (Diefenbach, 2009). Because no specific number guarantees quality, the present study employed the advanced concept of information power where with the help of my key informant, I selected the most relevant sample of participants who were involved in climate change learning and who were actively practising adaptation on their farms and in organisations that are effectively engaged in climate change education (Malterud et al., 2016). Data saturation was also kept in mind and informed the decision on when to stop an interview, the number of interviews and the number of case studies.

3.4.3 Time frame

In terms of time, in determining research validity, the time lapse between the event and the interview and the place it is conducted is important; this is also crucial in document analysis (Diefenbach, 2009). The present study was particularly interested in understanding current or recent learning in relation to contemporary issues – climate change and climate action. Interviews were conducted at participants' places of practice allowing participants to refer to existing artefacts and references. The analysed documents were provided by the participants, ensuring their relevance to the current state of the subject matter.

The length of my stay in the field was also crucial in ensuring the authenticity and trustworthiness of my research process. I heeded Yin's (2011) advice on ethnographic research: researchers should immerse themselves in fieldwork for a lengthy period to surface key lessons relating to the

participants' everyday life and culture. This advice was vital in guiding my engagements, especially in the second case study where I stayed in the field for a longer period of time.

3.4.4 Limitations of the study

The emphasis on context in case studies limits the possibility for replication in other contexts. However, the researcher's detailed trail of the research process from conception to writing up can provide a basis for replication (Creswell, 1994). The present study's investigation of two case study areas connected in a social learning network and CoP with other cases makes them replicable to other case study areas. This informed the decision to confine the research to two case study areas.

The maintenance of a chain of evidence further strengthens the reliability of this multi-case case study – Yin (1994) emphasised the importance of chain evidence by comparing its significance in a criminological investigation – the process of recording evidence should be tight enough that the evidence presented in court – or the case study report – is assuredly the same evidence that was collected at the crime scene. No actual evidence should have been lost, through carelessness or bias and therefore fail to receive appropriate attention when the facts of a case are considered. It is also important to keep records for interested readers of the case study report to be able to track the research process from conception to conclusion, to be able to trace the steps from either direction (from conclusion back to the initial research questions or questions to conclusion) (Yin, 1994).

3.4.5 Triangulation

Triangulation emerges from the reality that no single observer, theory research tool or data source can capture all the essential details (Denzin, 2017). Triangulation in my study brought clarity to the following questions:

- How do we know that they are CoPs?
- How do we know that social learning is happening in this case?
- How do we know that learning has happened?
- How do we know that value was created or not created?

Various methods of triangulation, including data triangulation (use of different data sources), theory triangulation (use of multiple theories), methodological triangulation (use of other methods), investigator triangulation (involvement of various investigators) makes case study findings and conclusions more likely to be convincing and accurate (Yin, 1994). Data source triangulation involves a look for consistency in other times, other spaces, or as persons interact differently (Stake, 1995). In both cases studies, data was generated from multiple sources, farmers, organisations, extension officers and a range of data collection tools were used including interviews, participant observations

and document analysis. In the first case study, data triangulation was further ensured by the group interview, while in the second case study data was further triangulated by conducting longitudinal interviews with key informants.

For theoretical triangulation I used two theoretical frameworks that are connected to each other and one (related) evaluation framework. The three helped establish the existing learning landscape, map out the learning landscape and track the value creation processes in the learning spaces. The theoretical triangulation also involved a peer review process by reviewers from different disciplines and theoretical backgrounds to review the research design (Higher Degrees Committee members) and interpret the findings (research participants, journal reviewers) for the study to arrive at authentic conclusions. Commenting on the importance of theoretical triangulation, Yin (2011), regarded it as a sign of research integrity because of the importance of the willingness to be proven wrong or even to have your earlier thinking on the matter challenged. Throughout the process, I was open to reviews from colleagues and journal editors through conference and work presentations and journal submissions. As noted I also sought reviews from the participants, who member-checked their responses and how they were framed in the various papers. The reviews were considered and incorporated into the final write-up.

3.5 Ethical considerations

> Because the designs and procedures of doing the qualitative study are potentially more flexible than most other kinds of research, people will want to know that the research has been conducted accurately and fairly. (Yin, 2011, p. 44)

In a qualitative study, the first objective is to describe and document the research procedure for inspection, scrutiny, and traceability (Yin, 2011). Qualitative research scholars are obligated to change the world, engage in ethical work that makes a positive difference by provoking change and create texts across gender and race that involve readers and audiences in this passion, moving them towards action (Denzin, 2012, p. 85). This was the pith of my study; as educational research with the ultimate aim of bringing to the fore the women farmers' learning experiences, it had to tick all the boxes of ethical research. My commitment to preserving the integrity and credibility of the research process was initiated by acquiring formal research approval from the Research Ethics Office at Rhodes University. However, as I moved from one case to another or within a single case, I had to make certain changes to my usual approaches and therefore I continuously reviewed my ethical judgments and notified the supervisor and the Research Ethics Committee through annual ethical reviews. I adhered

to three primary ethical considerations in a qualitative study: informed consent, confidentiality and the interpretation and use of the data (Cohen et al., 2007).

3.5.1 Informed consent

Before formalising their participation through the consent form, it was my responsibility to outline the research process clearly, especially regarding how and why participants were selected, how permission to contact research with the participants was granted, the time frame, the potential dangers to participants, as well as openly sharing the possible limitations of the study and its processes (Yin, 2017). The informed consent also included a request for participants to consent to voice recordings, observations, field notes, and pictures. In most instances, my field assistants explained the informed consent in isiXhosa to build trust and ensure that participants were fully informed about the study Throughout the data collection phase, especially during interviews, I remembered that interviewees have the choice to either answer the questions or not, for whatever reason. As such, the interviewer should be alive to what transpires in the interviews and be able to establish whether participants are not interested in the subject matter, they were suspicious, or they did not fully understand the question (Diefenbach, 2009).

3.5.2 No harm to data sources

Although the potential for participant harm in the proposed study was low, the commitment to not cause harm was prioritised. The principle of 'no harm' goes beyond the research field processes and includes how the findings are reported and shared. When rapport and trust have been established between the researcher and participants, participants tend to express themselves openly, sometimes including their vulnerabilities (Simons, 2009). I remained committed to protecting the participants' confidential information using it as accurately as possible to avoid any harm. Extension officers and farmer organisations face reputational risks especially where findings from their catchment areas are not positive. To avoid such risks, their names are not published here or any other related publications.

3.5.3 Information management

Throughout the study I was aware of the recently enacted Protection of Personal Information (POPI) Act 4 of 2013, which gives effect to the constitutional right to privacy by safeguarding personal information when processed by a responsible party, subject to justifiable limitations. This, combined with Rhodes University's guidelines from ethical research, required me to prioritise secure storage of data comprising personal information. I utilised Google Drive and Rhodes University's cloud-based storage connected to secure servers which are password protected and can only be accessed through confidential login credentials. I only shared my research data with my supervisor. However, any other

parties that may be interested in accessing the data for ethical use, may be granted access to it, upon request and consultation with my supervisor and the Rhodes University's Research Ethics Committee.

3.6 Summary

This chapter continued to describe the role of the theoretical framework as the central factor in shaping my study. It introduced the study design and the research tools, giving a step-by-step explanation of the decisions taken in conducting the study. The complementarity of the data collection methods was emphasised showing how the three methods built on each other. The two data analysis procedures adopted for each case study are also discussed showing their utility in the present study with participants of varying experiences and data collection methods and were almost open-ended. Towards the end, the chapter shares various ways through which the authenticity and integrity were preserved. The chapter also shared the ethical considerations guiding the study; although research ethics were approved prior to the conduct of field work, the chapter showed that in some instances I had to make ad hoc decisions regarding ethical dilemmas that arose from the field work.

Chapter 4: Summaries of articles

4.1 Introduction

This section shares abbreviated versions of the four academic articles that I prepared for my PhD. Three articles are under review with different journals, and Paper 4 has been provisionally accepted. The articles cover the whole PhD journey from conception, the methods and tools, the findings and the conclusion and recommendations for best practices. As shown in Figure 4.1, each paper responds to a set of objectives and sub research question, and they all respond to the main research question. However, the papers are not mutually and exclusive to each other. They are connected to each other by the research objectives and questions and the adopted theoretical and evaluation frameworks that bind the papers together to answer the main research question. The full papers are in Appendices 10, 11, 12 and 13.

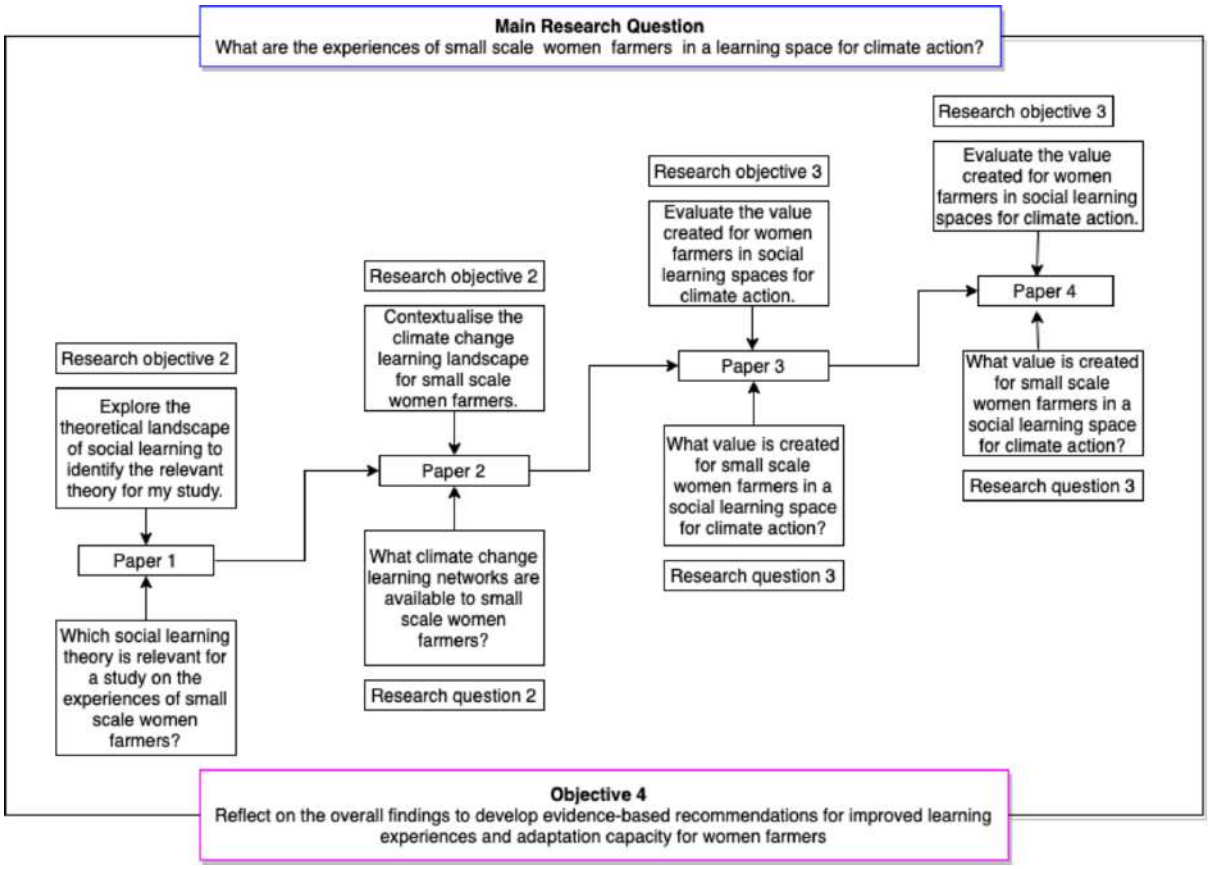

Figure 4.1: Diagrammatic representation of the papers and how they correspond to the research objectives and questions

Source: Author

4.2 Paper 1: Conceptual paper

Title: A reflection on finding a coherent Social Learning Theory to explore the experiences of small-scale women farmers in social learning spaces for climate action

Author: Ludwig Chanyau

Affiliation: Rhodes University

Makhanda, South Africa

4.2.1 Background

The paper takes a reflective approach showing how I sifted through the theoretical landscape to find a theory of social learning most relevant to my PhD study. The paper maps out three prominent contours of social learning in the field of natural resource management, social learning in developmental psychology and social learning connected to the concept of communities of practice. Drawing on Wals's book *The acoustics of social learning: Designing learning processes that contribute to a more sustainable world*, and several other scholarly works, the paper probes the murkiness in the conceptualisation of social learning. In fact, Reed et al. (2010) and Wals (2007) concede that there is no consensus on what makes up social learning, and it can be explained in various ways.

4.2.2 Methods and tools

Using Okoli's (2015) systematic literature review, which he described as a rigorous, standardised methodology, the paper traces the epistemological roots of the three theoretical branches of social learning. It employs Google search protocol to trace each of the branches of social learning, showing how each of them interpret how learning happens and how the learning is applied in different contexts.

4.2.3 Findings

At the conceptualisation stage of this paper in 2022, the number of Google hits for the term 'social learning' soared above four million compared to 2016 when Wals et al. (2009) found the number of hits to have increased from around 400,000 to about 900,000 between August 2005 and November 2006. The surge points to increased interest and use of the concept. However, the term and the theories are used in different ways but also interchangeably. Therefore, the purpose of the paper is to identify the contours of social learning and bring clarity to the concept for both the purposes of my own study, and for other researchers and practitioners to have a clearer picture of social learning in its current, varying forms.

- **Social learning in developmental psychology:** The paper identifies Bandura as the leading theorist of social learning in developmental psychology. Social Learning Theory describes how humans and animals learn behaviours through observing their preferred models and repeating the behaviours. The outcomes of the mimicry either positively or negatively reinforce the behaviour. The theory disagrees with the ideas of extreme behaviourists who describe behaviour as a product of innate functions. This branch of social learning did not work with my study because it focuses on how children learn existing behaviours from models, while my study focuses on how farmers co-learn towards new practices to address the effects of climate change. Additionally, the theory focuses on the cognitive processes of individuals; the original concept does not consider group processes such as the development of shared meanings and values that provide a basis for joint action.
- **Social learning in natural resource management:** Here, social learning emerged as an antithesis to the elitist development approach that allowed only those proximal to power and resources to define the developmental discourse for their communities. Its emergence was also sparked by the dominance of environmental issues in governance and development discourse. For improved natural environment management, the theory suggests that participant should go through a five-stage process of reflection, systems orientation, integration, negotiation, and participation. Although the theory had some relevance to my study (for example, the semi-formal learning approach), the hierarchical nature of leadership in learning where the facilitation and efficiency of social learning lies mainly in the hands of the natural resource manager did not fit with my context; in my study the extension services which aim to provide resource management services are resource- and staff-strained to play such a leading role, and in the context of COVID-19 pandemic where gatherings were restricted, interactive farmer learning processes like farmer field schools were curtailed, leading to the adoption of unconventional and fragmented learning networks. Additionally, the theoretical assumptions in the natural resource management social learning include that learners have one shared goal; this is not the reality in the farming communities where farmers have different forms of agency, interests, and practices that may not all be accommodated by the structure of NRM social learning which ismore focussed, make it difficult to accommodate differences and new members who may wish to join in along the learning pathway.
- **Social learning in communities of practices**: Here, the learning theory emerged in protest to the conventional learning processes defined by the assumption that information moves from the ‘knower’ to the learner. This learning is situated among a group of participants (which can

also not be a community of practice) with a shared drive to attain a difference they care to make. The learning group is heterogenous, it includes members of different backgrounds with different levels of competence who learn together to attain a common goal (domain). This branch of social learning was relevant to my study because it recognises that people have different knowledges and there is no 'super being' who knows everything; this is the case among farmers because most have a long history of agriculture and contextual knowledge that has been inherited through a long chain of generations which extension officers should not ignore and rather embrace. Additionally, because of different levels of farming experiences and social positions, farmers learn from each other, with the novices learning from the established farmers. Toolkits for working with the concept of community of practice and social learning are available for analysing this kind of learning and these sorts of relationships.

4.2.4 Conclusions and contributions

The varying conceptualisation and the apparent conflation of different kinds of social learning are the result of the nature of social learning. It shapes our daily lives in different ways at different times, and it is at the heart of all efforts for desirable social change. As such, to adopt the concept as a framework to understand learning processes, one needs an operational definition of what will be considered a theory of social learning and its compatibility with the adopted research pathways and the intended goals. Therefore, although the choice of one particular 'branch' of theory was made, the other two branches are also relevant in certain situations. In accordance with the nature of my study, I chose the branch of social learning related to the concept of communities of practice because it allowed me to trace informal and unstructured and fragmented learning that is inherent in farming communities because of the presence of different knowledges, learning preferences and practical experience and the dispersed nature of learning leaders or facilitators. The emancipatory experiences necessitated by the shared desire to make a difference or differences, because farmers are not a homogeneous group, is a key attribute of the concept of CoP based social learning which made it more suitable for my study. Additionally, these differences, as with farming communities and agriculture in general exist beyond the farm level and into the wider community, therefore the pervasive attribute of CoP-based social learning made it a suitable tool to trace not only farmer learning as different but also that transformative difference in other learning and practice spaces.

4.3 Paper 2: Exploratory evaluation

Under review: *South African Journal of Agricultural Extension* [https://sajae.co.za/]

Title: Communities of practice for climate change learning and action for small-scale women farmers in the Eastern Cape Province of South Africa

Authors: L. Chanyau (Environmental Learning Research Centre, Rhodes University) and M. Weaver, (Institute for Water Research, Rhodes University)

Chanyau contributed 70% of the paper by conceptualising the article, conducting data collection and interpretating the findings, drafting the article and identifying a suitable journal. Weaver contributed 30% to the article by critically reviewing the article and producing diagrams and graphical representation of the case study area.

4.3.1 Background

Paper 2 uses the concept of CoP and the CoP-based social learning adopted for the study in the first paper, to identify the learning and relational aspects of the existing learning networks and communities, in Case study 2, the Raymond Mhlaba Local Municipality, in the Amathole Distirict in the Eastern Cape. Reviewing various literature on small-scale farmer learning and farming in general, the paper shows that despite the dwindling agricultural output in the region compared to other regions, agriculture remains the mainstay of many governments' economic aspirations and the hope for many in their fight against poverty. The paper interrogates the outcomes of the intensive agricultural investments of the mid-20th century by governments and international organisations, analysing why these investments have had only short-term reprieve for agriculture that did not last long to cushion the industry from socio-ecological challenges such as climate change. The discussion then moves to the specific context of the study, the Eastern Cape, discussing the factors causing the province to have one of the poorest farmer-extension officer ratios, why the province is leading in drops in the number of households practising agriculture, and the lack of urgency in addressing these apparent realities that are being exacerbated by climate change. The paper recognises the importance of climate change awareness among farmers in dealing with the challenges because they are usually the first responders in times of crisis; agriculture is among the leading contributors to the province's economic outputs and knowledge about climate change and the actual process of learning is important in dealing with other disasters, for example the recent locust outbreak.

4.3.2 Methods and tools

The paper adopted the format of an explorative case study evaluation that mapped out the learning landscape and networks for small-scale women farmers. The paper maps the relational aspects of the existing learning communities, showing the stakeholders, tracing the movement of knowledge and resources within and beyond the communities of practice, assessing how learning happened, and considering the stakeholders and outcomes to establish the connection between learning processes and changes in practice. I gathered data through semi-structured individual interviews with small-scale women farmers and one group interview with farmers who are part of an agricultural cooperative. I also conducted semi-structured interviews with extension officers and organisations involved in farmer training and support.

4.3.3 Findings

- The study found a broad and nested constellation of communities of practice that involved several smaller communities of practice, that included non-governmental organisations such as World Vision, farmer learning networks like Imvotho Bubomi Learning Network (IBLN), students and staff from tertiary education institutions like Rhodes University, Fort Hare University, and Fort Cox College of Agriculture and Forestry, government departments such as Department of Social Development and Department of Agriculture Land Reform and Rural Development and farmers of different competencies and specialities. The shared goal is the drive to learn to make a difference in farmers' resilience and adaptation to the effects of climate change.
- Retrospectively, participants shared how they exchanged traditional local knowledge on environmental events in their communities like tornadoes and recurrent droughts. Within the abundance of knowledge or epistemic plurality, extension officers must cross the boundaries between scientific and traditional knowledge finding a common ground between the two. However, their lack of adequate training on the science of climate change makes them more inclined to stick to traditional knowledge.
- The findings in the paper challenge commonly held views on the inferior participation of women and show that, in this case, women farmers are playing a significant role and are leaders in agriculture. This finding is in contrast with most preceding studies conducted in the province that found women in agriculture facing various hurdles affecting their full participation in agriculture. The findings from the first case study found women farmers to be leaders in their CoP and leading recruiters of other 'new' women whom they mentor and treat as equal partners; this was corroborated by the women farmers themselves and other stakeholders.

- The NGOs that are involved attributed the failure of some of their projects to unresolved conflicts in the CoP that were mainly caused by conflicting interests among members and between stakeholders. However, they conceded that although the conflicts have been detrimental to the success of their projects, they have learnt from them, and the lessons have been instrumental in addressing other challenges.
- In this CoP participants usually hold face-to-face meetings for training – field-based demonstrations and information exchange; however, because of COVID-19 social restrictions, the constellation of CoPs and smaller CoPs are moving to take advantage of the resultant improved digital access to expand membership beyond their communities to include members from other provinces and further afield, widening competences, knowledges, and their skills base. However, the cost of internet devices, data and limited technology skills and ability to comprehend the shared information, have all increased the existing digital gap.

4.3.4 Conclusions and contributions

The paper shows that in the context of this case at least, CoPs are delicate by nature; they are not well insulated from socio-ecological changes. Evidence showed that the COVID-19 pandemic disrupted existing CoPs and reduced their effectiveness because CoPs run better face-to-face and follow an interactive process among participants of a common identity. As such the paper contributes to the conceptualisation of CoP by showing the importance of:

- Versatility of and in CoPs, especially in the case of transition of CoPs from physical to virtual CoPs resulting in mixed identities and repertoire.
- Flexibly regulated openness of social learning to allow effective and contextualised learning for participants.

4.4 Paper 3: Mini-ethnographic case study evaluation

Under review: *Journal for Agroecology and Sustainable Food Systems*
[https://www.tandfonline.com/toc/wjsa21/current]

Title: "We don't believe in killing pests; we believe in controlling them": An assessment of the value created for members in a social movement on agroecology in climate-vulnerable regions of South Africa.

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4.4.1 Background

This paper is informed by research in Case Study 2 and builds on Paper 1 and Paper 2. Paper 1 explored the most suitable theory for my study and Paper 2 considered the learning landscape using the identified theory in Paper 1. This paper ethnographically evaluates the learning experiences of small-scale women farmers in Zingisa Educational Project's social movement with characteristics of communities of practice situated in the Buffalo City Metropolitan Municipality in the Eastern Cape Province, with learning and support networks across the globe. The paper takes the readers through an exploration of the aggressive post-World War 2 agricultural development (often dubbed the Green Revolution) showing how the race to end poverty and food insecurity opened floodgates of misuse of agricultural resources such as fertilisers and chemicals, and annihilated food sovereignty among small-scale farmers and producers. The practices of that era had long-term negative effects on the natural ecosystem and led to ecological challenges that we are currently dealing with including climate change and environmental degradation. The practice also led to the current skewed global food system that is reinforced by global food monopolies. The paper acknowledges the emerging wave of environmentally sensitive agricultural practices such as Zingisa's agroecology movement that seeks to mend the relationship between ecology and humanity. However, despite the popularity of sustainable agricultural production, the paper queries the performance metrics used to measure the success of the emerging sustainable practices. The paper therefore adopts the Value Creation Framework (VCF) to evaluate Zingisa's agroecology project. The VCF emerged as useful for working with the concepts of CoP and social learning; I had the right toolkit to trace and evaluate how the movement operates and the learning experiences of the involved members, and by doing this, I answered the following questions, among others,

- How does it work?

- Who is involved and for what reasons?
- What do they and their communities gain from it?
- What do we learn from it?

4.4.2 Methods and tools

This mini/micro-ethnographic research involved spending 15 days of immersion in the community and taking part in various activities with my focal point being the training and learning activities. Because of the structures of social movements and the various passions and energies driving the members, ethnographic evaluation was vital as it considers multiple realities and subjective experiences in one context or activity rather the ontological position of empirical science where there is a single reality and experience (Simons, 2009). Additionally, the considerably long and partially unstructured enquiry allowed the surfacing of natural interaction and experiences of the participants. Farmers are a heterogenous group; their experiences are not uniform and as such, I needed to explore the farmers' activities close up to gain a well informed and fair representation of their subjective realities. I gathered data using semi-structured interviews to develop value creation stories and conducted participant observations and document analysis to track the learning experiences of the participants of the members of the experience (farmers, extension officers and involved organisations).

4.4.3 Findings

As already shared in Chapter 3, the findings were presented following the value cycles with key findings within each cycle:

- **Immediate value**

This is generally not observed as soon as farmers join the programme, because the farmers and extension officers alike tended to be sceptical about agroecology, the amount of labour involved, and the yields. In fact, in many cases, before demonstrations of value are available, the immediate value of introducing the ideas of agroecology, which run so counter to the conventional wisdom of what profitable, progressive farming entails, is non-existent. After some time, however, farmers seem to see immediate value through demonstration sites, farmer-led training approaches, and through realising that this is in fact an old or indigenous way of farming; this led to increased sign-up, payment of joining fees, and recruitment of others into the network.

- **Potential value**

The growing demand for training created potential value for Zingisa; sending participants on international study tours create confidence in the agroecology methodology as one is able to see how others were successful, in a range of contexts, after some time. The increased interest led to the growth of the movement which now has 2 700 farmers, thereby widening the seed sharing and learning network. Participating in negotiations and experimentation creates potential value for farmers as they can see what works in their contexts. Potential value was also achieved when Zingisa negotiated access to land for farmers and convened farmers to work together to access markets. When a plan to form agroecology co-operatives backfired, some potential value was not realised, and the experience was a learning opportunity to see what works and what doesn't.

- **Applied value**

Farmers achieved applied value when they used the training and member networks to start collecting and storing seeds, try inter-cropping and mulching, producing vermicultures and reducing artificial fertilisers. However, the type of land tenure influences the application of the acquired knowledge. For example, in Mdantsane, farmers who acquired knowledge about the importance of building a water reservoir and planting trees cannot implement these ideas because they occupy the farmland temporarily and the land can be repossessed by local authorities at any time.

- **Realised value**

For the farmers, value was realised when they reaped healthier crops and reduced their input costs and used their finances to address some of their needs, and also, when they gained better access to markets. Throughout the fieldwork, there was evidence of realised value in terms of good quality harvests and healthy crops.

- **Enabling value**

The activities of the movement are enabled by the funding Zingisa received from the Ford Foundation. In turn, Zingisa enabled these values for farmers by taking a farmer-led learning approach which gives farmers the freedom to conduct farm research and share lessons. Farmers themselves enable their positive experiences through their labour, commitment, and willingness to work together. Enormous enabling value is created by funders who donated financial resources and tools, as well as partners who coordinated further learning and built social cohesion and solidarity. Connecting agroecology with traditional or indigenous ways of farming is also enabling, as it creates a sense of comfort and connection. However, Zingisa was also quick to note that not all traditional practices are being perpetuated; some are being challenged (e.g. use of non-scientific seasonal predictions and non-use of record keeping) and this is an example of a reframing value: farmers can identify with how farming has traditionally been done but are also supported to try out something new. This is potentially far

more empowering than training strategies that suggest to farmers everything they have done before is wrong, and everything that they already know is useless (with the trainer, government or NGO being the sole source of necessary knowledge and resources). Shifting towards becoming self-reliant is an important reframing for farmers; it is certainly a very important achievement (realised value) for Zingisa, who would like to see farmers supporting each other, but not relying exclusively on authorities or NGOs like themselves (i.e., overcoming debilitating dependence, developing agency, while recognising that farmers can also never solely rely on themselves).

- **Orienting value**

Zingisa provides support with working with the principles of agroecology in various contexts. These include low inputs, integrated pest control, working with nature (we don't kill insects, we control them) and striving for more self-reliance while also working with partners and other farmers. Another very important orienting and enabling value is Zingisa's methodology for engaging with farmers, and their way of work, which allows farmers of different competences and background to support each other towards a common goal of food sovereign and good environmental care.

- **Transformative value**

Zingisa reframed their approach to establishing agroecology cooperatives, especially in urban areas where the members of the cooperatives meet for the first time during the formation of the cooperative making it difficult to establish sustainable working relationships. Further enquiry showed that the introduction of financial resources in an urban cooperative led to a conflict which resulted in women farmers being kicked out of the cooperative. Zingisa now works with family-based cooperatives where there are already existing structures that guide the functioning of CoPs.

- **Strategic value**

One can detect in the way Zingisa is reframing the principles of agroecology that strategic value is also being created. By pointing out that agroecology captures carbon in the soil, reduces the need for fossil fuels and mining of phosphates and nitrogen and reduces methane and other forms of greenhouse gases, networks like Zingisa can tap into climate change funding for the benefit of farmers who have long been marginalised by commercial agriculture, as outlined in the introduction, and also adversely affected by climate change.

4.4.4 Conclusions and contributions

The key informants are of a view that agroecology can transform agriculture and rural livelihoods, and they pointed to the changes in attitudes towards home gardens and the changes in social and cultural boundaries as evidenced by the movement's success in acquiring land from the local traditional leader

for women farmers. To see whether these women farmers and families have experienced a transformation, one would have to engage more closely with them, and this will be the subject of further research. Suffice to say that based on this evaluation, there is evidence of the transformative power of agroecology in the value-creation narratives analysed here. The findings confirmed some of the findings in Paper 2 on the effects of external interference on delicate CoPs. Boundary within and between CoPs is a source for new learning and new practices, the boundary crossing into CoPS and the changes that come about as a result, may disturb the functions of the CoPs. New technology and unguided resource investment into CoP may disrupt the community, shift the domain, and eventually disintegrate the CoP. Urban CoPS are not working as well as rural CoPs. CoPs and social learning spaces are more sustainable in situations where they have limited outside interference and when they are built based on existing power relations.

4.5 Paper 4: Case study evaluation findings interpreted through a gender lens

Provisionally accepted for publication: *Agenda*

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Title: Women farmers leading and co-learning in an agroecology movement at the intersections of gender and climate

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> Chanyau contributed 70% of the paper through the article's conceptualisation, data collection and interpretation and drafting of the article. Rosenberg contributed 30% by critically reviewing the article and offering guidance for the presentation and identifying a suitable journal.

4.5.1 Background

This paper builds on the three preceding papers. It adopts the social learning theory identified and used in Paper 1 and Paper 2 and the evaluation framework adopted in Paper 3. Although the paper builds on Paper 3 and adopts a feminist approach, it is more interested in the experiences of the involved organisation and extension officer as they facilitate learning in a social movement on agroecology. In diagnosing the problems, the paper shows that black women in the Eastern Cape Province of South Africa farm against the odds of historical intersectional inequalities continuing into the present: limited access to finance, insecure land tenure, little bargaining power and unequal access to water, the latter being exacerbated by prolonged droughts in the region, that render food security and income generation activities even more marginal. This paper was particularly interested in the women farmers' access to social learning spaces and knowledge about climate change. Other

research showed that traditional extension services are often inadequate in scope and inappropriate in focus and methodology, centring on the top-down dissemination of an industrial agriculture model that takes neither the on-the-ground realities of resource-constrained farmers nor climate risks into account. This paper shares the case study of an agroecology movement that, by contrast, promotes climate-appropriate, low-cost farming practices that are tried out and further developed by the farmers themselves. Dominated by women farmers, the movement responds directly to their needs and not only allows for but requires co-learning and co-construction of new knowledge – that is social learning. The paper concludes that the movement is responding to many of the inter-sectional challenges that women farmers face and that its social learning approach holds much potential for expanding women farmers' ability to provide for themselves and others, despite the challenge of climate change.

4.5.2 Methodology

The paper utilises the same ethnographic data gathered for Paper 3 in the Buffalo City Metropolitan Municipality. The data collection methods consisted of:

1. Document analysis to gather information on the background and impacts of the Zingisa Education Project;

2. Participant observation of the farmers and other movement members in social learning spaces and the agroecology plots, providing a vantage point on real-time farmer learning and farming practice

3. Ten value-creation 'storytelling' interviews in English and isiXhosa conducted with the help of a local research assistant. The 10 interviewees consisted of two extension officers, one man and one woman who spearheaded the movement, two representatives of partner organisations, five small-scale women farmers and one male farmer. The participants varied in terms of their forms of land tenure, number of years in the movement, skills and specialities, roles in the movement, and location in the Amathole District. Research participants were purposefully sampled when they were shown to be knowledgeable about the movement and its value for farmers. A key informant familiar with the movement and aware of other considerations such as physical accessibility, language, safety and security, assisted with their identification.

We utilised a deductive data analysis approach to make sense of the data, code it and develop themes to share and discuss the findings.

4.5.3 Findings

- The case study of the women's movement on agroecology shows the effectiveness of social learning in drawing the interests of small-scale women farmers and ensuring their effective participation.
- Emancipatory and contextualised learning approaches are important in gradually addressing embedded social cultural practices that limit women's capacity to attain the differences they care to make.
- Extension services should leverage the utility of CoPs to address the diverse needs of farmers of different competencies, resources and land tenure systems, especially in the context of unforeseen socioecological challenges.
- Showcasing examples of quality case studies of successful women leadership in agriculture is essential in enabling example-based learning, lobbying for the effective representation of women of diverse contexts in decision-making about learning and resource access and in shifting the framing of women farmers only as victims and survivors.
- Group learning and communal agroecology plots are conduits for experimenting with new inventions, allowing farmers to learn collaboratively in groups and helping minimise widespread losses through risk pooling.
- Transformative value from women farmers' effective participation goes beyond agriculture into other development spheres. Therefore, if development policy discourse is serious about addressing food system issues, the fair inclusion of women in decision-making and in accessing information should be considered.
- Collaborative learning and practices stimulate social cohesion, which is key in improving the precarious position of women farmers, pushing the social cultural boundaries, and executing labour-intensive tasks and bargaining power.

4.5.4 Conclusions and contributions

With contextually grounded and collaborative learning methodologies, extension services in social learning spaces have a good chance of helping farmers create value for themselves and their communities. However, it is not only the existence of the movement or access to extension services that has enabled women farmers to attain the differences that they care about – improved climate adaptive capacity and sustainable agricultural practices, but the importance of effective social learning that accommodates farmers of different competencies and encourages learning and practical collaborations among them to address individual and collective socio-ecological challenges. There is a

need for extension services and the involved stakeholders to shift the discourse on women farmers from the problematic framing of women as either victims or as survivors and to see them as drivers of sustainable societal change.

Chapter 5: Key study findings and implications for further studies and policy

5.1 Introduction

This study has given me the experience that I had hoped for, allowed me to reflect on my positionality and conduct research on a topic I care deeply about. I am more confident that I can articulate the learning experiences of small-scale women farmers, based on having done so in Raymond Mhlaba Municipality and Buffalo City Metropolitan Municipality, specifically regarding the learning landscape, as well as the relational structure among farmers, extension services and other stakeholders. In this final section of the thesis, I share a reflection on my experiences, the research process and the key findings and discuss their possible implication for policy and future studies. Thus this chapter will close the thesis by taking the readers on a shared reflective journey through it.

5.2 Theoretical and practical considerations for future research

5.2.1 My experience of working with a combination of theories

The use of the two theories was useful for gaining in-depth understanding of the two cases. The CoP framework was essential in mapping out the learning and practice landscape, showing who is doing what, with what intentions, under what conditions and in collaboration with whom. Relationships among farmers and between all the stakeholders were clear, showing the flow of resources and knowledge in the learning and practice landscape. However, because of the nature of learning due to the COVID-19 pandemic and the subsequent increase in technological adoption in farmer learning, the concept of CoP did not have the most effective tools to trace all the learning, and this is where SLT became instrumental. Social Learning Theory was effective in tracing the fragmented learning that happened within and outside the existing communities of practice, and the sudden and extensive shifts in the CoP boundaries especially in the context of the COVID-19 pandemic and the associated social restrictions. With SLT the changes were evident in knowledge and learning centrality, as farmers, especially young farmers with better technological tools, had more access to information that they could easily store, share and re-use while those with limited access, especially the elderly, continued to rely on traditional interactive face-to-face learning which was heavily affected by the pandemic.

However, although the two theories managed to surface a great deal of data and the conflicts in cooperatives and contradictions, because of a certain degree of incomprehension and the irrelevance of some of the information shared, the two theories that I adopted did not offer tools to investigate

these conflicts and contradictions further beyond the level of knowing that there were conflicts and that conflicts affected progress but also offered opportunities for learning. It would have been helpful to have a theory or a methodological approach that would provide a more nuanced understanding of the conflicts; how they affected learning and possible interventions for conflicts.

5.2.2 Practical utility of VCF

For sustainability education, the study tested the utility of the Value Creation Framework, an evaluation framework with a prominent place in business literature (Wenger-Trayner & Wenger-Trayner, 2020). By doing so, the study has contributed insights into how the framework can be adopted to design, implement, and evaluate lifelong learning projects. From my experience with the VCF in my PhD and my other work as an early career monitoring, evaluation, research and learning (MERL) practitioner, I discovered that the VCF appears to work well when conducted in an ethnographic way because people's value creation stories are often connected to their physical environment, the artefacts and their interactions with other people; these stories do not always surface when the story is told in an environment divorced from the stories being shared or in a telephonic interview as was my experience with one of the interviews. However, from experience, this approach generates a vast amount of qualitative and quantitative data that needs to be included and triangulated for the value creation stories to be not only complete but also representative of the experiences of the storytellers.

I would argue that the pervasiveness of CoP and SLT were well complemented by the VCF which is also a semi-structured framework for participants to tell stories (in their own terms) about their experiences and the differences they made even beyond the learning space or their communities; this outreach is important because learning spaces and CoPs are part of a comprehensive social system that involves other communities (Wenger, 2010, p. 3). This is the most critical tool in the VCF toolkit; it sets it apart from other common evaluation frameworks that are only interested in direct changes within a project space and within a specific time frame. For example, a key part of indirect social learning emerged from the story of Zingisa: communities were learning from other communities about their agroecology projects and some community members were learning through distant observations as they passed agroecology centres and noticed their activities, they developed an interest and some established their own agroecology gardens. VCF acknowledges the importance of the changes in the learning space; however, it sees the learning space as part of the broader community and for emancipatory changes, we should understand how the learning space interfaces with the bigger community. For the future, it would be of interest to trace these indirect connections to see the

causality between these projects and Zingisa. It would be helpful to examine if there are innovating approaches that could loop back into Zingisa for improved practices.

For scholars and practitioners who read this thesis and develop an interest in using VCF in evaluating their projects, I found VCF to work better when the research process is well planned with all involved parties aware of the functioning of VCF and the philosophy behind its use. In the value creation interviews, it is important that the researcher is nimble and picks up on 'triggers' to help construct a full story (Wenger-Trayner & Wenger-Trayner, 2020, p. 219). My language limitation did not allow for this; the gap in terms of time lapse and the translation processes meant losing some of the key nuances of the participant stories. I noticed during some of the interviews, that sometimes there are no alternative English words. I tried to remedy the language barrier and the gaps in the translation, by recruiting an isiXhosa transcriber to make corrections and ensure clarity and coherence in the transcripts. I then followed up with participants for clarity and more information. The experience showed me that translation in research goes beyond converting words to include these nuances, and non-verbal cues like eye contact, sighs, and head shaking are essential.

5.2.3 Importance of thorough contextual profiling and flexibility in community research

My experiences from conducting the field work made me realise that when working in a community, it is important to have a key informant and the research assistant who are aware of the community dynamics and are well known by the potential participants; this is even more pertinent in ethnographic research. Similarly, Wenger-Trayner and Wenger-Trayner (2020) advised that the research facilitators and assistants must know VCF well and must have a good understanding of the research context. As shown in Chapter 3, my research assistant in the first case study was not from the community with whom I was working and although I had briefed him about the study and the framework, the lack of contextual understanding of the case study area made the translation lose some of the key features of the stories shared by the participants. Having a local research assistant with the background knowledge of the community and other contextual realities is very important in research because of three key reasons that emerged from my experiences in conducting this research:

- They are aware of the potential participants' seasonal activities. Knowing this in advance is important in identifying their availability. In some cases, during my field work, it was difficult to arrange for interviews or to travel to meet the farmers because of inaccessible roads after the rains. Farmers are also generally not available for research work at the onset of the planting season.
- They know the use of community-specific metaphors which are key for creating a conducive research engagement that allows participants to participate fairly and effectively and to draw

connections between the research focus and their practices. For example, using words such as 'learning' and 'education' during the interviews presented some challenges. The terms had different connotations to the participants from my understanding of them; traditional understandings relate these words to a one-way movement of knowledge from a knowledgeable person to the learners and some participants found the terms condescending. To remedy this, I used words such as 'training', 'engagement', 'co-learning', 'learning together', and 'knowledge sharing'; these were translated or explained in isiXhosa.

- Local community members identify with a local research assistant, and this is key in trust building which is vital for full participation and good quality data. They also understand the local dynamics, the social cultural expectations in each area and they are aware of any safety concerns. For example, in the second case study, the research assistant alerted me to the volatile security situation in one of the communities I wanted to work with and we found safe ways of working together by holding the interviews far away from the community (though this which made it difficult to complete their story and for triangulation because the data was limited to stories with observations).

However, it is imperative that researchers prepare the research assistant for the field works in terms of their understanding of the subject matter and the importance of good translation and facilitation of group interviews. Practising this would be in line with emancipatory research work that avoids perpetuating 'helicopter research' where participants and communities are passive participants not involved in data collection, review methods and findings. I involved the participants and their communities by working with key informants, using remunerated local research assistants, and participating in mutually collaborative and synergistic activities such as seed sharing, meetings, and training. During these meetings I continuously asked for permission to take photos and voice recordings and explained their importance to the study. Following Haelewaters et al.'s (2021) advice on respecting local written and unwritten rules and norms and the importance of guidance from locals on how to navigate these rules and norms, I always took the advice of the participants and key informants on the framing of questions in the pilot stage and in deciding on contextually relevant reciprocation, connected to my positionality and trust building which is key in ethnographic research approaches. The advice of my key informant was critical in, for example, adhering to the cultural practice of providing refreshments whenever one brings participants together for group interviews or meetings.

5.2.4 Deciding on whether to use pseudonyms in research

Chapter 3 reported that although all the participants agreed for their names to be used in the study, one of the participants (Nkuli) firmly requested for her actual name to be used. Unlike with other

participants who agreed to the use of their real names through the consent form, Nkuli's case was unique in that it emphasised what Saunders et al. (2015) described as the need for a balance between protecting participants and preventing loss of ownership of their contributions to the research and the phenomenon under study. The case reiterates the importance of consulting the participants about anonymisation when conducting social research rather than simply assigning pseudonyms; this is important for building trust as it gives the participants the opportunity to decide how they want to be identified in the research. Nkuli's request speaks to the ongoing debate on when and how to use pseudonyms. I have seen that it is important that participants reserve the rights to decide how they wish to be represented in published research outputs (Allen & Wiles, 2016; Lahman et al., 2022).

5.2.5 Combining university community outreach with research work

As shared in Chapter 4, during my field work I noted the interest of both participants and non-participants in wanting to know more about Rhodes University. For some it was curiosity, while others were considering enrolling at the university. It would therefore be worthwhile for the University's community engagement department to provide students conducting field work with pamphlets or brochures they can give out during their interactions with the communities they work with. This would also help communities to understand the importance of the research and their participation and would also work as a contextually relevant reciprocation.

5.3 Key study findings and implications for policy

According to the participants in this study, the government and other responsible authorities are aware of what needs to be done to help small-scale women farmers improve their practices considering climate change. The authorities are also aware that supporting small-scale farmers does not present a trade-off with other support initiatives for women. This is also evidenced by the huge number of local and international policy documents and policy frameworks related to small-scale farmers indicating that government, at least on a theoretical level, understands the plight of small producers and that they need different kinds of support compared to large-scale producers (African Centre for Biodiversity, 2015). The following are examples of some of the existing frameworks: the Strategic Plan for Smallholder Support (SPSS), Draft Conservation Agriculture Policy, National Strategy For Indigenous Food Crops, National Extension and Advisory Services Policy, among others. The study's main thrust was on highlighting case studies of the success of women-led projects in a localised context, with the hope of inspiring wider action with broader transformative value because CoPs are not exclusive to farmers but also involve other key players (Mukute & Lotz-Sisitka, 2012), and they are part of the broader community in which they are located; as such while it is a local case study, the

focus is on the broader landscape. Below, the key recommendations arising out of the study are shared and discussed, showing how various entry points for policy can stimulate broad effective change for effective learning and practice among small-scale women farmers.

5.3.1 Design and implement targeted learning approaches for farmers of varying needs

Technology-based learning and social media platforms are increasingly championed as a solution for quick transmission of information for disaster preparedness and wider reach. This study showed that the existing community of practice and its adoption of digital platforms of learning and knowledge sharing has exposed farmers to real-time peer and expert support. The platforms have expanded the communities of practice beyond the Eastern Cape to include regional and global partners who share insights and resources for better practice. However, the study found that the adoption of these new learning methods expanded the digital gap among member of the CoPs with young farmers more competent to effectively learn through digital platforms, while the elderly farmers have limited access and competences to exploit digital learning opportunities. As such I argue that the effectiveness of social media as a learning tool lies beyond people downloading applications, and beyond the number of people joining the learning groups and the number of 'clicks' or website visits, or the amount of information uploaded; it lies in the effective learning of the small-scale farmers that are part of these groups. Lessons can be drawn from a case study by Weitzman et al. (2021) on Brazil's *Semear Internacional* Program (PSI), which adopted agroecological logbooks as a political-pedagogical tool for training rural women. Their approach was based on four components: knowledge management, monitoring and evaluation, communication and South-South and Triangular Cooperation and Policy Dialogue. The four facilitated rural women farmers' access to contextualized knowledge and innovations through co-creation and co-learning processes to address issues that include access to markets, practice of agroecology, gender, gastronomy and sheep and goat farming with the produced practice guidelines disseminated for good practice.

Therefore, contextual considerations should be made on how the information is packaged, how it is distributed, how farmers access it, how farmers interact with it and a follow-up should be made to measure its contextual relevance in practice. Therefore, extension services should ask themselves, what else is needed besides knowledge and for effective learning to happen? I suggest a combination of farmer-centered learning methods that looks beyond the common success indicators but also consider the experiences of the farmers and their communities.

The importance of targeted learning and practice interventions was emphasised in both cases studies. The study found that farmer-centred learning approaches are effective in accommodating farmers of

different competences, learning and resource capacities. Farm visits by extension officers to monitor progress are effective in developing a shared rapport among famers, which is essential in stimulating and nurturing farmer-to-farmer learning support. The success of educational interventions in climate change depends on how they are designed and connected to the local, tangible, actionable aspects of sustainable development, climate change and environmental education (Anderson, 2012). Towards this, farmers and stakeholders may consider working towards equal partnerships. Consultative research on farmer needs may need to be conducted in advance with farmers as leader researchers to ensure their collective and individual realities and preferences are taken into consideration in the planning and implementation phase. Higher rate of acceptance, adoption, ownership, and success of interventions are associated with interventions that start at what the farmers know and then build on their knowledge and experiences where relevant and desirable (Aarts et al., 2014). As such, there is a need for experimental farms that act as conduits for new technologies to allow farmers to collectively create applied value for involved members and innovation can help minimise widespread loses.

5.3.2 Emancipatory learning for effective women farmer representation in decision-making

As was the case with the use of technology, the study showed that the emancipation of women goes beyond mere inclusion of women to offering them spaces in discourses pertaining to their livelihoods. The importance of learning as an effective emancipatory tool was evident in both the case studies. In Raymond Mhlaba local Municipality, women were leaders in their learning communities and have been responsible for most of the success in their farming practices. In the Buffalo City Metropolitan Municipality women's awareness about the possibilities of adaptative agriculture as a fundamental aspect of their well-being yielded transformative results such as less dependence on government and NGO support and healthy living because of improved diets, among others. However, it is not only a matter of learning; emancipatory learning methods need to be adapted to ensure that the learning preferences and contextual needs of the involved farmers are taken into consideration – you don't have to just farm, you have to farm differently.

It is evident that women's involvement in leadership and decision-making, especially on affairs pertinent to access to land and extension services, is still lacking. There is a need to consider effective inclusion of women and other marginalised groups in the decision-making about their learning needs and their preferred methods of learning and other related topics such as land use planning, livelihood enhancement, water and other natural resources management and development initiatives. By doing so, adaptation becomes part of the broader social, economic, and political forces that shape local development initiatives and is attuned to transformations in the geo-political systems (Nightingale, 2017). However, this process may need to pay attention to the challenges that climate change

presents in the struggle for equality by adopting an approach that ensures equal and effective participation of women and men in decision-making, because inclusion alone is not enough. While there is no consensus on the percentage of inclusion needed for effective representation and on what works between 'threshold representation' and 'critical mass' in decision-making processes (Doss et al., 2018), women advocacy groups such as Rural Women Assembly may help women farmers with representation that works for them. In this process, their varying needs and knowledge must equally be taken into consideration and incorporated into policies to ensure the removal of the constraints that limit women's effective access to resources (Skinner, 2011). The study found that small-scale farmers are not a homogenous group; they have different competences and needs. As such, the farmer learning and training programmes may need to be tailor-made at least to the needs of farmers of similar profiles.

5.3.3 Streamline extensions services to socioecological changes

The common themes in the poor performance of extension services lie in their poor access to resources. However, the study found that their training methods, especially on the use of technology, are also problematic and there is a need for contextualised training that matches the needs of the farmers with the need for flexibility to deal with new socio-ecological challenges through learning together with farmers. This should complement or replace the approach of r transmitting information from researchers to farmers, whichcan have a detrimental effect, especially regarding the adoption of new knowledges. The story of Zingisa as shared in Paper 3 and Paper 4 showed that Zingisa experienced challenges because farmers, and other extension officers using conventional training and practice methodologies, could not understand the utility of agroecology in the context of climate change. However, Zingisa was flexible in taking a gradual learning approach that accommodated opposing ideas until the farmers saw that the new proposed methodologies were producing good results and were what was needed in times of climate change; this is how the idea of farming differently was accepted and the attachment to conventional ways of farming was loosened.

In an era of unpredictable socio-ecological variability, as was the case with the COVID-19 pandemic, and increased shifts from subsistance farming to market oriented production. Stakeholders in agriculture could consider the findings by Davis et al (2019), they proposed new approaches to aimed at productivity and profitability as the highest extension objective, followed by increasing farmers' knowledge through training. These changes could be nurtured through what ,Worth (2018) refered to as Agriflection. A reflective practice that would lead to the re-definition of extension, revising the assumptions on which the current definition rests towards a a learning model that shifts i) the context

and locus of learning, ii) what is learned, and iii) the learning process. The model proposes a culture of continuous reflective learning as the highest purpose of extension. and is in tune with contemporary socioecological approaches pertinent to sustainable engagement with smallholder farmers in scientific discovery, innovation and technology development based not on what they lack, but on what they have. This model is closely tied to the practice of agroecology in climate vulnerable areas explored in this thesis.

The study showed that climate change did not form part of their curriculum in pre-service training and they were only introduced to it passively in in-service courses. This was despite climate change being the most concerning issue for agriculture and general development because of its interconnectedness to other key features of the development agenda like health (Hawkes & Ruel, 2006) and security because food can be considered a national security issue (Eiran et al., 2021). Additionally, human resources in extension services need a thorough assessment in terms of the number of active officers, the size of their catchment areas, the learning and resources needs of their clients and the resources available to them.

The effects of climate change are evident especially through deagrarianisation, and there is an increased appreciation of the important role played by small-scale agriculture in sustaining livelihoods including in urban and peri-urban areas as evidenced by new urban farmers claiming unused open spaces for community gardens, attracting more community participation, interest, and support from the local authorities. However, this development has further strained the already struggling extension services in the province who now need new ways of engaging with this emerging type of farmer with different needs and may need different learning approaches. To scale up urban agriculture a new approach to extension services is needed; this may require extension service providers to consider different training methodologies. Because extension services are already overstretched, it thus makes sense to channel the limited capacity towards making CoPs and social learning spaces for effective farmer-to-farmer learning that can operate with limited input from the extension services. It may also be worth the extension services investigating the learning and practice experiences of urban farmers considering the issue of land tenureship and that limited farming spaces restrict the application or relevance of the knowledge and skills they share with these farmers. The approach may require curated innovative ways of increasing productivity on limited farming spaces to improve household income in times of increased economic challenges and its associated effects like unemployment without compromising the urban ecosystem. Extension agents need to encourage and take advantage of leading and emerging urban farmers and help them expand their knowledge and service networks

as mechanisms to expand and sustain their reach and help them negotiate institutional arrangements to operate sustainably and profitably (BenYishay & Mobarak, 2019).

5.3.4 Leverage on the utility of CoPs in farmer learning and practice

This study showed that existing communities of practice and social learning networks have registered successes in filling the gap in extension services. Therefore, improvements in extension services may need to be supported by strengthening the functioning of communities of practice to support social learning, building on their achievements so far and the experiences of the participants. Additionally, although CoPs are commonly described as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly, the reason the community comes together can also be an incidental outcome of member's interactions (Wenger, 2011). The findings in this study have highlighted the versatility of CoPs, thus extension services may need to exploit the adaptability of CoPs to create sustainable solutions relevant to the participants' contexts and changing realities and limit the demand for extension officers through supporting and training CoP members who then become peer trainers – the incapacitation of extension services will be exacerbated by climate change, hence the need for functional CoPs. This approach is important especially during disasters and in post-disaster situations such as the COVID-19 pandemic. However, more research needs to be conducted, especially regarding ways to make CoPs sustainable in changing realities and in cases of external influences. For example, in the second case study the disintegration of a cooperative that was working as a CoP when the government poured in financial resources resulted in serious conflicts. The findings speak to the importance of being careful when interfering with the functions of CoPs, as good intentions, adding resources like knowledge and money may threaten existing working relations. CoPs should ensure that the contextual realities of their members are always considered to allow full participation for all members.

5.3.5 Underscore quality case studies of women leadership in agriculture for example-based learning

The generalisation of women farmers' experiences through aggregated statistical conclusions and urban biases in understanding women's social positions masks cases of impactful women leadership at subnational and national levels (Nelson & Stathers, 2009). Most of the preceding studies shared in this thesis showed a common consensus regarding women's vulnerability to climate change and the compounding effects they face due to their social cultural position and responsibilities. However, the study has highlighted community level cases of successful women leadership in their learning and practice networks. Women are often running the development agenda of their communities and they

are being recruited for improved social cohesion and bargaining power to address their vulnerabilities to sociocultural norms and the general threats faced by small-scale farmers. It is important for future studies to raise awareness of these evidence-laden success stories for them to act as inspirational quality case studies of climate change adaptation and for them to generate transformative value beyond the agricultural sector and to spark change in other spheres of development. In a world facing so many challenges, there is a need for positive news, especially around women farmers who are often portrayed as victims, to share their contribution to just and resilient food systems. This is a paradigm shift from climate vulnerability narratives with connotations of hopelessness, fearmongering, and guilt tripping; women are in fact very effective in sparking action and behaviour change (De Meyer et al., 2021) towards positive solution-based narratives that help farmers realise their potential to learn and apply new practices that generate better outcomes in times of climate change and other challenges.

Research on women in agriculture often portrays agricultural work as mostly a burden for women; for example, Raidimi (2014) found women in Sub-Saharan Africa provide an estimated 50% to 80% of agricultural labour, Palacios-Lopez et al. (2017) claimed that globally women make up 43% of the agricultural labour force, and Njobe (2015) approximated women participation to be around 50% of the agricultural labour on farms in Sub-Saharan Africa. The varying percentages on women labour portray the varying contexts in which women participate in education. Similar to the findings made by Doss et al. (2018), on the positive collaborations between men and women, the present study found that women and their male counterparts work together with men being responsible for most of the labour-intensive parts of the agricultural labour especially in the land preparation stages. Therefore, there is a need for evidence-based data that describes the actual needs of women farmers to enhance their productivity, rather than relying on generalised data. However, as was the case in the second case study as shown in Paper 3 and Paper 4, the leadership role of women or even their equality within CoPs, is not fixed and can be disrupted with the injection of money or new practices that are not collectively accepted.

5.3.6 Need for training on conflict management in cooperatives

Agrarian communities in southern Africa are facing resource constraints that impact their livelihood, and climate change adds to these stressors (Reid & Vogel, 2006), as was shown in the first case study area where two government departments did not have a shared approach to water usage, resulting in a disservice to the farmers who would benefit more from the collaborated efforts of the two departments. Climate change affects all sectors of society and impinges differently upon different lives; in agriculture, there is complexity due to contesting priorities and the uncertain conditions in which the farmers must balance between producing for self-consumption and earning a living (Carr &

Thompson, 2014). Poor responses to climate change may make the situation worse, and as such, the design and implementation of new measures to improve resilience and adaptation ought to be preceded by taking stock of the existing interventions to understand what has worked or not worked and find reasons for this (Reid & Vogel, 2006).

Conflicts are inherent in communities of practice among individual participants because of differences in preferred practices and between organisations in terms of approaches to farmer support and contestations for resources. However, the study showed that although they in most cases produce negative value for the participants, they are potential sources of new learning. In the context of the study, there is a need for organisations working in agroecology and women's affairs to understand their learning needs and co-create improved practices that build on the registered successes of local agricultural programmes. There is a need for more advocacy and capacity mobilisation to raise awareness on the role of women in agriculture and the need for improved access to land, information, resources, and fair markets.

5.3.7 Systemic interventions to transform the agriculture sector

While climate change is one of the biggest threats facing small-scale farmers, the current urgent need is to transform the hostile environment within which small-scale producers, especially women farmers operate, regardless of their production methods, in their struggle for technical and infrastructural support and to participate in viable and fair markets (African Centre for Biodiversity, 2015). Farmers and extension officers in the study noted the need for more training support in resource management, market access for farmer cooperatives to be more sustainable. The unequal South African food system has all the symptoms of the inequities and challenges in the global system that has been exacerbated by dispossession of land under colonialism and then apartheid, globalisation. Deregulation of agriculture post-1994 has also contributed to a dual agricultural system that benefits commercial famers with access to resources and markets while supressing poorly supported smallholder farmers whose immense contribution to the food systems is missing in the economic development discourse (Black, 2016). There is a need to support existing farmer cooperations to learn from the positive and negative values they have generated to inform better practices and lobby for fair markets.

5.4 Summary

Overall, this study concludes that effective emancipatory climate change learning for small-scale farmers will lead to no-regret adaptation that will strengthen their resilience to unforeseen and abrupt socio-ecological changes and will improve their agency to deal with their daily socio-ecological

challenges and the challenges of their communities. Among others, the key findings and recommendations are summarised below:

- Women farmers are already aware of climate change, but extension officers are lagging and NGOS are stepping in
- There is an increase in deagrarianisation, but there is also an increase in farming in urban areas and there is an urgent need for extension services in these areas. However, the extension services are already overstretched and there is a need to rethink extension services methods in these communities because these are new farmers and their land tenure is complicated.
- CoPs are compensating and complementing extension services; therefore if CoPs are strengthened, extension services are also strengthened.
- Farmer-centred approaches are important in creating value for farmers as they are rooted not only in the needs of the farmers but also in those of the wider community.
- The digital divide is a reality, and younger farmers have more access to information while their elderly counterparts are struggling to access and comprehend digital knowledge information on agriculture.
- Farmers, including women farmers, are not homogenous: some have high level of agency and some do not, therefore there is a need for a nuanced approach to extension services which goes beyond just inclusion.

As cogently shared by Wenger-Trayner and Wenger-Trayner (2020) in the quote below, I believe this whole research process has empowered me to provide space for participants and stakeholders to reflect on their experiences and make some differences or at least to think about making differences in their practices:

> The difference that learning enables participants to make does not have to be appear big or dramatic, part of a grand vision or strategy. It can also be small, local, inchoate, and incremental. Even if participants' aspirations target something big to start with, getting there is likely to take a succession of small steps, an accumulation of small differences. And conversely, an accumulation of small differences may also lead to a bigger and unforeseen difference. (p. 13)

I believe this thesis carries with it potential value in the context of my study and in other contexts and I hope it will stimulate an inclination in others to try something different towards the difference they care to make.

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Appendices

Note: The format of Papers 1-4 differ in Appendices 10-13 as they are included in the format as required by the journals to which they have been submitted

Appendix 1: Access letter

RHODES UNIVERSITY
Where leaders learn

REQUESTING PERMISSION TO CONDUCT RESEARCH WITH YOUR EXTENSION OFFICERS

3 Croft Street
Makhanda
6139
Date:…….

Dear Ms/Mr

RE: REQUESTING FOR PERMISSION TO CONDUCT RESEARCH

My name is Ludwig Chanyau. I am a PhD scholar in the Environmental Learning Research Centre at Rhodes University under the supervision of Professor Eureta Rosenberg. My PhD aims to evaluate the experiences of emerging women farmers as they engage in climate change learning. The study will be conducted in the Eastern Cape province. The objectives of my study are as follows:

- Synthesise the conceptual framing of social learning for farmers in the context of climate change
- Articulate farmers' climate change learning experiences in social learning spaces.
- Examine the factors that shape farmers' social learning and climate change adaptation.
- Develop a coherent social learning and practice framework that would create significant value for emerging women farmers in the context of climate change.

I am seeking the participation of your extension officers in this study. To assist you deciding on my request, I am attaching the following documents:

- Ethical clearance letter from Rhodes University
- The research instruments to be used for data collection.

The full study is expected to run between 1 November to 31 December 2021.
If you have a question or concerns about my research, please feel free to contact my supervisor on the following contact details.

Phone number: 046 603 8389 Email address: e.rosenberg@ru.ac.za

For research ethics questions and concerns please feel free to conduct Rhodes University's Ethics Coordinator on the following contact details:

Rhodes University, Research Office, Ethics
Ethics Coordinator: ethics-commitee@ru.ac.za
t: +27 (0) 46 603 7727 f: +27 (0) 86 616 7707
Room 220, Main Admin Building, Drostdy Road, Grahamstown, 6139

Thank you for taking the time to assist me in my educational endeavours.

Yours sincerely,
Ludwig Chanyau

Appendix 2: Participant informed consent

INFORMED CONSENT DECLARATION

Project Title: Learning to make a difference: Two case studies of small-scale women farmers in learning spaces for climate action in the Eastern Cape province of South Africa.

Ludwig Chanyau **(Student Number 20c1118)** from the Department of Education, Rhodes University, has requested my permission to participate in the research above nature and the purpose of the research project. This informed consent declaration has been explained to me in a language that I understand.

I am aware that:

- The research project aims to evaluate the climate change-related learning needs among emerging women farmers in the Eastern Cape Province of South Africa.
- The Rhodes University has given ethical clearance to this research project **(Ethic Approval Number,)** and I have seen/may request to see the clearance certificate by contacting M.r Siyanda Manqele (s.manqele@ru.ac.za).
- By participating in this research project, I will contribute to understanding climate change social learning spaces. The research will produce insights that will be useful in transforming our practices and our communities in general.
- I will participate in the project by narrating my experiences in the climate change social learning spaces and about the outcomes of my participation.
- My participation is voluntary and should I at any stage wish to withdraw from participating further; I may do so without any negative consequences.
- I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.
- There are no foreseeable risks of participating in the study. I may decline to answer any or all questions, and I may terminate my involvement at any time if you choose.
- The Principal Investigator intends to publish the research results in the form of journal papers, and I do not mind if my identity is revealed in the study as long as it is in line with the research ethics procedures at Rhodes University.
- I agree/disagree with the Principal Investigator's request to take photographs or video me as part of this research project.

- I agree/disagree with the Principal Investigator's use of voice recording of my comments and opinions during interviews.
- By signing this informed consent declaration, I am not waiving any legal claims, rights, or remedies.
- A copy of this informed consent declaration will be given to me, and the original will be kept on record.

I, ……., have read the above information / confirm that the above information has been explained to me in a language that I understand, and I am aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research. I have not been pressured in any way, and I voluntarily agree to participate in the abovementioned project.

Participants signature …….
Date ……
Place ……..

Rhodes University, Research Office, Ethics
Ethics Coordinator: ethics-commitee@ru.ac.za
t: +27 (0) 46 603 7727 f: +27 (0) 86 616 7707
Room 220, Main Admin Building, Drostdy Road, Grahamstown, 6139

Appendix 3: Interview schedule for emerging farmers

Monitoring and evaluation of climate change education

Introduction

Establish rapport: My name is Ludwig Chanyau, I am a PhD in Education at the Environmental Learning Research Centre at Rhodes University in Makhanda formerly known as Grahamstown.

Purpose

I am conducting a PhD study that seeks to understand the climate change learning experiences of emerging women farmers in the Eastern Cape province of South Africa. I have been referred to you by …….. who knows you through their work in ……My relationship with them is based on ……..

Motivation

The key objective of the present study is to evaluate the climate change related learning needs among emerging women farmers in the Eastern Cape Province of South Africa. The findings will contribute towards the improvements in climate change learning experiences of emerging women and farmers in general.

Time

The interview will likely take about 45 minutes

Consent Form

I have with me a consent form that explains in detail the purpose of my study and the ethical consideration that will be observed to ensure that your participation in this study does not have any negative impact on you and your farming practice ……..share a copy of the consent form and explain the details.

Demographic information:

1. Let me begin by asking for your name, surname and age?
2. What is your level of education?
3. Where is your farm located?
4. How big is your farm?
5. What kind of farming do you do?

Introductory

6. Talk me through your journey as a farmer?
7. What is your understanding of climate change?
8. How does climate change affect your farming practice?
9. How important is knowing about climate change to your farming practice?
10. How do you learn about climate change?

Formal training:

- Can you describe the kind of training you received?

- Walk me through your experiences of this training?
  Positive: What do you think were the reasons for your positive experience?

  Or both

  Negative: Can you describe the challenges that you faced?
  Did you raise the concerns with the trainers?

  YES:
  - How did you raise these concerns with the trainers?
  - Describe their responses to your concerns?

- Does the training relate to your knowledge needs in addressing climate change challenges in your practice ?
- Has there been any changes to your understanding of climate change as a result of the training?

Informal learning:

- Can you describe the kind of learning you receive?
- Walk me through your experiences in learning about climate change through that way?

- Does the training relate to your knowledge needs in addressing climate change challenges in your practice ?
- Has there been any changes to your understanding of climate change as a result of the learning?

11. Prior to the training/ learning you have mentioned, did you receive any climate change education?

- When was it ?
- What was your experience of that training?
- How did it relate to the training/learning experiences you mentioned above?

12. Have you formed any climate change learning connections with other farmers?

Yes:

- Who are these farmers (type of farming, location) ?
- Approximately, how many farmers in your connection ?
- What kind of information does the farmer in your connection provide?
- How often do you interact with these farmers?
- How helpful is this information to your practice?
- Besides fellow farmers who else offer you climate change learning support?
  In what ways do they offer the support?
  Has this support been helpful?

No:

- What are the reasons for not having climate change learning connections with fellow farmers?

13. Beyond face to face training or peer-connection learning do you have any climate change education learning material - (internet, books, pamphlets)?

YES:

- What kind of material do you have?
- How accessible is this material?
- Does it enhance your understanding of climate change?

NO:

- What are the reasons for not having access to the support material?

14. Overly, how has been your experience in implementing climate change interventions you learnt from CCE?

Positive: What would you attribute this success to?
Do these outcomes give you the confidence to learn more about climate climate change?

Neutral/ Negative: Describe the factors you would attribute these challenges to?

- Based on the challenges you mentioned, do you have the confidence to continue learning about climate change
- What kind of learning approaches would you recommend?

15. Thinking about your experiences before you gained knowledge about climate change education, has there been any changes to your farming practice?
(Farm size,crop type, water saving/ irrigation options, seasonal crops)

Positive: Describe the changes that have taken place?

- Are these changes helping you to move towards commercial farming (profitable practice)?
- How are these changes taking you towards that?

No

- Explain to me why there haven't been any changes?

Neutral/Negative:

- **Explain the reasons for the non-change/negative changes?**

16. What would be your recommendation for climate change education to help farmers towards :
    - Effective climate change interventions in your farming practice?
    - To emerging farmers for their collective good?

Thank you for your participation - Your voice will be heard and I hope measures will be taken for you to make the difference that you care to make.

Appendix 4: Interview schedule for extension officers

Monitoring and evaluation of climate change education

Introduction

Establish rapport: My name is Ludwig Chanyau, I am a PhD in Education at the Environmental Learning Research Centre at Rhodes University in Makhanda formerly known as Grahamstown.

Purpose

I am conducting a PhD study that seeks to understand the climate change learning experiences of emerging women farmers in the Eastern Cape province of South Africa. I have been referred to you by …….. who knows you through their work in ……My relationship with them is based on ……..

Motivation

The key objective of the present study is to evaluate the climate change related learning needs among emerging women farmers in the Eastern Cape Province of South Africa. The findings will contribute towards the improvements in climate change learning experiences of emerging women and farmers in general.

Time

The interview will likely take about 45 minutes

Consent Form

I have with me a consent form that explains in detail the purpose of my study and the ethical consideration that will be observed to ensure that your participation in this study does not have any negative impact on you and your farming practice ……..share a copy of the consent form and explain the details.

Demographic information:

1. Let me begin by asking for your name, surname and age?
2. How many years have you been practicing extension services?
3. What qualifications do you possess?
4. What's your catchment area?
5. What kind of farmers do you work with?
6. Describe your typical working day

Opening

7. Describe your understanding of climate change in relation to your practice?
8. How did you learn about climate change?
9. Have you offered any climate change training to farmers in your catchment area in the past two years?

YES:

- Describe the training that you have offered ?
- Talk me through your experience of sharing your expertise with farmers?

Positive:

- Describe what contributed to your positive experiences?

Negative:

- Talk me through your experience of the training?
- Describe what contributed to your negative experiences?

NO:

- How do you teach your farmers about climate change?
- Describe your experiences of offering this kind learning approach to farmers?

10. What tools, if any, do you use in your training or offer farmers for continual learning?
11. Besides the training/ learning that you mentioned, how else do you ensure that farmers are equipped with climate change intervention skills?
    - How effective are these other means compared to the ones you mentioned earlier?
12. Based on your experience how would you describe the relationship between what you teach farmers about climate change and the current climate change demands?

Positive :

- Please explain more on the linkages?

Negative:

- Please explain why that gap exists?

13. Have you formed any farmer climate change training connections with other professionals?

YES:

- Describe these connections?
- How have these connections influenced your climate change training for farmers?

NO:

- What are the reasons for the lack of these partnerships?

14. What would you consider to be the outcomes of your climate change extension services ?
    - How are these outcomes distributed across your catchment area?
    - What could be the reasons for that kind of distribution?
15. Looking back from when you started extension services in the catchment area and the climate change training, has there been changes in :

- Farmer's perceptions and attitudes towards climate change?
- Your understanding of climate change?
- Your department's urgency in climate change education?
- Your climate change training approaches?
- Your confidence in teaching about climate change?

16. What would be your recommendations to your department/government for:
    - Climate change training to be more effective?
    - Climate change training to be up to date with the current climate change demands?
    - For improved farmer participation in climate change education?

Thank you for your participation - Your voice will be heard and I hope measures will be taken for you to make the difference that you care to make.

Appendix 5: Interview schedule for farmer organisations

Monitoring and evaluation of climate change education

Introduction

Establish rapport: My name is Ludwig Chanyau, I am a PhD in Education at the Environmental Learning Research Centre at Rhodes University in Makhanda formerly known as Grahamstown.

Purpose

I am conducting a PhD study that seeks to understand the climate change learning experiences of emerging women farmers in the Eastern Cape province of South Africa. I have been referred to you by …….. who knows you through their work in ……My relationship with them is based on ……..

Motivation

The key objective of the present study is to evaluate the climate change related learning needs among emerging women farmers in the Eastern Cape Province of South Africa. The findings will contribute towards the improvements in climate change learning experiences of emerging women and farmers in general.

Time

The interview will likely take about 45 minutes

Consent Form

I have with me a consent form that explains in detail the purpose of my study and the ethical consideration that will be observed to ensure that your participation in this study does not have any negative impact on you and your farming practice ……..share a copy of the consent form and explain the details.

Demographic information:

1. Let me begin by asking for the name of your organisation?
2. How long have you been in practice?
3. What's your catchment area?
4. What kind of farmers do you work with?

Opening

1. Describe your work with farmers to address climate change challenges?
2. How has been your experience in your involvement with farmers?

- Modes of learning
- Type of content
- Barriers and challenges

(2b) What were the reasons for the reasons for the experiences

3. What partnerships, if any, have you formed with other organisations to enhance farmers' climate change education?

Positive:

- Take me through the types of partnerships you have formed?
- How satisfied are you with these partnerships ?
- Take me through the reasons for the success of these partnerships?

- What would you improve for the partnerships to be more successful?

Negative:

- Take me through the reasons for not having partnerships?
- What do you think is needed for the partnerships to emerge and for them to be successful?

4. Since your involvement in farmers' climate change education has there been changes to your approaches as a result of new learning?

Yes:

- Please explain to me these changes?
- Did these changes have an impact on your

5. Describe your experience of implementing your farmers' climate change learning project?

Positive:

- Explain to me the reasons behind this success?

Negative:

- Explain to me the reasons for the challenges you have been facing?

6. Looking back to when you started your farmers' climate change learning projects, tell me about your progress so far ?

    - Explain to me the reasons for this +\- progress?

7. In retrospect, has your understanding of the climate change learning space changed?
8. Tell me, has there been any changes to your resolve in addressing climate change challenges through education?
9. For best climate change learning outcomes, what would you recommend to:

- To the responsible government departments?
- Organisations like yours?
- To farmers ?

Thank you for your participation - Your voice will be heard and I hope measures will be taken for you to make the difference that you care to make.

Appendix 6: Example of data coding

Case study 1: Raymond Mhlaba Local Municipality
Farmer 1
Date: 24/03/22
Place - Qibisa
A farmer within a community gardening project
Plot size - Its 1.4 hectares

Link to the transcript:
https://docs.google.com/document/d/1yWpN75vFVcvUBpOkIo_G0RWn8V7THegu/edit?usp=share_link&ouid=115525687830425528784&rtpof=true&sd=true
Link to the interview recording:
https://docs.google.com/document/d/1yWpN75vFVcvUBpOkIo_G0RWn8V7THegu/edit?usp=share_link&ouid=115525687830425528784&rtpof=true&sd=true

---

Ludwig: What kind of farming do you do?
Farmer 1: I grow a variety of vegetables that include potatoes, butternut, cabbage, spinach, beetroot onion maize. Currently there is potatoes. However, we haven't been doing much of maize production because it requires water and the changes in climate have also discouraged us from growing maize

Ludwig: How long have you been farming?
Farmer 1: The market gardening started in 2020, but I have been a farmer all my life, most recently I was into poultry, keeping chickens for meat and eggs. I had a home garden; I was also into livestock that include sheep and goats, and I am still doing it alongside this garden.

Ludwig: Over these years have you been noticing any changes in the climate, weather patterns or the occurrence of droughts?
Farmer 1: There has been serious soil erosion as a result of heavy rains, and we have experienced a very serious drought. In the few past years there has been a drought that serious affected our gardening. We have started to grow more of potatoes and butternut which are more resilient to the harsh and unpredictable weather patterns that are a result of climate change.

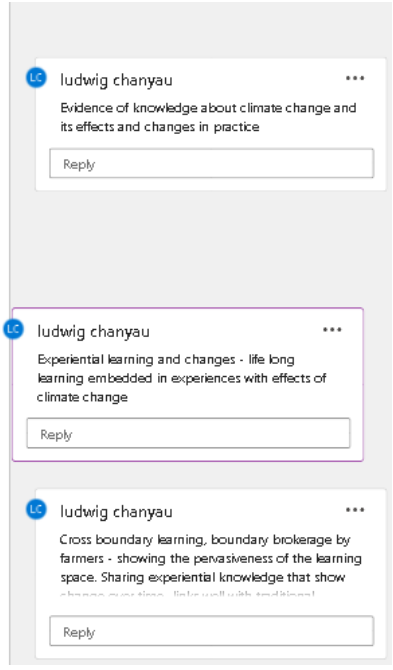
Ludwig: Besides these personal experiences of climate change, how else are you learning about climate change?
Farmer 1: We come together as different villages and farmers to market our produce, we have formed groups where we ask each other and discuss issues around the changes in weather patterns and most of the groups I work with from other areas did mention that they are no longer practicing agriculture as they used to because of the drought. We also learn and share knowledge with other farmers practicing in other communities. When we meet at the market in Qonce we exchange ideas. For example, they mentioned that they are no longer growing certain crops because of the harsh weather conditions and poor water supply" Some have have downscaled to little home gardens.....And also, Covid-19 has contributed negatively to our gardening experiences

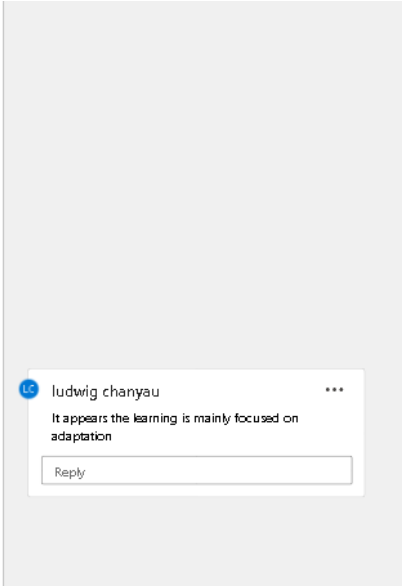
Ludwig: In what ways has Covid-19 affected you?
We could not be active in planting our fields because some of our members got Covid and could not come and work with us. Also remember that Covid rules couldn't allow us to come as a member of the gardening project to work as a group as we did before.

Farmer 1: Have you tried using other platforms of communication among yourselves as farmers and with the extension services:
Yes, but the shared information is not always relevant to our contexts and sometimes too complicated for our comprehension and to put into practice in their contexts.

Ludwig: Have you received any form of formal training or information from organizations working with farmers concerning the challenges you are facing because of climate change?
Farmer 1: Extension officers provided us with training on how to plant the drought cabbages, that is the distance between two cabbage plants. The extension officers give us information on how to control pests.

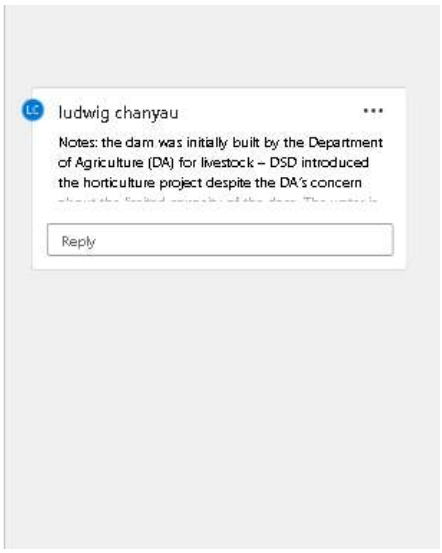
Ludwig: Is this training helping you transition into new forms of farming and crops suitable for the harsh conditions?
Farmer 1: They came and assessed our soil type and they have recommended crops for each portion of our plot and that is the reason we are planting potatoes and they told us, because of the water issues we need to plant crops that don't require a lot of water.





Ludwig: What role is DSD playing
Farmer 1: We get funding from DSD and they are the ones who fenced our plot, they also helped us secure containers where we store our equipment. We also get seedlings and seeds and they sometimes come together with extension officers to train us on farming.

Observation data: Mxumbu dam used for irrigation and for livestock watering



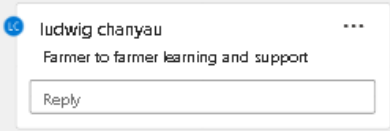
Ludwig: Do you also share information with people who are not involved in agriculture?
Farmer 1: I do advise other people, especially the ones in my community, for example, that now we are getting into winter I advise people to plant potatoes because potatoes are going to be very expensive, you get them for r80 a bag, so instead of going to King Williams to buy the potatoes, you can have them in your backyard. I also share the seeds and seedlings for potatoes.....I have another hectare in front of my house where I plant all varieties of crops and will then share the seedlings.

I encourage households to plant vegetables because they are healthy for them and their families. Recently I received green paper and seedlings and have shared with the community.

Are these community members putting into use the information and the seedlings that you give them?
They plant the seeds and seedlings and in some good cases they sell their produce.

Overall, what other challenges do you face and how do you address them?
It's not easy, the main challenge is water – we have a water pump that is struggling to give us enough water for our crops. In 2020, we produced 50 bags of maize, we sold them and used the money to buy the tractor disc, we want to invest more, so that when we have the equipment, we produce more, instead of taking money to the bank we invested in the equipment.

Besides the challenges you are facing in your farming, what other challenges have you experienced or observed?
There is quite a significant change, especially to household gardens, because people used to produce veggies and take them to a local clinic for soup kitchen and people will be recommended different soups to boost their immunity, especially those dealing with chronic diseases, but because of climate change people can't grow anything as it would be a loss. We also experienced tornadoes and people's houses have been destroyed, so the living has been a challenge.



Appendix 7: Data Analytic Framework for Raymond Mhlaba Metropolitan Municipality				
Theories	**Theoretical concepts**	**The codes**	**Themes**	**Examples of empirical data from interviews**
CoP and Social Learning Theory (SLT)	Shared domain (CoP), interest to make a difference (SLT)	Heterogeneous composition (backgrounds, competences, skills, age, gender)	(Existing communities of practice Xesi) Constellation of practice	*"In most projects women leading, they are responsible for decision making and are more successful, proactive and are the drivers of the CoP compared to their male counterparts"* ***(D1).***
	Situated learning (CoP), lifelong and socially embedded learning (SLT)	Internal knowledge boundary crossing, demographic diversity results in knowledge diversity	A nexus of scientific, traditional, and experiential knowledge	*"We have not received training in climate change, just like the farmers and many others we get climate change information from news platforms, even social media. I also know about climate change through my own experiences because I am a farmer too".* ***(EO2)***
	Legitimate peripheral participation (CoP)	Iterative learning exchanges between varying competences, cyclical knowledge looping	Gradual and progressive participation by new farmers	*"the new farmers often infuse the insights they gained from our interactions with traditional knowledge and ingenuity in their practice"* ***(F3)***
		Knowledge and practice contradictions Conflicts as learning opportunities	Conflicts and contradictions in CoPs	*"there is a need for training on conflict resolution because the conflicts are affecting our progress in many ways, especially in cooperatives"* ***(FG)***
	Cross-boundary learning (CoP), pervasive learning space (SLT)	Rise of virtual CoPs, expansion of CoPs vs effective participation of all members	Use of social media as learning tools	*"the shared information is not always relevant to our contexts and sometimes too complicated for our comprehension and to put into practice in their contexts''* ***(F1).***
		Knowledge brokerage, farmers as knowledge brokers, negotiating epistemic plurality	Boundary crossing and knowledge brokerage	*"We also learn and share knowledge with other farmers practicing in other communities. When we meet at the market in Qonce we exchange ideas. For example, they mentioned that they are no longer growing certain crops because of the harsh weather conditions and poor water supply"* ***(F1).***
	Practice and competence development	Follow up monitoring to connect new knowledge and practice, practical demonstrations vs abstract instructions	Approaches to effective learning in the CoP	*"For training that involves chemicals they must write down so that they will do exactly as they should. I prefer writing, most of them are aged and unlike the youth, they may forget, hence I prefer that they write. For the youth a mix of theoretical and practical training was ideal as they are usually literate"* ***(EO3).***

GI: Group Interview **WV: World Vision** **EO: Extension Officers** **DSD: Department of Social Development** **F: Farmer**

Appendix 8: Example of data coding on interview transcripts

Case study 2: Buffalo City Metropolitan Municipality
Farmer3
Place: Khayelitsha – Zwelitsha
Date: 3 October 2022

Link to transcript:
https://docs.google.com/document/d/14RH4lQpXnjhvvzSgsY88ikgeIYSmEAJ9/edit?usp=share_link&ouid=115525687830425528784&rtpof=true&sd=true

Link to interview audio recording: https://drive.google.com/file/d/1tW6geD8-sXs0zBXLLO7vYH7dYh3KJ-wr/view?usp=share_link

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Ludwig: How did you start farming and how long have you been doing it
Farmer 3: I started in 2017, we are a group of seven members – five females and two males. It started when social workers visited us her in Khayelitsha, going around encouraging people to open some cooperatives. We jumped in and we selected our first land for the cooperative because we already had a little piece of land and we had a little knowledge about farming so we started from there.

Ludwig: Besides the little knowledge that you started with; did you get any form of training on agriculture?
Farmer 3: Yes, we received training from Zingisa on Agroecology, water harvesting, seed saving, seed multiplication and many other exciting trainings

Ludwig: So how would you describe the training?
Farmer 3: The training is very important, it has great impact on our practice because when we started we didn't know anything about agroecology or permaculture, we were just planting. We didn't know the importance of intercropping, crop rotation, water harvesting, water conservation, even the herbs and their importance in repelling pests and we also take the herbs for our own health. So, the training from Zingisa was very effective.

Observation data: all vegetable beds are surrounded by garlic chives and spring onions to repel pests

Ludwig: How would you describe the trainers?
Farmer 3: They are very good because they are using a leaner centred approach. They want to know what we already know. The learning process is participatory, we participate and then we present, the trainers are very good.

Ludwig: I would like to hear more about the learner-centred approach, how does it work?
Farmer 3 : **The trainers don't want to spoon-feed us and we also don't want to be spoon-fed, they want to know what we know and then on top of that they correct the mistakes we have been making. After training, the trainers also conduct visits because if they give us seedlings, they need to check the progress**

Ludwig: You mentioned several topics and trainings that you have received, can you describe for me the process of putting these learnings into practice?
Farmer 3: I have got a very good experience because I noticed that when I implement things like using raised beds, I realised that I will also be conserving water. At the same time, I realised that the raised beds produce food that is nutritious and tasty compared to the normal beds. The plants also grow very fast compared to normal beds.

Ludwig: what about the yields, how would you compare them before and after training?
Farmer 3: We used to practice monocropping, but now we are intercropping in the same little space, we are able to plant many different crops, we are yielding more and we do this while also saving water because with the raised bed you only irrigate after two weeks because of mulch which keeps

ludwig chanyau
The involvement of social workers in supporting agricultural cooperatives shows cross departmental relationships - as was also
Reply

ludwig chanyau
Positive immediate value that shows a positive learning environment and learning approaches
Reply

ludwig chanyau
Intertwined orienting value positive immediate value and transformative value as farmers leave old practices for new approaches
Reply

ludwig chanyau
Learner centred training approach is immediate value as shown by level the training landscape which allow farmers to participate in the learning
Reply

ludwig chanyau
A combination of orienting value in terms of the importance of prior learning as a starting point for learning in a social learning space. The
Reply

ludwig chanyau
Positive applied value that is evidenced by positive outcomes from the application of the acquired knowledge and skills. There is also the continuation by realising the effects of bed type on the quality of the produce
14 December 2022, 5:03 PM
Reply

Ludwig: what about the yields, how would you compare them before and after training?
Farmer 3: We used to practice monocropping, but now we are intercropping in the same little space, we are able to plant many different crops, we are yielding more and we do this while also saving water because with the raised bed you only irrigate after two weeks because of mulch which keeps the warm and moist for a very long time

Observation data: showing good production and the expansion of the plot that has been happening over the years

ludwig chanyau
Transformative value as seen by changes in practice and also realized value as evidenced by effective water management
14 December 2022, 5:04 PM
Reply

Ludwig: It sounds like, without raised bed the consumption of water is very high?
Farmer 3: Yes, mulching also controls weeds because the grass that we put on top suppressed weeds, also when the mulching decomposes, it becomes fertilizer, it beautifies the garden.

Ludwig: I have seen the green containers outside; how do they work?
Farmer 3: Here in Khayelitsha there is a problem of water, water cuts can take up to three weeks, so you have to have water storage facilities, you harvest the rain water, so that in the days of need you have water to irrigate. Without those tanks and buckets you are seeing, there wouldn't be agriculture here. Also, the furrows that are in-between the raised beds they help keep water

Observation data: Rain water harvesting at the farm

ludwig chanyau
The effects of external factors 9outside the control of farmers) on the application of the acquired knowledge and skills - is this negative applied value and to who?
14 December 2022, 5:04 PM
Reply

Ludwig: How is your community reacting to your success, are they also getting interested in farming?
Farmer 3: We hold some workshops here at our farm, we invite member of the community to attend, they do attend but they are really not interested because agriculture is for someone who loves it. They sometime start the garden, but hardly two months they stop and it's over. Also here, our place is an informal settlement, so most people even when interested, they don't have the land and the resources like fencing

Ludwig: So what about you, how are you managing to get the resources to enable your practice
Farmer 3: For the fence, we were helped by a community member in 2018, he had won a competition at ABSA and part of his the Ts&Cs was that he must help one of the projects in the community and we were the beneficiaries. From DSD, and Zingisa and Dept of Agric we get seedlings and training

Ludwig: So tell me, in terms of the changing climate, how do you learn about it so that you be better prepared
Farmer 3: In terms of climate change, I do not have much knowledge, but I know if we plant trees around the farm, they will help us as windbreakers but the challenges is that the plot is not ours so we can't plant trees – we might be removed from here any time, this is not our land. The land is

ludwig chanyau
A mix of positive transformative value and negative transformative value. Positive because Farmer 3 is taking the learning further to her community, but with a negative transformative value as a result of less interest from farmers
14 December 2022, 5:05 PM
Reply

ludwig chanyau
External enabling value by organisations that are not directly involved in the agricultural sector but see value in investing in it
Reply

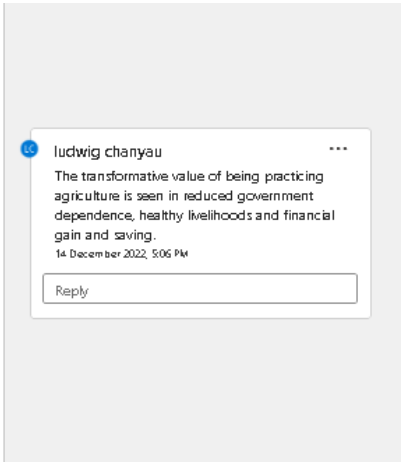
ludwig chanyau
The participant sharing a great deal of positive potential value, however is not achieved

marked for housing not agriculture - so we can't do any long-term climate change intervention because the land is not permanently ours. We can't even dig a dam to harvest and save water.

Ludwig: Working this land and that is coming out of it, what other changes are you seeing in your life because of your participation in agriculture?
Farmer 3: We are gaining a lot out of this; we are no longer buying vegetables and we are eating healthy. Working in the farm keeps us fit and we are also selling and also getting some income. We are not dependent on government grants only. We are independent

Ludwig: coming back to the issue of training, how do you connect with other trainees.
Farmer 3: We do share ideas, we have WhatsApp groups where people share about their problems, they will ask, I have this problem, how can I solve it, my cabbage is like this and that, what can I use, we then give each other advice.

Ludwig: Int erms of training, what would you want to be improved?
Farmer 3: in terms of training, I think the training that I need urgently is the training on how to learn on the internet, how to use the internet to improve my farming and file my papers on my own. I end



Appendix 9: Value creation matrix for Raymond Mhlaba Metropolitan Municipality

Source: Adapted by the author from Wenger-Trayner & Wenger-Trayner (2020)

	Immediate value	Potential value	Applied Value	Realised value	Enabling value	Strategic value	Orienting value	Transformative value	Notes
Guiding questions	What is the experience like?	What comes out of it?	What are you learning in the doing?	What difference does it make?	What makes it all possible?	What is the quality of stakeholder relations	Finding yourself in the broader landscape	Does acquired value have broader effects?	**NB** Remain cognizant of the bottom-up indicators
Key informant 1: EO1	Reaching farmers and finding non-value because of resistance to the methodology	Contextual relevance, new insights on agroecology processes, inclusion, 2700 farmers joined agroecology expanding seed sharing and learning network	Failure of cooperatives, rethinking cooperatives, water challenges, learning from farmers, training of lead farmers	Climate resilient communities, climate-friendly adaptation, empowered farmers, gender equality, preservation of local knowledge, reduced environmental impacts, increased access to inputs,	Funding, commitment, local knowledge and resources, training support, use of local language, proactive participation, provision of agricultural land	Varying support from stakeholders, the importance of engagements,	Similarity with contextual and traditional farming practice, links with global movements on agroecology, embracing diversity, connection with relevant institutions	Self-reliance, Involvement of traditional leaders, farmer agency, social cohesion, improved collaborations	**Date: 6/10/2022** **Place: Zingisa** **Contact: xxxxxxxxxxxx** To provide me with the movement's founding documents and reports **4/10/2021- Observing a farmer's field:** Farm demonstrations are key in closing the gap between learning and practice

Key Informants 2 and 3: EO2, DSD	**Farmers' initial Negative attitude towards agroecology is an example of an immediate 'non-value' [or put differently, no immediate value), mistrust in the new practice, positive feedback**	**Growing confidence in agroecology among farmers**	**Resource accessibility, international exchange programmes**	**Biodiversity preservation, satisfied with the quality and size of the yields, Wide adoption of agroecology**	**Peer-to-peer training**			**Healthy diet, engaging the broader community**	**Date: 6/10/2022** **Place: Zingisa** **Contact: xxxxxxxxxxxx** **Invited to attend an exchange programme from 16-30/10/2022**
Key Informants, **Farmer 1, Farmer 2, Nkuli, Farmer 3, Farmer 4, Farmer 5**	Farmer-centred learning approach, participatory learning processes, not sure about the importance of food saving		Importance of immediate application of acquired knowledge and skills, limited application because of water challenges	Intercropping resulting in higher yields while saving water and shorter crop growing period	Peer-to-peer training		Farming background before joining the agroecology movement,		

Appendix 10: Paper 1

A reflection on finding a coherent social learning theory to explore the learning experiences of small-scale women farmers

Author: Ludwig Chanyau

Affiliation: Rhodes University

Makhanda, South Africa

Abstract

This paper shares the author's explorations in the search for a social learning theory (SLT) that aligns with his research in environmental education. It also highlights and addresses the concerns of several leading scholars on the lack of clarity and coherence in the articulation of social learning. Through a theoretical mining review, the paper traces the origins of three strands of social learning, showing their similarities and differences and relevance in varying contexts. Despite differences in disciplinary orientation, all three strands can be traced back to Vygotsky's philosophy. Central to all three strands is the drive to explain the learning relationship between people and their environment. The split-off point for the three strands is on the conceptualisation of learning and the role of the learner and their environment in shaping the learning process and effecting the desired individual and collective learning outcomes. The author ultimately identified and adopted the theory of SLT rooted in the concept of communities of practice as operationally aligned with the author's drive to understand the contours of climate change learning among smallholder farmers.

Keywords: social change, social learning, communities of practice

Introduction

In their book, *The acoustics of social learning: Designing learning processes that contribute to a more sustainable world*, Wals et al. (2009) noted that the number of Google hits for the term "social learning" had increased from around 400,000 to about 900,000 in the period between August 2005 and November 2006 (p. 9). At the time of writing this paper in February 2022, the number of Google hits for the same term had soared above four million. The surge points to increased interest and use of the concept. However, sifting through the hits shows that the term is used differently in various contexts, hinting at the metaphoric use of the term 'acoustics' in the title of Wals et al.'s book. Google search results show that social learning has been theorised differently in three associated domains, in developmental psychology dominantly by Bandura (1977), in the concept of communities of practice by Wenger and Lave (1991) and in natural resources management dominantly by Wals (2007) and Reed et al. (2010). This paper seeks to critically explore the three strands of social learning, stratify them, and show how each defines social learning processes.

Rationale of the paper – personal and conceptual dilemmas

I joined the field of environmental education from psychology and social development, at a time when I was involved in urban food systems, working closely with farmers and farmers' markets. This cultivated a strong interest in informal environmental education, which led me to enrol for a PhD in environmental and sustainability education. My PhD aims at developing a nuanced understanding of the experiences of emerging women farmers as they learn about climate change. In developing the proposal, finding a coherent theory of social learning well aligned with my study was difficult. Most of the publications I interacted with, some of which are referred to in this paper, had what I termed "epistemic ambiguity" on the concept of social learning. There was a stark lack of theoretical

coherence or clarity on what social learning means and which strand was being adopted. Upon discussing my dilemma in a faculty meeting, I realised that my experience was not unique. At the root of this dilemma, I discovered that the transdisciplinary nature of environmental education attracts scholars from different academic and professional backgrounds. The scholars are drawn back to the social learning concept that resonates with their original specialties. In my case, my psychology and social development background led me to adopt a theoretical hybrid of social learning that was informed by developmental psychology and communities of practice; this resonated with my academic and practice background. This produced a 'mismatch' between the chosen theoretical framework and my intellectual aspirations.

Through a continued search for clarity, I discovered that the dilemmas are not only a product of the transdisciplinary nature of social learning; leading scholars, especially in natural resource management, query the conceptualisation of social learning. They note that it is not well crafted and is often conflated with all social processes, and there is no clear distinction between individual and collective social learning (Keen et al., 2005; Reed et al., 2010; Wals, 2007 & Wals et al., 2009). Therefore, in the absence of an orienting scholarly work differentiates strands of social learning approaches, it is likely that some practitioners and scholars will face dilemmas in deciding on the theoretical strand to adopt for their given research topic and interests. This paper thus seeks to shed light onto this grey theoretical zone.

Research methodology

To manoeuvre around the above noted issues and chart a clear path to stratify the three social learning strands, I adopted Okoli's 'theory-mining review' for each of the strands. Okoli (2015) defined a theory-mining review as:

> *A literature review that extracts theoretical concepts from its constituent primary studies as a key aspect of the synthesis; it might also extract and synthesize the relationships between these concepts, the explanations of these relationships, and the bounding contextual conditions of the extracted relationships.* (p.5)

To identify the theories of social learning, extract the philosophical underpinnings and draw relationships and distinguish between them, the study developed a Google Scholar search protocol for each strand as shown below in Table 1 that follows. I sifted through the search results for each of the theoretical strands to find publications that included seminal publications and systematic reviews; after this I identified relevant references in each review paper to explore further how they conceptualised social learning. However, as advised by Okoli (2015), the review did not follow any strict systematic process of searching and quality appraisal. The following section offers a comprehensive literature review of the three strands of social learning theory, showing their roots and the philosophies that drive them. Based on staying power, the section will explore social learning in developmental psychology as it precedes the other two strands.

Table 1: Google hits from the search protocol (Source: author)

Theoretical strand	Search terms	Hits
Natural resources management	social learning, OR natural resources management, OR resilience	1 350 000
Psychology	social learning, OR developmental psychology, OR Bandura	222 000
Communities of practice	social learning, OR communities of practice, OR Wenger-Trayner	4170

Discussion of findings

Social learning – A learning perspective in developmental psychology

Social Learning Theory (SLT) in behavioural studies can be traced to Sears and Bandura. Sears's theory is rooted in the Hulian learning theory, which is related to the psychoanalytic theory, while Bandura's theory was influenced by the operant tradition (Grusec, 1992, p. 776). Bandura's learning theory recognised the reciprocal connection between cognition and external stimuli in influencing behaviour; hence Bandura later referred to it as a 'social cognitive theory' (Shaffer & Kipp, 2007). He rejected experimental outcomes of extreme behaviorists who explained behaviour only in terms of internalised components such as thoughts, ingrained symbolic functions, expectations and convictions (Meyer et al., 2003). Furthermore, the experiments did not involve any social interaction to be relevant to the everyday world where people have social interactions (Schultz & Schultz, 2009). As such, Bandura's SLT (see Figure 1) should be understood as a bidirectional learning process in which cognitive facilities and social factors interact through reciprocal determinism to produce a behaviour (Bandura, 1977).

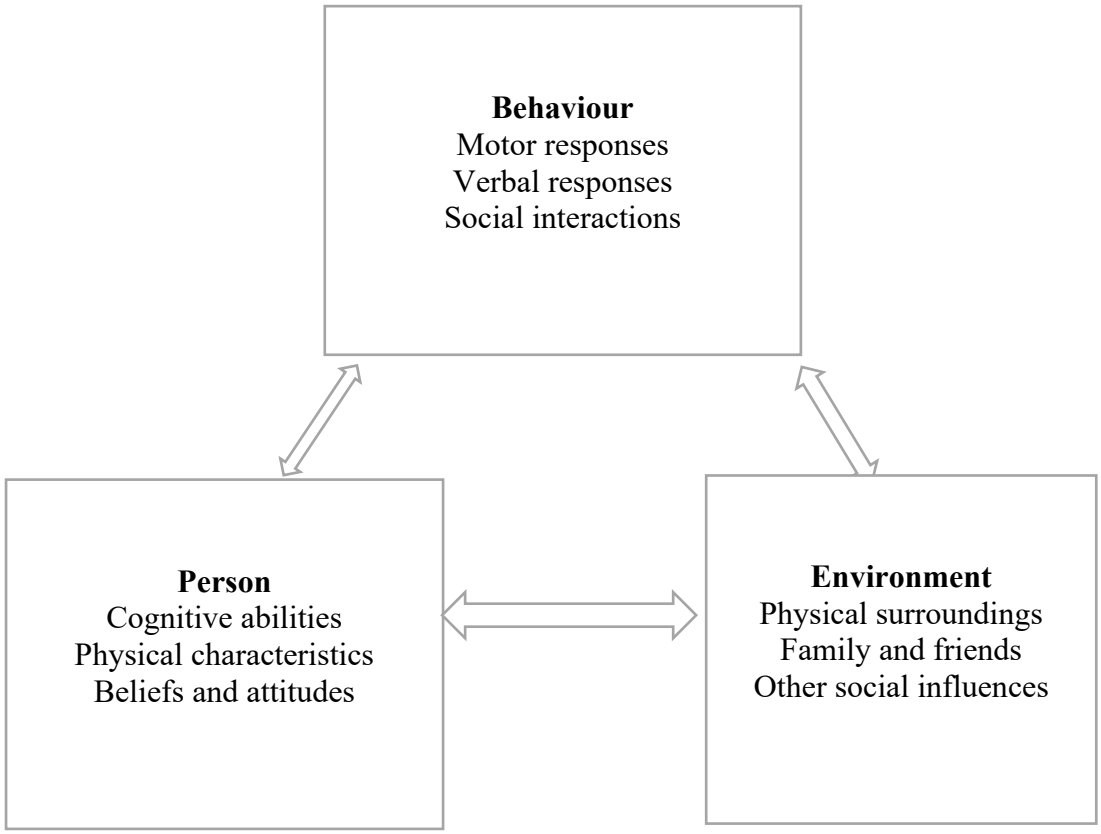


Figure 1: Bandura's model of reciprocal determinism (Shaffer & Kipp, 2007)

Although their work was not closely related, Vygotsky and Bandura shared a critical voice in opposing simple stimulus-response theories from behaviorism and mechanistic materialism (Grusec, 1992). They both recognised the role of mediating tools, albeit the difference in the tools; Bandura (1977) emphasised the role of cognitive tools in shaping children's behaviour, while Vygotsky (1981) leaned towards Marxism in recognising human-social interaction, classifying individual development as an offshoot of the society and culture as represented by culturally produced symbols (language, tools and institutions (p. 21). Thus, because of the heterogeneity of sociocultural realities and social experiences, people have differences in knowledge, interest and behaviour (Vygotsky, 1998).

Bandura's social learning theory is also referred to as observational learning because of the prominence of observations in determining what is learnt. Whether good, wrong, normal or abnormal, much of the behaviour is learned by imitating other people (models) (Shaffer & Kipp, 2007). Under observational learning theory, learning is governed by four components that are not mutually exclusive (Crain, 2014). It is imperative to note that the components do not operate in isolation; they are in constant interaction with the individual, the situation, and the immediate behavior (Meyer et al., 2003).

The characteristics of the model determine whether it is likely to be imitated. One is likely to imitate someone one identifies with more than someone one does not connect with (Crain, 2014). Age, gender, race, locality play a critical role in making decisions on imitating (Meyer et al., 2003). A high-status model may lead the observer to imitate the behaviour, but if the reward is ineffective, the imitated behavior may be abandoned, and the observer is less likely to be influenced by the model in the future (Schultz & Schultz, 2009). Characteristics (or attributes) of the observer determine the ability to imitate the behavior. Attributes such as motivation, interests, self-confidence, opinions, intelligence, and perceptiveness are all critical in all the steps of observational learning. The observer's personality is critical in selecting the model and behaviour to imitate (Meyer et al., 2003). The imitator is not a passive participant in the learning process; his/her participation is more introspective. The results of the model's behaviour, vicarious outcomes of a behaviour – reinforcement or punishment determine how the observer imitates a behaviour. Vicarious punishment and vicarious rewards have similar effects on the acquisition of the behaviour as they are both remembered equally well, with vicarious reinforcement encouraging imitation. In contrast, punishment is likely to lead to the avoidance of the behavior (Meyer et al., 2003, p. 231). When observers are confident about the possibility of learning, they go through a process that involves attentional, retention, motor reproduction and motivational processes to reproduce the behaviour.

The process of observational learning processes

As shown below in Figure 2, observational learning is activated by four related components that work together to enable imitation. Observers are exposed to a wide array of new behaviours; they learn both desirable and undesirable behaviours (Schultz & Schultz, 2009).

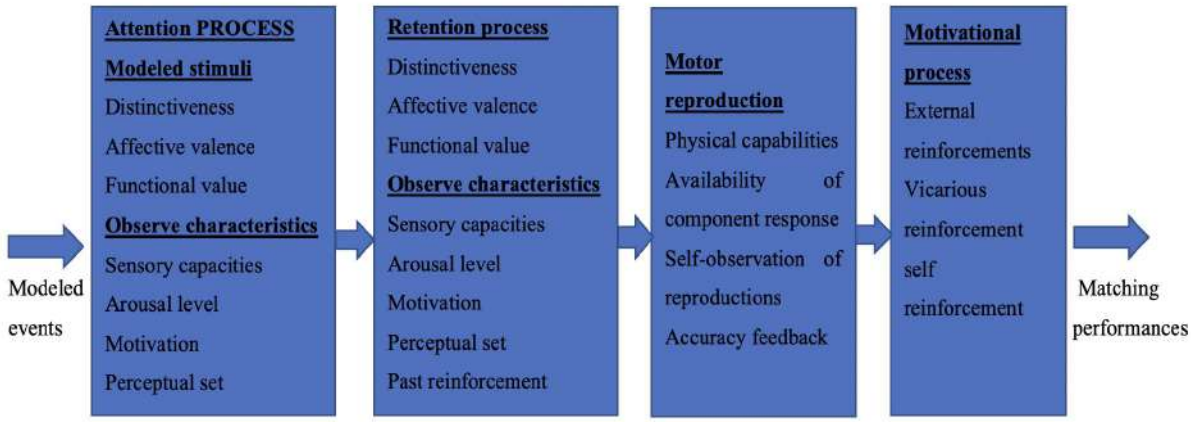


Figure 2: Process of observational learning (Bandura, 1977)

To successfully work with the model, the observer needs to pay attention to the model and the particular behaviour they wish to imitate (Meyer et al., 2003). However, because imitation often happens sometime after the observation, there is a need to retain mental representations that can be used when imitating the behavior (Shaffer & Kipp, 2007). However, even when one has been attentive and retained, and even rehearsed the representations, there is a need for an observer to be able to put the symbolic representation into practice; one must have the necessary motor skills (Schultz &

Schultz, 2009). Not all acquired new knowledge will be performed; there is a need for motivation to reproduce the acquired knowledge. Motivations also determine what one pays attention to (Crain, 2014). If the model expects a reward, they are likely to reproduce the behaviour (Meyer et al., 2003). As such, Bandura's SLT theory understands human behaviour as a product of a cyclical interaction between the person, environment, and behavioural reinforcements. However, the learning is not a linear process; in some instances, the reinforcements – positive or negative may be delayed or may not be short-term.

Self-regulation and self-efficacy in social learning

After the observational learning process ends, the role of reinforcements and motivation in optimising behaviour diminishes, and internal regulation takes over (Grusec, 1992). Bandura (1977) called this process 'self-evaluation', where the person self-introspects and adjusts their behavior based on what they expect of themselves. However, in some instances, self-standards are products of internalised effects of differential responsivity – direct rewards and punishments from adults that shape children's behaviour (Crain, 2014). Self-standards can also result from external sources where children observe adults or other children self-regulating. However, observation is not without a selection process; children select the model and the behaviour based on their ability to imitate it (Grusec, 1992). They have the freedom to determine their behaviour, albeit, within limits determined by the nature of the situation, learning experiences, social expectations, and the behaviour people produce in the situation. As such, individuals have several behaviours to choose from in every situation, also known as 'response repertoire' (Meyer et al., 2003).

Self-efficacy relates to personal judgement on what would be required to copy a behaviour (Bandura, 1977; Meyer et al., 2003). Simply put, social learning theory means "believing that you can" (Schultz & Schultz, 2009). Self-efficacy determines one's chances of accomplishing a task or picking the behaviour to imitate (Crain, 2014). It is a self-reflective process where one develops perceptions of one's capabilities to function in a given situation and influence performance (Meyer et al., 2003). That is, a student with a positive self-efficacy will be more determined to perform well despite their social and personal circumstances. Therefore, high self-efficacy leads to the higher success of imitation while low self-esteem leads to less likelihood of success (Meyer et al., 2003).

Overall, social learning in developmental psychology emphasises learning behaviours <u>from</u> each other rather than learning <u>with</u> each other as farmers do. It focuses on the cognitive processes of individuals; the original concept does not consider group processes such as the development of shared meanings and values that provide a basis for joint action (Pahl-Wostl et al., 2007). The role of the environment and the community in Bandura's SLT provides models and regulates behaviour through social control mechanisms that are perceived differently by the observer and vary across societies and cultures.

Social learning theory in Natural Resource Management (NRM)

In natural resources management, social learning emerged as an idea to oppose the elitist approach to development that allowed only those proximal to power and resources to define the developmental discourse for their communities (Friedmann, 1981). However, its origins can be traced to the period before the increased attention on inclusive and sustainable development (Muro & Jeffrey, 2008). It is a concept that emerged upon realising the failure of traditional learning approaches in liberating communities out of their environmental and socio-economic challenges. It came out as a form of advocacy for new ways of relating to the world, ways that aim at problem-solving and promote individual and collaborative action and transformation (Wals, 2007).

As the world faces more disruptive environmental challenges of varying proportions, some localised and some global, some short-lived and some long term, some existential and some suppositional, the need for a collective effort to address these challenges has become more urgent. The Greek

philosopher Heraclitus is quoted as saying, "change is the only constant in life"; indeed social change is inevitable, whether the world chooses to act or not. Society must reorient itself to sustain all elements of the planet. Keen et al. (2005) suggested three changes that could be incorporated into environmental learning and management: learning partnerships between communities, professions, and governments, collaborative learning and collective decision-making transformation in thinking and in the learning values and ethics in the learning process.

However, these suggested changes are not completely new; cooperative problem-solving approaches have always been part of human society and have in many cases led to sustainable solutions, especially in rural development programmes (Meinzen-Dick et al., 2004).

In recent years and as shown by the high number of Google hits in Table 1, social learning has incrementally been adopted in the natural resource management discourse to strengthen existing collective learning and interventions as well as to build new learning landscapes towards participatory learning processes that spark more learning opportunities for improved natural resource management (Muro & Jeffrey, 2008). Considering the above characteristics, Woodhill (2010) defined social learning in NRM as,

> *a process by which the society democratically adapts its core institutions to cope with social and ecological change in ways that will optimize the collective wellbeing of current and future generations. (p.4)*

However, the process is gradual: attaining the sustainability goals does not happen instantly; it relies on various facets of the learning processes, including the attitude of community members to reflect and define and redefine their path in recurring patterns, and the ultimate result comes about little by little (Wals et al., 2009).

The emergence of social learning in natural resource management arises because the past half a century has seen environmental management gain dominance in governance, civil society and community development discourse. At the centre of the discourse is the evidenced-based understanding that broad social change is the starting point in addressing the environmental challenges threatening the society and the global system (Keen et al., 2005). There is now a widely shared recognition that the 'technocratic era', where developmental and environmental problems mainly were considered as requiring technical solutions from government and international development players, was over. It is essential to consider the social dimensions to problems, and local communities need to take a leading role in finding solutions towards social change and closing the gap between social and natural resources (Woodhill, 2010). To show how big the gap is, Keen et al. (2005) provided an example:

> *We eat a banana from across the globe without knowing the social or ecological circumstances under which it was produced; we wash our hands, with little awareness of the catchments from which the water comes and where the wastewater will go; and we turn on the heating, lights and television with little concern about the flows of energy we induce, or how they were generated.* (p. 4)

Keen further suggested the need for new environmental management that supports collective action and reflection directed towards improving human and environmental interrelations in the shared system where social learning and environmental management are reconciled to bring about desirable social change.

The emphasis on collectivism is premised on the emergence of what Beck (1992) labelled 'unbounded systematic risks' that are not confined to time, locality, or social class; risks that eventually affect those who produce them. Woodhill (2010) presented social learning as the paradigm of choice to traverse and engage with these broader institutional dilemmas and ease the tension between sustainable development, democracy and free-market ideology (p. 57). At its core, the social learning processes

involve five key interwoven components that interact to produce better learning and collective action outcomes for learning members and the wider society (see Figure 3).

Figure 3: Five key components of social learning in natural resources management
(Keen et al., 2005)

Reflection and reflexivity – Locating the self in a collaborative learning process
Social learners in natural resource management engage in an iterative process of self-introspection to rethink their position in the learning space and the society in terms of how theoretical and social systems shape their learning, actions and values (Keen et al., 2005). Whether collectively or individually, the reflection process provides checks and balances on what happened and what ought to happen. In some instances, this process revealed that some professionally designed interventions had had negative consequences, which are sometimes worse than the challenges they sought to address (Schon, 1983). The importance of reflection in learning systems means negotiation between different epistemologies and subcultural forms amongst different discourses and the development of the social or moral identities of the learners (Beck, 1992).

A systematic approach that caters for effective participation
The problems faced by natural resource management are wide-ranging. Some involve negotiating governance policies on resource exploitation. As such, natural resource management requires methodological pluralism that recognises the contexts and interests of the involved stakeholders – humans and non-humans (Woodhill, 2010). A whole-system approach to social learning should consider the various layers of society, how they come together to produce the challenges, and how they can be reworked to produce the desired change (Keen et al., 2005). It should also recognise the relationship between local autonomy and global systems and their effects on learning and action (Woodhill, 2010). Successful communication and comprehension of the knowledge of each involved stakeholder across all the different societal levels are vital in attaining these aspirations.

An integrative approach
For the social learning spaces to have influence beyond the immediate process and outcomes, the environmental managers have to invite and accommodate new relationships, new ideas from different disciplines and sources (Keen et al., 2005). For a social learning space to be in tune with the global environmental and systems change, Breit and Troja (2013) noted that it has to incorporate diverse human capacities, it should be transdisciplinary, and should cater for diverse social, economic interests and should be constantly aware of cultural settings and their influence on social change. They further noted that experts are lay people regarding specialties other than their own field of expertise; as such, there is a need to embrace insights that may not be in line with conventional knowledge.

The success of social learning in natural resource management relies on negotiation and the attainment of a shared understanding and consensus. However, this is not guaranteed. It takes much effort and sometimes contradictions for participants in a participatory social learning process to abandon their original ideas (Muro & Jeffrey, 2008). To balance personal and collective positionalities, a social learning space should be pluralistic in methodologies, and inclusivity should be beyond

ceremonial representation. The methods and philosophies should integrate science, art, politics, experts and laypeople, reductionism and holism, local perspectives, and global perspectives need to be actively linked to addressing the existential threat to sustainable environmental management (Woodhill, 2010).

Negotiation

Social learning spaces in environmental management involve communities, organisations, individuals with different identities but with a common interest that defines their difference from other community members and other social learning spaces. The instrumentality of this diversity materialises through a constructively negotiated process that embraces conflict as a learning opportunity and sees competing ideas as sources of new knowledge (Keen et al., 2005). The divergence of participants, interests, and mutual interdependence is the cornerstone for successful social learning (Van Bommel et al., 2009).

Participation

Collaborative approaches to environmental challenges require communities to engage in learning partnerships (Keen et al., 2005). Common challenges faced by participatory approaches in natural resource management are a result of lack of philosophical grounding that leads to 'blind participation'; as such, it is essential for natural resource managers to conscientise participants about the critical assumptions and values that underpin their praxis (Woodhill, 2010). For effective participation, participants must go through a reflective process locating themselves, their ideas, and their communities into the learning, negotiating for these values, and participating in activities that ensure that their values are represented. As such, the learning is experiential; it involves learning under some level of uncertainty. The use of the word 'uncertainty' implies that the process is not always straightforward; "it is possible to have an inkling of a value that one does not fully grasp" (Callard, 2016, p. 130).

Different conceptual paradigms of social learning in natural resources management

There seems to be discord among scholars spearheading the adoption of social learning in natural resource management, especially on the conceptual construct of the approach. This has resulted in various interpretations of the concept being vague (Pahl-Wostl et al., 2007). Though the various conceptual paradigms have resulted in the varying use of the concept, they all point towards supporting resilience and sustainable changes to the present environmental distresses (Rodela, 2011). Central to all the approaches is that for lasting outcomes, social learning has to involve multi-party representatives of all stakeholders who regularly interact in a less formalised manner (Pahl-Wostl et al., 2007). The boundaries of each social learning space are not necessarily fixed or rigid. The participation is not always consistent; the membership is not always on record – what binds the members together is their common goal towards collective action (Meinzen-Dick et al., 2004). The collectiveness and participatory nature of social learning are at the heart of the interpretation and understanding of social learning in natural resource management (Muro & Jeffrey, 2008).

Social learning in communities of practice

Commenting on the shortfalls of the contemporary modes of learning that assume learning as an individual process with a beginning and an end, a learning process which is blinkered from the outside world and where students are supposed to pay attention to the teacher or a model and where collaboration is considered as cheating, Wenger-Trayner (2008, p.3) raises suppositional questions on the properties of a learning model that would work:

> *What if we adopted a different learning perspective that places learning in the in the context of lived experience of participation in the world. What if we assumed that learning is as much a part of our human nature as eating or sleeping, that is not life sustaining and inevitable, and that – given a chance – we are quite good at it?*

> *And what if, in addition, we assumed that learning is in its essence, a fundamentally social phenomenon, reflecting our own deeply social nature as human beings capable of knowing? What kind of understanding such a perspective yields on how learning takes place and on what is required to support it?*

He called this learning social learning, a learning process in a community practice starts tentatively with a drive towards attaining a common purpose (Wenger et al., 2002). As time progresses and with modest resources and little gains, the group continuously reinvents itself, new members join while others leave; this group was termed a community of practice (Wenger-Trayner et al., 2009). Simply put, a community of practice is a group of people who engage in collective learning towards a common purpose (Wenger et al., 2002). Though the term 'community of practice' has appeared relatively recently, the phenomenon it describes and the theory that informs it are not new (Wenger-Trayner et al., 2009). The concept of community of practice emerges from the efforts to understand the social nature of human learning (Wenger, 2010). Lave and Wenger coined it as they conducted studies on apprenticeship learning; they used it to describe communities that existed as a learning curriculum for the apprentice (Wenger et al., 2002).

Characteristics of communities of practice and how they shape social learning

Communities of practice are commonly identified by three characteristics that are crucial in the operations and the success of the communities of practice. However, the characteristics may exist differently and may have varying influence in different contexts of communities of practice.

The domain

Unlike a usual network of people or club of friends, communities of practice have an identity that arises from a shared domain of interest. The commitment to the domain and the shared competence sets apart members from others (Wenger-Trayner et al., 2009). The community of practice comes together and remains together because something unites them. The domain represents the drive central to the formulation, the functions and the staying power of a community of practice (Wenger, 2014). The domain may be refined and adjusted as the community gains more insights essential to ensure the longevity of its relevance as time progresses (Mercieca, 2017).

The community

Communities of practice rely heavily on a healthy relationship, trust and mutual engagement among the members and the existence of and management of community boundaries. The commonalities across community members – jargon and ideology vocabulary – shape the practice boundary (Mercieca, 2017). The boundary develops gradually and through a negotiated process. Those within the community will become more comfortable with these defining features, while those outside the community may have discomfort with them. However, these boundaries are not fixed; each community of practice has brokers who traverse the boundaries of their community and their broader environment, taking out and bringing in new insights to enhance the richness of their community's knowledge base (Wenger, 2014). These factors need to be fostered for the community to remain on course for preserving the domain (Mercieca, 2017). However, the term community does not imply homogeneity; diversity in community is a good learning resource (Wenger-Trayner et al., 2009). The community of practice becomes a community because of a domain that unites them and defines their different levels and types of participation (Wenger, 2014). While diversity is necessary, a common desire to make a difference is the primary driver of being part of social learning spaces as participants seek to enhance their ability to do something to bring change to their world (Wenger-Trayner & Wenger-Trayner, 2020).

The practice

The practices involve several related activities towards the better functioning of the group and better chances of attaining their targets. However, the logistical issues such as resources and the community's place of meeting determine the level of participation for some community members (May & Keay, 2017). Online communities of practice would require members to have access to stable internet connection and gadgets to fully participate, while meeting places requiring investments in transport and time may present difficulties for other participants to participate fully. The different forms of learning and practice that are conducted in the community of practice mean that as time progresses, members would have developed new and improved forms of skills and practical knowledge, better efficiency, enhanced access to a broader range of resources, and collective action leads to better practice and more likelihood to achieve the domain. Community members are also practical carriers of knowledge from the community of practice to their world of work and vice versa (Wenger, 2014).

Communities of practice as social learning spaces

A community of practice can also be described as 'a condition of possibility of learning' which emanates from the differences among changing participants, activities and circumstances (Mercieca, 2017). This learning was termed 'situated learning', a concept akin to social learning and in line with social and cultural theory. It describes how learning is shaped by the social situations in which it occurs rather than acquiring knowledge. This learning involves acquiring the skill to perform by engaging in the process under the attenuated condition of legitimate peripheral participation (Lave & Wenger, 1991). Legitimate peripherality points to ambiguities and uncertainties common in struggles between newcomers' access to practice and sequestration (Lave & Gomes, 2019, p. 141). They shared this view with the theory of 'Learning and Pitching', which adopts the concept of 'jamming with the pros' to explain how children learn behaviours by observing and helping family and communities in daily routines (Rogoff, 2014).

Each moment of learning is a claim to competence, which may or may not be embraced by the community. Embracement by the community implies that one assumes an identity and becomes part of the community (Wenger, 2010). A member's identity gets strengthened the more they remain in the community and the more experience and confidence in their own learning and sharing of ideas. This may eventually lead to a member having to assume a leadership role in the community and be a good example to other members (Mercieca, 2017). However, as found by Tamako and Thamaga-Chitja (2017), among smallholder farmers in South Africa social cultural contexts determine access to learning spaces and resources to put the new knowledge into practice. Similarly, Lave and Wenger (1991) found that unequal power relations and hegemony over resources of learning in communities of practice are central in shaping legitimacy and peripherality of participation.

Discussion

Readers with a background in psychology might wonder whether using the term 'collective' is acceptable when discussing social learning and if it is feasible to explore the concept of social learning without mentioning Albert Bandura. Those in natural resources management and communities of practice may not be attuned to the role of Bandura's SLT in understanding learning processes. The differences between these theories lie in the type of learning, the process and the intended outcomes of learning. Bandura's theory is heavily modelled to understand the individual learning process; it does not profoundly deal with interpersonal learning, the basic tenet of social learning in natural resource management and communities of practice (Keen & Mahanty, 2006).

The social learning approach in the communities of practice and natural resource management is understood as both an individual and collective learning process that leads to collective action (Muro & Jeffrey, 2008). They both recognise the importance of diversity in membership and ideas as essential

learning resources. The difference lies in that in natural resource management, the responsibility of creating and ensuring the efficiency of social learning lies in the hands of the natural resource manager. The learning spaces are not natural occurrences; they are conceptualised spaces (Kroma, 2006) and sometimes with external role-players' influence (Sol et al., 2013). However, in the communities of practice, the existence and functions of a social learning space are the responsibility of all involved. The boundaries are well defined, and community members are equal despite their participation in the communities of practice.

Bandura believed that a change in attitudes and beliefs does not always lead to change in behaviour, and not all newly acquired knowledge will be performed (Crain, 2014; Muro & Jeffrey, 2008). Social learning in communities of practice and natural resources management have the same understanding. They both contend that new knowledge and skills have to go through an individual and collective reflective process to determine the feasibility of actioning new skills and knowledge and as such, not all newly acquired skills and knowledge will be put into action. As with the dilemma of self-regulation and factors that affect modelling under Bandura's social learning, the plurality of insights and ideas in communities of practice and natural resources management may result in early saturation, may be time-consuming and may result in the abandonment of other insights and skills (Muro & Jeffrey, 2008).

In the context of the pluralities mentioned above, my experience of sifting through these three strands to find a coherent theory for my research trapped me in a theoretical maze that required more research and reflection. Interfacing the conceptuality of my study and the insights from the existing literature, I considered various attributes of learning processes for farmers. Women farmers may possess formal and intergenerational informal knowledge, while extension service providers may be more equipped with formal knowledge and modern technical skills, and as such, they are equal members who exchange knowledge and take collective action. More so, the learning space would be ongoing, with farmers and stakeholders reflecting on their learning and practice journey. Such a space would have to be inclusive and accommodating, considering that other farmers may have limited experience and would be legitimately peripheral and gradually learn from the more experienced farmers. Considering all these attributes, I concluded that my study was grounded in communities of practice, and as such, I adopted the SLT by Wenger-Trayner (2008). The evaluative nature of my study required an evaluation framework that is attuned to social learning processes in communities of practice, and as such, I adopted the Value Creation Framework, a process-based evaluation approach that tracks the creation of value in a social learning space, linking community activities to the desired outcomes (Wenger et al., 2011). The process requires participants to give accounts of individual and collective experiences through value creation stories.

Conclusion

Though the paper showed how the three concepts emerge from different disciplines, it should be emphasised that the philosophies behind them overlap, confirming the importance of an interdisciplinary approach to understanding learning. Central to all the three strands of social learning is the drive to answer the same questions on how people interact with the world. This is because all three streams of social learning emanate from one central source: Vygotsky's social-cultural theory emphasises individuals' unity and environment in determining human development (Mercieca, 2017). The varying conceptualisation and the apparent conflation of social learning result from the nature of social learning. It shapes our daily lives in different ways at different times, and it is at the heart of all the efforts to attain desirable social change. As such, to adopt the concept as a framework to understand learning processes, one needs an operational definition of what will be considered a theory of social learning and its compatibility with the adopted research pathways and the intended goals.

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Appendix 11: Paper 2

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Learning in a constellation of communities of practice: An exploratory study on the climate change learning landscape for small-scale women farmers in the Eastern Cape province of South Africa

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Abstract

The growing uncertainties about climate change impacts require new forms of learning at all levels to enhance adaptation and build resilience against climate shocks. For small-scale farmers, especially women who rely on rainfed agriculture and are constrained by social-cultural systems, learning about climate change would enhance their adaptation and resilience capacity. This study adopted Lave and Wenger's concept of communities of practice (CoP) to map out the contours of climate change learning for small-scale women farmers. We conducted interviews with seven small-scale women farmers, two farmer support organisations (DSD and World Vision) and three extension officers. We also conducted a group interview with ten farmers. The study found that the increased technological penetration exacerbated by limited face-to-face interaction because of COVID-19 translocated an existing local CoP into a broad practice landscape. Although the translocation resulted in exposure to more lifelong learning opportunities, knowledge, and diverse skills for adaptation and resilience, the gains did not always align with the contextual realities of the small-scale women farmers. For effective learning in the CoP and improved adaptation and resilience, the paper recommends that while local CoPs are expanding into the landscape of CoPs, they should remain committed to their members' learning needs and practical realities.

Keywords: climate change, adaptation, resilience, rural development, social learning, small-scale women farmers, sustainable agriculture

1. Introduction

1.1 Climate change impacts in the region

The scientific community has given a clear signal alerting the world to the socioecological costs of increases in global temperatures due to climate change (Chandra et al., 2018). Across the development spectrum, failure to limit global warming to below 2 degrees Celsius will have catastrophic effects on the gains made over the decades; effectively compromising the well-being of rural communities, especially smallholder farmers whose livelihoods depend heavily on rainfed agriculture (Ayanlade et al., 2017; Christoplos et al., 2009; Gebrehiwot & Van der Veen, 2013; Pereira, 2017; Volenzo & Odiyo, 2019; Wrigley-Asante & Dake, 2019). Sub-Saharan Africa is home to many communities whose vulnerability is worsened by poor adaptation capacity and reliance on socio-economic activities anchored on natural capital

(Adger et al., 2003). Therefore, globally, the region has been declared the most climate change-vulnerable region (Kotir, 2011; Pereira, 2017). Dwindling agricultural output and other compounding developmental drawbacks have left one-fourth of the region's population, above 250 million, undernourished (Gassner et al., 2019; Kutir et al., 2015). The high agricultural and rural development investments and transformation interventions in post-colonial Africa by governments and international organisations since the 1960s did not register long-lasting reprieve for smallholder farmers and did not bolster their agency to withstand natural hazards, including climate change (Davis et al., 2010; Hoeffler & Hoeffler, 2011). Whereas the global average, developed countries and Asia registered a steady increase in per capita agricultural production since 1961, this has gradually declined in Sub-Saharan Africa (Hazell & Wood, 2008). Despite the dipping performance and the challenges faced, agriculture is still generally considered Africa's main driver of economic growth (Dercon et al., 2008).

Africa's poor agricultural performance is part of a knot of climatic and non-climatic factors (Pereira, 2017). Untangling this knot requires a cross-cutting approach that maps out community-based learning landscapes to understand how farmers, especially smallholder rural farmers, utilise available resources and networks to learn and respond to climate change and the associated barriers (Antwi-Agyei et al., 2015; Dercon et al., 2008). In farming communities, these grassroots learning approaches stimulate critical reflection on the causes and effects of climate change on agriculture and the agency to integrate scientific and community knowledge of climate change and adaptation measures into their practice (Ayers & Forsyth, 2009).

1.2 Importance of climate change awareness in resilience and adaptation

Climate change presents an unprecedented catastrophe, and its manifestation in the future remains unpredictable (World Meteorological Organization, 2019). Equally, the education and research sectors are responsible for supporting farmers in ways that align with their available resources and skills. Furthermore, vulnerability and resilience indicators should be adjusted to understand who needs what, where and how (Carter, 2022). As first responders, climate change awareness among farmers is crucial for them to understand their vulnerability and make informed decisions about their adaptation options (Anabaraonye et al., 2020; Asare-Nuamah et al., 2019). Climate awareness creates more opportunities for communities beyond climate change preparedness and helps them avoid significant losses during and in post-disaster scenarios (Muttarak & Lutz, 2014).

Consequently, the need for farmers to be aware of climate change, its impacts and how they can adapt to it is now more critical than ever (Kutir et al., 2015). Therefore, modern scholars must understand how farmers learn and act on the acquired knowledge and the outcomes to develop well-targeted adaptation policies (Below et al., 2012). Towards that end, it is important to be attuned to the contextual dynamics that determine climate vulnerability, learning and adaptation capacity.

As sustainability researchers, we are committed to understanding the current aspects of learning and implementing interventions that enhance the connection between learning,

implementation, and adaptation outcomes. This is crucial because the effectiveness of the learning process depends significantly on how farmers learn (Elum et al., 2017; Kom et al., 2020).

1.3 Theoretical framing

The present study and preceding studies with similar drives and some practitioners in the same line of work have adopted Lave and Wenger's (1991) concept of Communities of Practice (CoP) because of its instrumentality in helping communities leverage what they know through collaboration, social interaction, knowledge management and linking the individual and the collective through knowledge transfer and participation (Cox, 2005; Koliba & Gajda, 2009; Millen et al., 2002; Smith & McKeen, 2004).

The notion of CoP presents a radical critique of cognitivist learning theories, emphasising the relational aspects of learning within communities (Handley et al., 2006; Johnson, 2001; Lave & Wenger, 1991). This contrasts with the individualist and acquisitionist approaches that see learning as solely transmitting 'factual' information from an expert to a learner to learning as is commonly practised in agricultural extension services (Van den Ban & Mkwawa, 2007). Participation in a CoP entails members developing a shared set of skills, knowledge, and experiences (a shared repertoire) in a particular field of human activity and collaborating with others (mutual engagement) who share this same interest (domain) over an extended period (Davies, 2005; Kirschner & Lai, 2007). However, the term community does not imply a 'group' of people in the strict sense; it implies a social process of negotiating competence in a domain over time (Farnsworth et al., 2016), and neither does it imply harmony or homogeneity. Disagreements, conflicts, and tension are also found in CoPs, although they are not part of the envisioned intentions (Wenger, 2010).

Two core modes of learning that characterise a CoP are situated learning and legitimate peripheral participation. In situated learning, the learner gains knowledge and skills by engaging and practising in social situations to approach real-life situations rather than acquiring abstract information for future use. The latter explains the learning process where newcomers and established practitioners regularly interact, negotiate meaning with different regimes of competence, and align and coordinate actions to accomplish their objectives; gradually, the newcomers join the ranks of the old-timers (Buch, 2021). Overall, situated learning emphasises the importance of social and cultural contexts in the learning process. In contrast, cognitive learning focuses on abstract knowledge and skills that can be transferred across contexts (Ormrod, 2018).

CoPs rarely exist in isolation but rather within a complex and dynamic system of multiple interconnected CoPs, each with their unique domain and set of practices. These CoPs overlap and interact with one another at their boundaries to share knowledge and resources. At these boundaries, individuals act as knowledge brokers and learning mediators to establish connections with other CoPs to import and export knowledge and elements of practice and coordinate interactions between CoPs (Baas et al., 2022). Boundaries also exist within CoPs based on differences in value, competencies, and repertoires (Buch, 2021). Although boundaries are potential sources of misunderstanding, confusion, and uncertainty, they

provide exposure to diverse competencies and experiences and are rich learning spaces (Wenger-Trayner et al., 2019).

Although there has been increased research on the functioning of these decentralised systems and participatory learning approaches and their utility, it remains uncertain whether they effectively promote sustainable adaptive capacity (McNamara et al., 2020). Therefore, this study sought to map the contours of climate change learning for small-scale women farmers in an agriculture-based CoP to understand the learning and practice experiences of the members.

1.4 Context of the study area

The case study area is on the outskirts of Middledrift town (also known as Xesi) in the Amathole District of the Eastern Cape province of South Africa (see Figure 1). The district was purposefully selected because of its high climate change vulnerability (Hove & Osunkunle, 2020). In all seasons since 2015, the district has experienced recurrent droughts that have worsened the already fractured socio-economic structure, whose dominant economic activity is small-scale farming (Mahlalela et al., 2020).

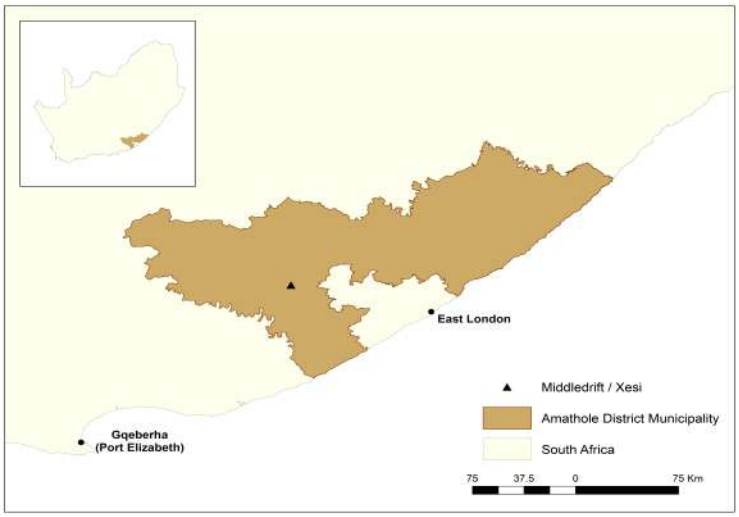

Figure 1: Location of the study area, Middledrift, also known as Xesi, in the Eastern Cape province of South Africa

Subsistence farming is shrinking, and the commercial production of crops relies heavily on limited state subsidies (Connor & Mtwana, 2018). Figure 2 shows a decline in the number of households involved in agricultural activities in South Africa, with the Eastern Cape among the provinces with reductions more significant than the national average of 6,1 percent. Although the decline is registered in all the provinces, the case of Eastern Cape is more concerning because of the lack of urgency to address the challenges compared to other parts of the country's nine provinces facing similar challenges (Hosu et al., 2016; Mahlalela et al., 2020).

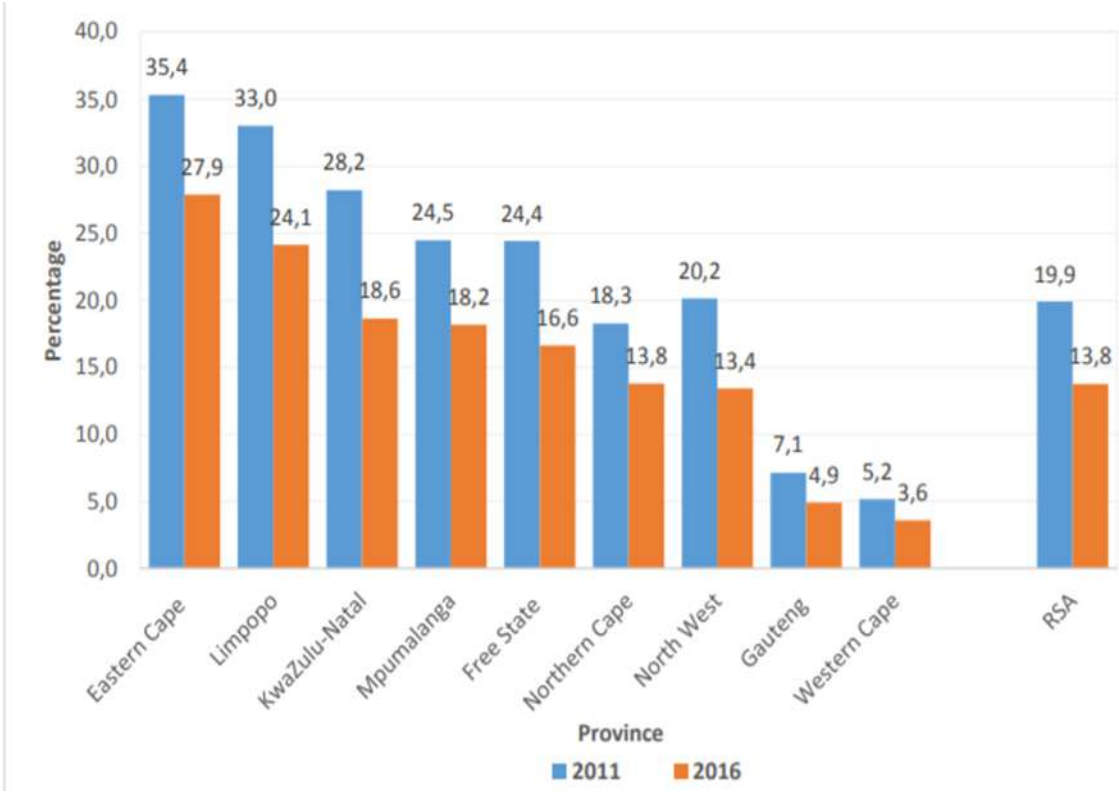

Figure 2: Proportion of households involved in agriculture between 2011 and 2016
Source: Statistics South Africa, 2016

The province has scarcity and incapacitation of governmental and non-governmental agricultural extension services that provide advisory and educational services to farmers to enhance productivity and foster sustainable rural livelihoods. It also has the lowest ratio of extension services to farmers (1:11 079) compared to the national standard of (1:399) (Ngaka, 2012). In the absence of clear policy statements and instruments to enhance institutional services for smallholder farmers in the province (Hosu et al., 2016), farmer support and community development organisations have embarked on various interventions to fill the vacuum by establishing and supporting existing CoP and learning networks to address the daily challenges faced by farmers in their daily practice, especially climate change which significantly reduces net farm revenue.

2. Materials and methods

The uniqueness of climate change learning in CoPs necessitated the adoption of the case study design as this provides an in-depth description of a real-life context by presenting narratives and situational explanations that allow the reader to relate the case to their personal experiences (Stake, 2005), and practitioners to interpret and adopt lessons from the case to their realities. The present case study is one of the three areas in the Eastern Cape where a broad study on climate change education among smallholder women farmers is being conducted. The study adopted purposive sampling to select the case studies and participants, allowing the researcher to choose the most relevant sample with high information power (Malterud et al., 2016).

Besides information power, availability and willingness to participate were also considered in selecting the participants. A translator and field guide assisted in locating participants and translating interchangeably between English and the predominant native language, isiXhosa, and guided the researcher on sociocultural norms in the varying communities. We conducted interviews with seven small-scale women farmers, two farmer support organisations and three extension officers. We also conducted a group interview with ten farmers. The interviews took place at the participants' practice locations to allow the researcher to observe features and artefacts pertinent to the study. Multiple data gathering methods boosted comprehensiveness and confidence in data quality and credibility. In line with the CoP framework, data analysis was informed by the key concepts that define the structure and operations of a CoP. The process took a deductive data analysis approach where data was coded into categories informed by the key features of a CoP and drawing relationships among the categories.

3. Results and discussions

3.1 Existing communities of practice in Xesi

In the initial stages of the fieldwork, I engaged the services of a key informant from the Department of Agriculture Land Reform and Rural Development (DALRRD). Together, we mapped out the learning and training landscape for farmers in Xesi. Initially, the contextualisation of a CoP for smallholder farmers showed that it comprised farmers of varying standing in terms of experience, gender, knowledge, expertise, age, personality, and authority. Contrary to the findings by preceding studies in the same province that showed the participation of women farmers in agriculture as being restricted by sociocultural challenges that limit their participation (Aphane et al., 2010; Redding, 2020), the present study found that empowered women farmers dominate the Xesi CoP:

> *In most projects, women [are] leading, they are responsible for decision making and are more successful, proactive and are the drivers of the (CoP) compared to their male counterparts.* (DSD, research data)

This finding provides valuable insight into how Communities of Practice (CoPs) can promote collaboration and equality. By offering a forum largely independent of institutional pressures from the broader society, CoPs create a safe space for mutual learning, capacity building and collaboration (Thomson et al., 2022). In particular, the formulation of CoPs, the implementation and the domains and practice that govern its operations are tools that provide checks and balances for CoP members to develop a collective identity insulated from social and cultural norms that could hinder the participation of other CoP members.

Further contextualisation showed that the CoP for smallholder farmers had ties with other CoPs that operated in the broader Xesi town; these included academic and training institutions that included Rhodes and Fort Hare Universities and Fort Cox Agriculture and Forestry Training Institute. The CoP was also connected to a community development CoP that included the Department of Social Development (DSD), the Department of Agriculture, Land Reform and Rural Development (DALRRD) and World Vision. All the CoPs were

interlinked by networks of learning and participation, creating what Lave and Wenger (1998) described as a constellation of practice, a spatially extensive community originating from sustained and repeated interaction facilitated by various boundary processes (Coe & Bunnell, 2003). The constellation traverses the boundaries of CoPs in Xesi to form one big CoP, which became the unit of analysis for the present study (see Figure 3).

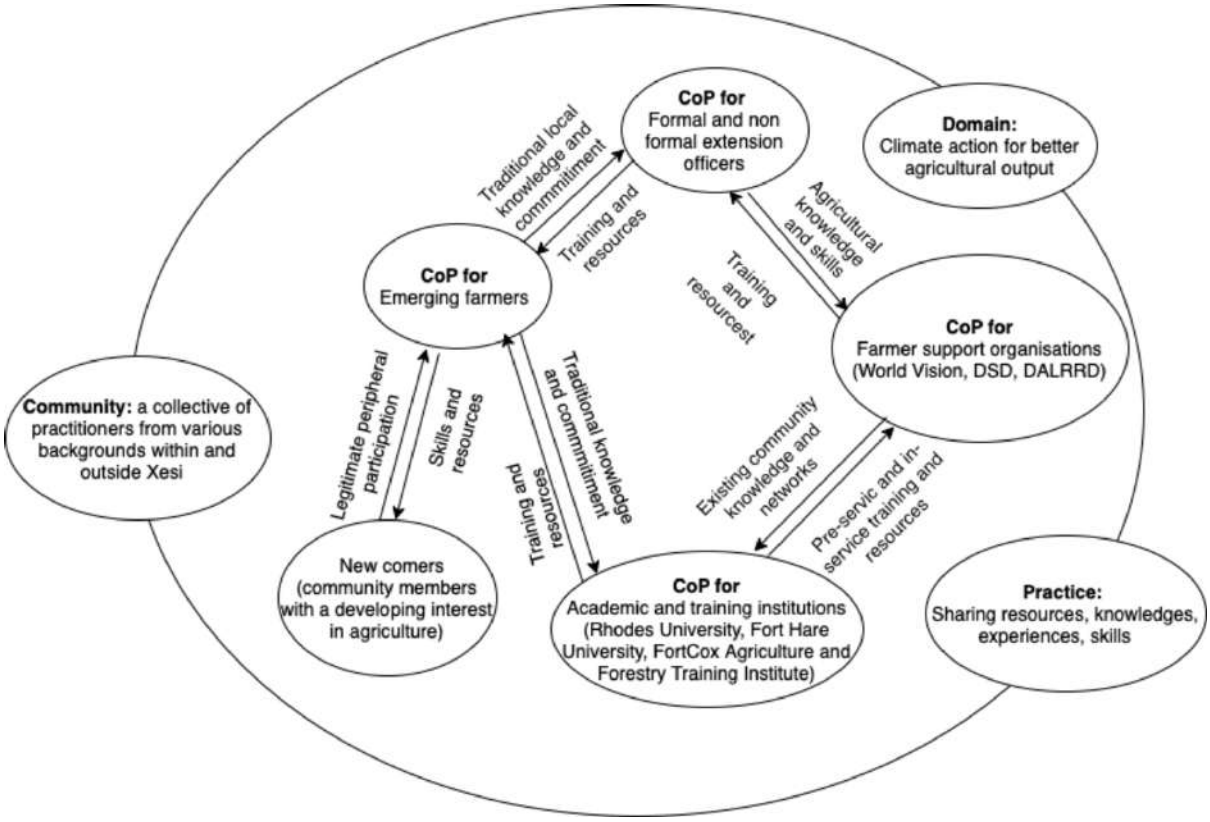

Figure 3: Community of practice for climate action in Xesi
Source: Author

Consistent with Handley et al.'s (2006) findings, the Xesi CoP has individuals historically or presently participating in more than one CoP, building relationships that enable them to learn from each other and share information and learnings through various platforms in pursuit of their domain. In tandem with Wenger's (2011) description of the operation of CoP as a hub of sustained interaction between practitioners to find solutions to recurring problems, the Xesi CoP is driven by concern over recurring droughts. Through their practice in a project such as Amanzi Food Project, a community-based initiative that seeks to promote food security and sustainable agriculture in South Africa through collaboration and education (Lupele, 2017), they collectively learned about rainwater harvesting, storage, and use to support rainfed agriculture. Academic and training institutions provide formal and non-formal training to pre-service and in-service extension officers and farmers. Community development organisations collaborate with extension officers to offer resources, further training, and monitor progress over time. Farmers bring in a rich contextual understanding of historical and cultural context and commitment which Lave and Wenger (1998) claimed are essential ingredients for the sustenance of CoPs.

3.2 A nexus of scientific, traditional, and experiential knowledge

Knowledge cannot be separated from the communities that create, use, and transform it (Allee, 2000). As such, after establishing the nature of the CoP landscape, we sought to understand the kinds of knowledge and practices that make up interactions within the CoP. The study found that the CoP consisted of individuals with diverse skills, experience, ages, and cultural backgrounds. This diversity gave rise to a mixture of scientific, experiential, and traditional knowledge rooted in their community's history, cultures, and experiences dealing with extreme climatic conditions. For example, farmers shared their experiences of climate change manifesting in their practice and communities. They gave examples of frequent tornadoes, high temperatures, droughts, and flash floods. They also mentioned the importance of traditional knowledge about moisture preservation during dry spells, avoiding frosting, and treating emerging livestock diseases that they attributed to climate change. In the broader CoP, the social exchanges of locally embedded knowledge with social-cultural richness drove situated learning. The epistemic pluralism led to multiple ideas that catalysed attaining the domain (Gherardi & Nicolini, 2000; Handley et al., 2006).

Unlike traditional learning processes, CoPs simultaneously present different levels of expertise and authentic social interactions rooted in shared learning which champions collective knowledge over individual knowledge (Johnson, 2001). Similarly, the study found that the various contributions, types, and levels of knowledge in the Xesi CoP allow each member to participate in generating and sharing knowledge. All three extension officers noted that their knowledge of climate change was not much different from that of the farmers in their catchment communities:

> *We have not received training in climate change; just like the farmers and many others, we get climate change information from news platforms, even social media. I also know about climate change through my own experiences because I am farmer too.* (EO2, research data)

They further noted that this position requires extension officers to raft in between the boundary of scientific knowledge, which is a product of their training, and traditional knowledge, which is inherent in the communities they work. An excerpt below shows that extension officers embrace the boundary as an opportunity to learn from the farmers.

> *We are not trained to impose knowledge on the farmers, we are also open to learning from the farmers. As the extension officer, you 'lower' yourself to their level and listen to them and learn more. They are good at demonstrating traditional practices and will accommodate whatever they introduce to us that works.* (EO1, research data)

The above assertions show a departure from traditional top-down approaches to farmer training, where extension officers were solely responsible for introducing innovation to farmers (Sithole, 2018), towards a flat practice landscape where all members have a voice and are listened to. The CoP has shifted towards a more collaborative approach, resulting in a long-standing history of shared learning and innovative, contextually relevant practice development. This inclusive and participatory learning environment leverages farmers' knowledge and experiences, leading to more sustainable and effective outcomes. As was

discovered by Christoplos et al. (2009) and Kutir et al. (2015), the findings showed a need to rejuvenate CoPs to be more contextually relevant to improve participants' climate change awareness and enhance adaptation. Conveners of CoPs and development practitioners in the climate change arena must acknowledge smallholder farmers' aspirational heterogeneity in their desire to adopt new knowledge and technologies and ensure that the knowledge and technical support are compatible with the target groups (Schattman et al., 2019). The importance of a farmer's environmental and social context goes beyond resources and the quality of learning; it should be cognisant of the sociocultural dynamics that shape access to these resources and learning and look at how the marginalised are affected by climate change and their access to resource and education and how this access shapes their adaptation (Sammie et al., 2021).

3.2 Gradual and progressive participation by new farmers

Established farmers, or old timers and newcomers' smallholder farmer relationships, were developed through legitimate peripheral participation (Lave & Wenger, 1998), as they engaged in learning exchanges. The new farmers, who now only produce for their household consumption, undertake legitimate peripheral participation linked to the CoP of smallholder farmers. Farmer 2, an established farmer, described herself as 'the village's extension officer' responsible for mentoring young and new farmers through regular interactions on adaptive practices considering poor rainfall patterns and lack of irrigation water supply,

> *I advise other people interested in farming, especially the ones in my community, for example, changes in rainy seasons and the need to grow potatoes because potatoes are becoming increasingly expensive … we also exchange seeds and seedlings.* [Farmer 2, research data]

At the legitimate peripheral participation level, as narrated in the above assertions, Handley et al. (2006) noted that newcomers have three options: they may choose to maintain marginal participation, may adapt their practice in ways which secure a continued sense of existential integrity whilst still notionally fitting in with community norms, or may avoid conflicts of identity and practice by choosing not to join the CoP. Newcomers in Xesi often choose the second option, which involves being active participants contributing to the CoP's knowledge and skills base and thus elaborating the role of situated learning in ensuring the evolution of knowledge and skills in the CoPs. The extract below from Farmer 3, an established farmer, shows that newcomers are not passive participants; they are equally responsible for shaping practice and shaping collective identity,

> *The new farmers often infuse the insights they gained from our interactions with traditional knowledge and ingenuity in their practice.* [Farmer 3, research data]

Collectively, the assertions above show how situated learning represents a departure from traditional learning approaches where knowledge and skills movement are one-directional toward co-creative learning, where knowledge exchange is bi-directional and where reconceptualisation and problem-solving are critical features. In most cases, the newcomers become successful, and their new practices are often eventually adopted and shared by established farmers in the CoP. These cyclical mutual engagements iteratively stimulate the

ongoing generation and retainment of situated knowledge and expertise during practice resulting in efficient ways for the CoP to achieve and renegotiate its domain (Johnson, 2001; Wenger-Trayner et al., 2019). As such, although the domain of the CoP can be known or unknown from the onset, what is certain is that the CoP is an open space for trial and error and practice towards attaining the domain, and a shared identity is negotiated and adaptable.

3.4 Conflicts and contradictions in the CoP

Although the preceding section has painted the learning networks between farmers as a harmonious set-up, farmers admitted that conflicts happen in their learning and practice engagements, especially for farmers in cooperatives. The Department of Social Development and World Vision pinned the poor performance of some of their projects on poor conflict management among farmers. One of the participants in the group interview confirmed:

> *There is a need for training on conflict resolution because the conflicts are affecting our progress in many ways, especially in cooperatives.* [GI 2, research data]

However, organisations agreed that one of the key lessons they learnt through their experiences is that "conflicts are inherent in all communities and are not entirely bad; farmers and ourselves should learn from it" [DSD, research data]. The organisations mentioned that plans were underway to learn from other communities and initiate training in conflict management from farmers and practitioners in different enterprises for better outcomes.

It also emerged from the group interview that although training in the CoPs offers farmers a wide range of information on climate change and adaptation, the acquired information and skills do not always produce the intended outcomes. In the group interview, participants mentioned that they had received training in Agroecology, with a focus on the various methods of adjusting to water scarcity; these included mulching, minimum tillage and raised beds. However,

> *The methods were helpful in the early instances, but in the long run, we realized that our yields were going down because the methods took up a lot of space. We then decided to go back to our traditional way of farming because yields do matter most to us.* (GI 4, research data)

For another participant in the group interview, the approaches to farmer support by the government need to be reconsidered because they are not in touch with their realities,

> *Sometimes the government come with a take-it-or-leave-it approach. Our needs are not considered; sometimes, the things they give us don't work, and we may not have the extra resources needed to implement the new practices. They sometimes provide us with cabbage seeds, but we know that cabbage requires a lot of water and takes a long time to mature. They just bring things without even consulting us.* (GI 6, research data)

To address these contradictions, farmers expressed the need for effective post-training follow-ups to ensure the appropriate application of the acquired knowledge and skills in ways that strengthen their practice and build identities in line with the communities.

Correspondingly, Wenger (2011) recommended that continual interactions in a CoP are vital in developing an intact network of shared practice supported by a shared repertoire of resources, experiences, stories, tools, and activities. This shared repertoire informs and supports the norms within the CoP, which are directed towards addressing recurring problems.

3.4 Use of social media as learning tools

While CoPs were initially conceived without social media in mind, new technologies such as the Internet have extended the reach of learning networks beyond the geographical limitations of traditional communities, expanding the possibilities for community and calls for new kinds of communities based on shared practice (Wenger, 2011) In fact, the original concept as posed by Lave and Wenger (1991) was based around situated learning in a co-located setting as part of an attempt to 'rethink learning'. However, with increasing globalisation and rapid advancements in technology, specifically the Internet, many CoPs are becoming virtual (Kirschner & Lai, 2007). Similarly, in the Xesi CoP, I found the CoP had various social media groups that were further expanded in response to restrictions on physical meetings brought about by the COVID-19 pandemic. The use of social media in the CoP has expanded the farmer's learning networks within the Eastern Cape province and further afield, allowing them access to diverse knowledge and practice elements. However, the group interview discussion showed that the expansion of the CoPs through technology has not been entirely beneficial across members of all age groups and skills,

> *For the elderly, WhatsApp has not been very beneficial, considering that some do not have electronic gadgets supporting WhatsApp and the prohibitive costs of internet data.* (WV, research data).

It also emerged that though the engagements with practitioners in other CoPs have been useful in providing a platform for sharing information and skills,

> *The shared information is not always relevant to our contexts and is sometimes too complicated for our comprehension and to put into practice in their contexts.* (Farmer 1, research data)

Thus, our findings align with the findings by Roberts (2006), who noted the importance of aligning knowledge with the specific predispositions of a CoP to enhance uptake of knowledge because members are more likely to adopt contextually relevant knowledge than the knowledge that challenges current identity and practices without making them static in terms of their knowledge base. Correspondingly, Dubé et al. (2006) found that while heterogeneity and diverse knowledge and skills are key tools in the operations of Virtual CoPs, especially against groupthink, they can also make participation difficult because people tend to interpret information based on their cultural filters leading to a potentially broad range of misinterpretations or distortions and making it difficult for practitioners to identify and develop common practice.

3.5 Boundary crossing and knowledge brokerage

CoP boundaries are not permanent; they are amenable, continuously shift, and porous (Roberts, 2006). Elements of practice and discourses can travel across boundaries diffusing through the constellation. They can be shared by multiple practices and create forms of continuity that take on a global character (Wenger, 2008). Thus, learning in CoPs transcends communities of practice; it is sought in places where valuation takes place towards creating the difference they care to make (Buch, 2021). As shown in the preceding sections, the constellation is made up of boundary crossings between various CoPs; the crossing goes beyond the Xesi CoP through farmers who act as brokers. They engage in cross-boundary learning, especially at farmers' markets where they share climate change-related information and commiserate with farmers from other communities,

> *We also learn and share knowledge with other farmers practising in other communities. When we meet at the market in Qonce, we exchange ideas. For example, they mentioned that they no longer grow certain crops because of the harsh weather conditions and poor water supply.* [Farmer 1, research data]

Commenting on these external interactions, extension offcer 3 mentioned that this kind of farmer-to-farmer social learning is "a remnant of a wide network of learning that was fractured by over two years of the COVID-19 pandemic". Similarly, EO 2 mentioned that farmers would bring to their attention new knowledge for their networks to determine its applicability to the context of the farmers.

3.6 Approaches for effective learning in the CoP

It was also interesting to understand from the perspectives of extension officers and farmer support organisations ways they found effective in facilitating learning. Findings showed that age was a critical determinant of the adopted training methods, "for elderly farmers, the training has to be more practical, that would include farmer field schools and onsite trials" (EO 2Extension officer 3 added that it also depends on the content of the training and how farmers learn better,

> *For training that involves chemicals, they must write down so that they will do exactly as they should. I prefer writing, most of them are aged, and unlike the youth, they may forget, hence I prefer that they write. A mix of theoretical and practical training was ideal for the youth as they are usually literate.* (EO3, research data)

The above assertion indicates the importance of ‘de-homogenising’ knowledge and practice in CoPs. It is for that reason that Gherardi (2005) preferred the use of the term ‘community of practitioners’ rather than CoPs to emphasize the 'practice' rather than 'community'. The findings are in tandem with findings from other Southern African communities where practical and collaborative farmer field schools were found to be levelling the training ground and allowing two-way movement of technical knowledge between farmers and extension services providers, with farmers sharing traditional knowledge that is often context-specific (Anandajayasekeram et al., 2007). Farmer field schools and other onsite learning processes allow farmers to learn from other farmers of similar profiles and aspirations, reducing the gap

between varying knowledge boundaries and the potential for conflict. These processes of learning engagement are essential in identifying entry points for contextualised climate change education and policy. The alignment of farmer learning processes with the socio-ecological contexts of smallholder farmers with limited access to adaptation resources and skills is critical in improving uptake and better adaptation outcomes. It also enhances the chances of knowledge and skills looping back into other communities of practice with minimum confusion among end-users (Wågsæther & Ziervogel, 2011). This will improve spatial dissemination of knowledge and co-learning across various communities of practice and societal institutions and will build the capacity for society to deal with environmental variability more effectively by making surprising environmental changes less surprising and more manageable (Christoplos et al., 2009). Improved participation in climate change learning communities would improve farmers' resilience, shape their adaptation patterns, and improve their bargaining power for access to essential services and resources.

4. Conclusions

This study found that communities of practice for emerging farmers have a higher chance of sustenance and effectiveness if the members are co-located in the same geographical area and hold face-to-face social interaction through practical learning than when they are virtual. Although the expansion of CoPs through the improved adoption of social media opened learning opportunities for the farmers, the study found that for effective situated learning, CoPs should be inward-looking, cognisant of the communal and individual dispositions because their life cycle depends on their continuing value to their members (Andrew et al., 2008). Into the bargain, inward-looking reduces the boundary gaps and improves the uptake and sharing of knowledge and skills within and between CoPs. In virtual CoPs, members live in different realities as compared to traditional CoP members, and as such, there is a need to understand and support the two separately (Bourhis et al., 2005). Understanding the two individually is essential in formulating effective climate change interventions that connect and support social change intervention that supports gender equality (Jerneck, 2018). Towards this goal, extension services training needs to be more focused on facilitation and communication skills to stimulate participation in CoPs, especially considering that smallholder farmers learn better through grounded interactive processes.

The findings showed that improved farmer to extension officer ratios, a better quality of training, and resource availability of extension officers would facilitate the emergence of effective CoPs that would transcend climate change, agriculture and sociocultural norms and values. The full participation of farmers in learning communities is essential, especially considering the critical linkage between climate change and development in the developing world because agriculture critically determines communities' development trajectories (Wrigley-Asante & Dake, 2019). The migration to virtual CoPs raises the potential for tension and conflict that arise from individuals participating in more than one CoP, thereby acquiring different identities and approaches to practice; as such, the need to balance expansion and relevance is of paramount importance to accompany CoPs on the road to success.

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Appendix 12: Paper 3

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Tittle: "We don't believe in killing pests; we believe in controlling them": An assessment of the value created for members in a social movement on agroecology in climate-vulnerable regions of South Africa

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Abstract

This paper reports on a research study of an internationally connected social movement on agroecology that has been running in South Africa for over 20 years. The study applied the Value Creation Framework (Wenger-Trayner & Wenger-Trayner, 2020) to gather value creation stories from key movement members. Data collection took an ethnographic approach that involved storytelling interviews and participant observations. The findings show that the functions of the movement are enabled by support from organisations that include tertiary institutions, government departments, NGOs, and the private sector. Despite some challenges, especially in the early stages, the movement has seen wide and gradual adoption of agroecology practices by over 2 700 new and existing farmers in the Eastern Cape alone, thereby widening the knowledge and seed-sharing network. In the communities it has reached, the movement has registered gains in biodiversity preservation, social cohesion, market power, gender equality and healthy living.

Keywords: food systems, agroecology, social movement, climate change, value creation framework, learning networks.

1. Introduction

The global food crisis of the post-World War 2 era prompted the emergence of the Green Revolution, especially in the tropics and sub-tropics (Fitzgerald-Moore & Parai, 1996); the new revolution industrialised agricultural practices, improving food availability and affordability (Pingali, 2012). However, the Green Revolution was not truly 'green'; it was fueled by unrestrained production of agrochemicals, chief among them nitrogen. Fertiliser is considered the greatest invention of the 20th century, ahead of computers and aeroplanes, because it has saved half of the world's population from starvation (Smil, 1999). The discovery of this agricultural catalyst after decades of searching was a 'eureka moment' that won the chief scientist Fritz Haber the Nobel Prize in Chemistry in 1918 (Simpson, 2009). Paradoxically, the subsequent imprudent use created what Wenger-Trayner and Wenger-Trayner (2020) would call negative value, as evidenced by the disenfranchisement of

smallholder farming communities and increased dominance of commercial producers, who accrued more economical and political power to shape global food systems (Holt-Giménez et al., 2021). The resultant elitist global food system is failing many; more and more people are going hungry, and by 2050, the planet will need to feed around 10 billion people making the achievement of Sustainable Development Goal 2 on Zero Hunger by 2030 more and more unrealistic (The World Bank, 2021). The window of opportunity for sustainable solutions is shrinking, and the need for sustainable food systems is now more pertinent than ever (Perfecto & Vandermeer, 2010; Ponisio et al., 2015).

It is imperative to note that it was and still is not only commercial producers whose practices hamper the environment and weigh down efforts towards a just global food system. Smallholder farmers also contribute through poor practices due to inadequate training and awareness of using hybrid seeds and agrochemicals, a coping strategy to improve productivity and profitability (Schroeder et al., 2013). Thus, we urgently need a whole-agricultural system that balances production and environmental well-being (Schnyder et al., 2019).

1.1. Towards a just food system: Enter agroecology

Proponents of agroecology believe it has the right toolkit to repair and transform the food system by redesigning food systems and maintaining the productive base of agriculture over time (Altieri, 1995; Altieri & Nicholls, 2005; Gliessman, 2018). While the practice of agroecology has continuously evolved from its framing in the 1980s, it has remained true to its principles, as captured by Gliessman (2018):

> *Agroecology is the integration of research, education, action and change that brings sustainability to all parts of the food system: ecological, economic, and social. It's transdisciplinary in that it values all forms of knowledge and experience in food system change. It's participatory in that it requires the involvement of all stakeholders from the farm to the table and everyone in between. And it is action-oriented because it confronts the economic and political power structures of the current industrial food system with alternative social structures and policy action. The approach is grounded in ecological thinking where a holistic, systems-level understanding of food system sustainability is required.* (p. 599)

The substantive importance of this integrative and transdisciplinary approach is that it embraces the plurality of knowledge and produces an inclusive understanding of the situation that is tuned to historicity and traditional practices, and it makes sense to local actors, matches their practical experience and the objects and processes to be managed (Hazard et al., 2018). In this transdisciplinary affair, farmers are the leaders; they run trials on new seeds, tools and practices, and researchers conduct testing and experiments to understand the ecological foundations of food systems and management while the involved social movements are at the coalface of the struggle for just food systems amplifying the voices of the people and farmers (Gliessman, 2018). Accordingly, one of the key pillars of agroecology is the direct involvement of the farmers from the conception stage, the experimental period, to the dissemination of learnings through models that focus on sharing experiences and strengthening local research and problem-solving capacities (Altieri &

Nicholls, 2005). Knowledge co-creation between farmers and stakeholders fosters participatory learning and development rooted in the farmers' context, which differs from top-down knowledge sharing (Utter et al., 2021), the common approach used by extension service providers (Van Niekerk et al., 2011).

Agroecological practice is a double-barreled approach that champions meeting global food demands sustainably and sufficiently (Dale, 2020; Hazard et al., 2018). Although money is essential, especially in the early phases, agroecology does not believe pouring money into agriculture is sufficient for lasting solutions; it believes household financial resources should be used for other essentials, such as education and health access (De Schutter, 2010). Agroecology believes that the power lies in unbounded knowledge systems and inclusive practices that facilitate the transition towards low-carbon, resource-preserving agriculture that benefits low-capital farmers (De Schutter, 2010). Farmers who practise agroecology have been found to have achieved high levels of productivity with high levels of environmental performance and high economic returns on investment, striking a balance between the human right to food and making staggering contributions to climate action (DeLonge et al., 2016).

Evidence emerging from the review of 10 000 studies shows that agroecology practices like farm diversification, agroforestry and organic agriculture improve the chances of low and medium-economy countries to reach their targets for the Paris Agreement's Nationally Determined Contributions (NDCs) on climate change mitigation and adaptation (Snaap et al., 2021), while simultaneously enhancing household food security, sustainable livelihoods and producing quality nutrition food in environmentally unpredictable regions while preserving the natural ecosystem which is under threat (Aare et al., 2021; Wynberg & Pereira, 2018). However, despite the noted advantages of agroecology, there is limited evidence on how agroecology works for who, where, and under what conditions (Shelton, 2021). In fact, some scholars question agroecology's ability to address the global food challenge; they bemoan the associated high labour investment and poor yields and question its utility for developing countries' economic realities and aspirations (Mugwanya, 2019; Paarlberg, 2018). Given the contestations, it was worth exploring the extent to which an agroecology approach did or did not create value in an area known for livelihood failures in the Eastern Cape province of South Africa.

1.2 A brief description of South Africa's social movement on agroecology

Transformation in food systems happens within a sociocultural context; it requires the support of the communities, primarily through embracing new forms of food production and consumption habits and establishing a direct relationship between communities and food through ‘food activism’ (Gliessman, 2016). Similarly, agroecology creates food sovereignty and nurtures localised and autonomous food systems that are supported through co-learning and co-innovation at a local level, moving away from top-down research and the hegemony of scientism, as well as the current privatisation of research and commodification of knowledge where farmers are reduced to passive participants whose knowledge is of little significance (Hazard et al., 2018; Pimbert, 2018). In the same spirit, one of the pioneers of agroecology in South Africa is the Zingisa Educational Project in the

Amathole District in the Eastern Cape province shown in Figure 1. The project started introducing the idea of agroecology around 2003.

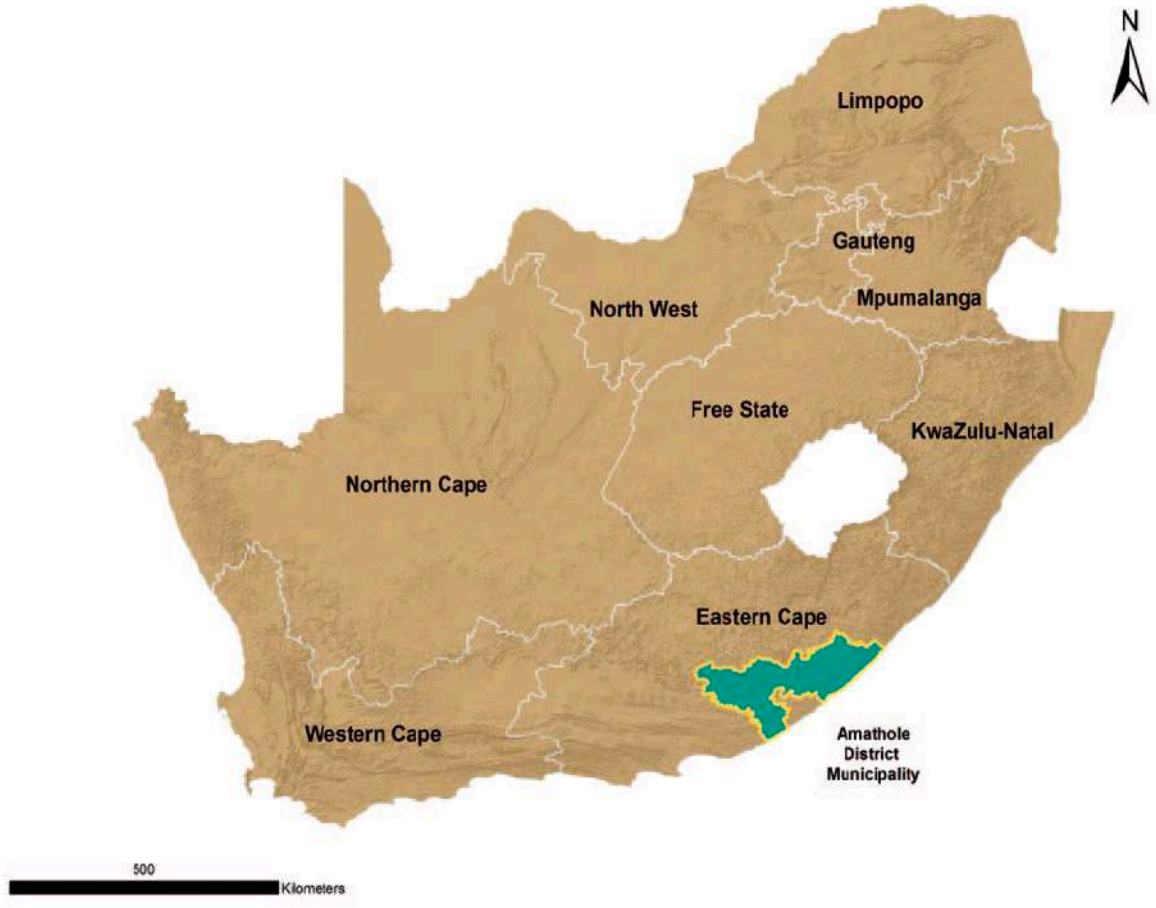

Figure 1: Location of the case study area, Amathole District

Source: Fisher, 2017

Zingisa works very closely with Ilizwi Lamafama Farmers Association, Imvotho Bubomi Learning Network government departments, lecturers, and students from Rhodes University, Fort Hare University, and Fort Cox College of Agriculture and Forestry. Over the years, the idea has become a social movement combining all aspects of participants' livelihoods towards sustainable food and environmental systems and involving various stakeholders.

According to the African Centre for Biodiversity (2015), which conducted a study on smallholder farmers and agricultural biodiversity across South Africa, members in the Zingisa-led movement grow a total of 600 crop varieties that include marigolds, maize, beans, and a few indigenous crops, including African potato, cowpea, amaranth and okra. They noted that the members, primarily women, go through a six-stage seed-saving process which is described here in some detail, as it demonstrates some key principles of agroecology, including low cost, context-specificity and an integrated approach.

- Stage 1: Members conduct a seed rescue process where the seeds are obtained from farmers within and outside the movement. The contact information of the sharer,

variety, germination period, associated pests and diseases is recorded by the farmers themselves, and a follow-up exercise is conducted where there is a need for more information.

- Stage 2: Farmers conduct trials to see the performance of various varieties. The most successful varieties in that particular context are selected for the subsequent stage, and the extra seeds are used for food.
- Stage 3: Demonstration stage, where the selected seeds are treated and cultivated on three plots with different amounts of manure to determine the most suitable amount for better yield.
- Stage 4: Multiplication of the seeds, where the farmers create an anti-pest barrier with plants such as garlic and spring onions. Sick plants are identified and removed, and healthy plants to harvest seeds from are identified; these are usually in the middle of the field, where they are shielded from the pests by the anti-pest barrier and other plants on the peripheries of the plot.
- Stage 5: Hygienic phase, where the members harvest, clean, and dry the seeds using clean and dry tools to avoid moulds and seed rotting with anti-pest herbs placed under the drying cloth. The farmers then place the seeds outside to dry on clean sheets or cloths. The farmers will monitor the weather throughout the drying process to ensure that bad weather does not interrupt the drying process. The dry seeds are then packed into bags, and their dryness is measured by the pitch of the sound they produce when the bag is dropped on the ground.
- Stage 6: At this stage, the members pack the seeds into bottles and add untreated ash to repel weevils and absorb moisture. The bottles are tightly closed, labelled with the information obtained in stage 1 and stored in a seed bank.

At Zingisa facilities, there is a demonstration plot where participants are trained on various agroecology practices. One of the features at the demonstration site is circular beds, which locals call a mandala bed (see Figure 2). The bed contains mixed crops and has ridges and mulching to retain water and control moisture loss.

Figure 2: Newly prepared circular bed (left) at Zingisa and old circular bed (right)

Photo: Author

2. Methodology: The evaluation framework

In the agricultural and farming systems discourse, there is increasing recognition of the roles of multiple stakeholders with different interests, perceptions, access to information, and types of knowledge in terms of collaboration and co-creation for improved mitigation, adaptation and resilience (Restrepo et al., 2014). The recognition mirrors the growing attention on the potential of social learning to improve development outcomes in the context of climate change and food security challenges (Van Epp & Garside, 2019). The previous section has shown that agroecology is built on the same philosophical foundation of communitarian learning and practice. However, as with social learning (Wenger-Trayner & Wenger-Trayner, 2020), the previous section showed that despite the associated challenges in understanding how agroecology works in different contexts and for people with varying competencies, the approach seems to be an effective way of solving the environmental challenges associated with agriculture and Zingisa seemed to be a good case study. Against this background, the present study adopted Wenger-Trayner and Wenger-Trayner's (2020) Value Creation Framework (VCF) to trace the experiences of the women members of the movement with training methods, training content, application of the acquired knowledge and the practice and broad outcomes of their participation. VCF tracks the experiences by gathering stories from participants as they narrate their experiences from the time they joined the movement to the overall outcomes of their membership. The stories are narrated in the first person referring to specific personal or team learning experiences with events, interactions, ideas, contributions, and changes in practice, rather than vague generalities (Wenger-Trayner & Wenger-Trayner, 2020). The method is suitable for evaluating network-based educational processes in varying contexts because it is based on storytelling inherent in people's daily lives; people lead storied lives, and education research involves constructing and reconstructing these social stories (Connelly & Clandinin, 1990). In the present study, the stories embodied the diversity of the members' experiences and the use of intergenerational knowledge accumulated over the years through experience and inheritance. The adoption of VCF fits well with the democratic values of agroecology, especially the prioritisation of small-scale farmers' agencies and voices over corporations and other elite actors (Anderson et al., 2021). VCF, as described in Wenger et al. (2011), was instrumental in surfacing the value created for women members of the movement. Initially, VCF was developed to probe five value cycles that are outlined below and described in relation to the functions of the social movement on agroecology:

- *Immediate value* would refer to the members' experiences of the activities of the social movement, for example, how the members experience the training exercises and the methods, and the methods used by the extension officers.
- *Potential value* concerns the knowledge, skills, resources, and networks gained because of participation in the movement.
- *Applied value* is represented by the members' experiences applying their potential value to their practice. It involves further learning and tweaking of potential value to meet their context. For example, should a farmer apply what she has learnt at the demonstration site to her plot of land, this would be applied value.
- *Realised value* implies the possibility of the outcome. This can be positive or negative; however, both are essential sources of learning. For example, should the

application of new knowledge through a new practice on one's plot of land result in an increased yield, it is realised value, but even a failure can have realised value if one learns an improved practice from it.
- *Transformative/reframing value* could represent a level where the social movement has stimulated changes in practice and attitude in the broader community.

Wenger-Trayner and Wenger-Trayner (2020) later added three other value cycles that also proved to be of importance to this study:

- *Strategic value* refers to the conversations and negotiations among the members and stakeholders to establish a common practice. For example, conversations and negotiations would involve actions to ensure land access. They can also take the form of personal reflections towards full commitment to the ideas of agroecology.
- *Orienting value* recognises the context in which the learning and practice of agroecology are conducted. This is broad and includes all the principles of agroecology and the way of work of Zingisa, which orientates their practice and then, in turn, the farmers' practice. All the key principles, such as no harm, low-cost, integrated, social-ecological, etc., help to orientate decisions about how agroecology does things and how it would not do things.
- *Enabling value* could include the material support and activities that facilitate the social movement's functions.

Each cycle involves a progression through moments of engagement, including activities, negotiation, recognition, and adjustments. However, it is essential to mention that the value cycles are not expected to take a linear format, and participants are not likely to experience all the cycles (Wenger-Trayner & Wenger-Trayner, 2020). Overall, VCF provides a view on whether there was learning in a community of practice (or other collective) and whether value was created for the members (Clarke et al., 2021).

2.1. Data collection

The case study used document analysis, ethnographic work, and semi-structured storytelling interviews with six farmers, three with extension officers, and two interviews with a representative of Department of Social Development (DSD) and Rural Women's Assembly (RWA). I also conducted longitudinal interviews with one of the two extension officer and one farmer. Although their stories may not represent the experiences of all members of the movement or all the associated stakeholders, their stories give a general overview of the experiences of both stakeholders and members. The participants narrated stories about their experiences and were guided by prompts that sought to establish connections between agroecology practice and the associated socioecological factors. The interviews were conducted at various agroecology sites in the Eastern Cape province. From the onset of the data collection process, I was cognisant of Wenger-Trayner and Wenger-Trayner's (2020) caution regarding collecting the stories.

> *Collecting value-creation satisfactory value creation stories takes some time. It is rare to get a good story in one go.* (p. 213)

They further noted that many value detectives have used their observation or participation in activities to find leads for stories. Accordingly, I spent eleven days observing and following agroecology practice from the offices to the field, engaging with the farmers and participating in field activities. I attended and observed a farmer field school on agroecology and considered its role in addressing climate change challenges faced by farmers and food preservation. I conducted document analysis on reports, pamphlets, social media, and websites to enhance my understanding of the movement's history, the present and the future. The use of multiple data collection methods and prolonged engagement in the field enhanced the study's validity (Creswell & Miller, 2000). Storytellers reviewed the draft paper to establish validity, credibility, and plausibility further, and their comments and suggestions were incorporated into the final paper.

2.2. Data analysis

The interviews generated considerable data connected directly to the storytellers' experiences. Data coding was conducted to assign data to specific value cycles using an inductive analysis that teased out major themes. However, the coding was not restricted to the predetermined value creation cycles and indicators; the process was also open to other findings that appeared to not belong to any of the cycles but could potentially be helpful to the success of the training. By doing so, the research accommodates bottom-up indicators in the form of the members' experiences which may not belong to any of the outlined VCF cycles movement and what the storytellers thought was relevant to their practice. Data analysis and consolidation were done using a value creation matrix, shown in Appendix A. The matrix is made up of columns that show the eight value cycles. The guiding questions for each value cycle are derived from Wenger-Trayner and Wenger-Trayner (2020). The monitored indicators are under the relevant cycles and there are extra columns with the names of the storytellers and additional information including the date of the story collection, comments about the story and information that needed follow-up. As shown in the notes column, indicators were expanded through an inclusive, bottom-up thematic process to complement the existing indicators and increase the chance that they were meaningful to participants – because they know what counts as value in their varying contexts.

3. Findings

3.1. Orienting value

When they introduced the concept of agroecology to smallholder farmers in their catchment area, the movement’s leading extension officer and his team discovered that, in most cases, it was only the terminology that was new. Some participants, especially the elderly, could see the resemblance between the principles of agroecology and the traditional agriculture practices of their communities. Establishing this connection created orienting value for the farmers and the Zingisa staff, as captured below in the movement's leading extension officer’s assertion.

> *It was just a matter of reminding people how farming was practised in the past and introducing science and innovations from other stakeholders. Regarding livestock, we encourage our farmers to focus on indigenous breeds because they are accustomed to the local climate and more resilient to [the effect of climate change].* (EO1)

The contextual relevance of agroecology and the movement's quest for a fair food system and its work with various organisations has created opportunities for new participants without land and with limited farming experience. For one of the research participants, a successful agroecology practitioner with clients that include some of the biggest supermarket franchises in South Africa, the involvement of her organisation in agroecology allowed her to get formal training to become a trainer for newcomers into the movement and to champion seed sharing and healthy diets.

> *I started farming on my dad's land, about two hectares; now I have a market [to sell my produce to two leading franchises] and street vendors. So, agroecology is my life. [Now] I'm working for Rural Women Assembly; our slogan says women are mother earth and women are guardians of seeds. We are training women around Eastern Cape on agroecology and telling them the importance of eating healthy and organic.* (Farmer 1)

Similarly, for others, although they had been practising agriculture before, they did not fully understand the utility of local methods and inputs in improving crop production in the practice of sustainable agriculture; the agroecology practice has allowed them to make use of locally available resources to enhance their production.

> *The training is very important; it greatly impacts our practice because when we started, we didn't know anything about agroecology or permaculture; we were planting. We didn't know the importance of intercropping, crop rotation, water harvesting, water conservation, herbs, and their importance in repelling pests. We also take herbs for our health. So, the training from Zingisa was very practical.* (Farmer 3)

Because of the growing interest, the gradual and consistent positive outcomes and the existence of a vibrant international network of agroecology practice which also created orienting value for the movement, some of the participants have had the opportunity to embark on several exchange programmes to improve their knowledge and skills. One of the leading extension officers explained how her participation in the exchange programmes boosted her confidence in finding local food solutions for the rural population:

> *The agroecology movement made me travel to Zimbabwe and Mozambique for the first time. We received training in agroecology, and we benefited because we learnt how agroecology works; it doesn't use pesticides; it only uses natural pesticides that you can make on your own. We don't believe in killing; we believe in controlling pests.* (EO2)

EO2's participation in the exchange programme created potential value for her and other movement members, as shown by the emergence of new insights and confidence in finding

solutions to a longstanding challenge. Additionally, using locally available and environmentally friendly pest control methods provides a double benefit to the farmers; it reduces their operational expenses and preserves the environment. In the training I attended, the trainers mentioned the importance of insects for pollination, improving agricultural soil and keeping pests in check.

3.2. Immediate value

The farmer training often takes place at farmer field schools at a community plot easily accessible to all interested attendees (farmers and non-farmers). The importance of these training venues is that farmers can implement the learned practices immediately, which was mentioned as one of the key features of training that farmers find helpful. At one of the farmer training events I attended, the extension officers started by asking farmers about their prior knowledge and then allowed them to 're-learn or unlearn' based on the principles of agroecology; this was confirmed as a regular practice by one of the farmers.

> *They [trainers] are very good because they are using a leaner-centred approach. They want to know what we already know. The learning process is participatory; we participate and present; the trainers are very good. The trainers don't want to spoon-feed us, and we also don't want to be spoon-fed; they want to know what we know and then correct the mistakes we have been making. After training, the trainers also conduct visits because if they give us seedlings, they need to check the progress.* (Farmer 3)

Although the principles and practices of agroecology were not new to many farmers, and farmers could see connections with the traditional farming practices of their communities, the idea of agroecology was not accepted at first; some farmers and extension officers initially showed resistance and mistrust.

> *Initially, farmers didn't even respect this idea of seed saving so that they would plant everything; after harvesting, they came again begging or asking for more seeds and other inputs.* (EO1)

Similarly, EO2, with almost three decades of work experience in the agriculture sector, has witnessed many transitions in agriculture, and described the introduction of agroecology as challenging. Appropriate to the name 'Zingisa' (isiXhosa word for 'persevering'), the team went through cycles of resistance, negotiations and testing. Through these phases, the team created immediate positive value that led to more learning and the emergence of new insights and increased interest from the farmers, as evidenced by consistent training attendance and willingness by new movement members to pay a joining fee of ZAR25.

> *Sometimes it isn't easy. It is not easy to change the mindset of the people because some think agroecology is very slow and prefer conventional methods. Yes, it is slow, but later, you will see people progressing and producing excellent yields and giving good feedback.* (EO2)

Additionally, my observations of and involvement in training workshops and farm activities showed that it is likely that although the idea of agroecology may be appealing, initial phases, which are manual labour-intensive due to the use of environmentally friendly hand tools, may not be attractice or seen as efficient as those in conventional agriculture. The challenges in establishing healthy engagements and rapport with potential participants represent what the VCF identifies as an immediate negative value (Wenger-Trayner & Wenger-Trayner, 2020).

3.3. Potential value

Despite the immediate negative value, currently, the movement boasts 2 700 members. The increase in the number of participants has generated potential value, including widening the learning and seed-sharing networks resulting in more knowledge and a wider variety of seeds.

> *The more people we have, the more the learning and the easier it is for learning to happen because there is no reliance on 'the knowledgeable ones'. We have trained lead farmers in every community who then teach other farmers, and the learning spreads like wildfire, for an example in one village in Sterkspruit, there was a group of youths whom we trained and have established their project quite well, and one headman from another community approached these youths to come and train youths in his village because they we just sitting doing nothing.* (EO1)

The importance of example-based learning is emphasised in the excerpt above, showing how communities are learning from each other and inspiring changes in attitudes towards agriculture. Additionally, the communitarian learning approach that allows all members to contribute to co-creating agricultural solutions fully enhances the community knowledge base, which is essential in ensuring broad community climate change resilience and food sovereignty.

3.4. Applied value

In discussions on their experiences with the various training projects, most farmers mentioned the importance of field-based demonstrations and practical instructions at the training organisations. Nonkululeko highlighted the connection between the potential value and applied value when she commented on the relationship between the training and the processes of adopting the gained knowledge into her practice:

> *It's more like, we go to class, they teach us, and then we go straight to the field to do what we were taught. And I think that's the best way because you get to see a lot, even when they talk about diseases, sometimes you see the pictures, which are not exactly what you see on the soil. So, when you go there, practically, you can see when the spinach is lacking some phosphorus, and then you know physically what to do; you put in some compost and other stuff.* (Nonkululeko)

However, for others, although the training provided them with new knowledge and the confidence to apply into practice the knowledge and skills, the application process is often hindered by limited access to essential inputs such as irrigation water, pointing to the increasing climate change threats faced by agroecology farmers who mostly rely on rainwater.

> *Here in Khayelitsha, there is a problem with water; water cuts can take up to three weeks, so you must have water storage facilities; you harvest the rainwater so that on the days of need, you have water to irrigate. Without those tanks and buckets you are seeing, there wouldn't be agriculture here.* (Farmer 3)

For a wider reach and enhanced chances of attaining lasting food solutions, Zingisa tried extending support to existing farmer cooperatives but yielded negative applied value due to varying levels of knowledge and preferred approaches among participating farmers resulting in confusion and a clash of interests. In one case, a very successful cooperative plunged into futile conflicts around the expenditure of the fund received from the government; eventually, women farmers were pushed out of the cooperative, and the cooperative is presently not operational.

> *Not all cooperatives are failing; family cooperatives are doing very well because if you bring a big group of people with diverse backgrounds, chances are that conflicts will arise from their work. I think that the government should desist from the habit of saying people should gather and work together when they are not even related and their interests are not even the same.* (EO1)

EO1 further mentioned the success of cooperatives is often determined by the existing relationship between the cooperative members and their commitment to remain in the cooperative despite other interests.

> *Suppose people know that this is our family thing they put all their efforts in, and they respect each other dues to the already existing relations, … in most communities, people are already related. In that case, this is good for power relations. Its projects mostly in urban setups, which usually give us problems because the people are [from different backgrounds] and not all of them will put effort and people's interests are more fluid – today they come for the project work, and tomorrow they look for piece job, so they don't quite commit – farming needs commitment, and most people lose patience, but when the harvesting starts everyone wants a share.* (EO1)

The negative feedback was necessary for the movement to shift their focus from cooperatives to family-based interventions. The movement adopted the slogan "One household, one food garden". Zingisa draws on the work of their partner organisation, which is also part of the movement, Rural Women Assembly (RWA), towards improved practice that caters to women farmers. RWA's slogan is*"*One woman, one hectare, we want land with water" and the organisation recognises women as "custodians of mother earth and women as guardians of seeds", engaging local authorities on issues of farming land, which they consider to be the foundation of agroecology. Figure 3 shows some of the farmland acquired from local authorities.

Figure 3: A thriving agroecology plot with scarecrows to fend off birds
Photo: Author

3.5. Realised value

Through the work of peer trainers, the goal of "one household, one food garden" and efforts by stakeholders, farmers are saving their seeds and making compost for fertilising their fields, reducing their reliance on external support,

> *We see many changes because [previously] the producers relied on the NGO for input. But as of now, most of our producers are self-reliant because they didn't even respect this idea of seed saving so that they would plant everything, then after harvesting, they come again begging or asking for more seeds and stuff. But now, they can save their seeds and make their compost to fertilise their fields. So, these are the changes that we see, that they don't mostly rely on external assistance.* (EO1)

EO1 further mentioned one of the notable successes of the movement as the strong sense of solidarity among the participating farmers in challenging traditional and social-cultural challenges around land ownership.

> *Recently, we've been working with a group of women who have acquired close to 88 hectares of land from the chief. So, chiefs are not only there to reign over people, but they must also look at the welfare of their subjects. So, we try and interact with*

them, engage them for such needs as the land because [while] our main focus is that of agroecology [it] is also [about] land access, water access and then access to seeds, good quality seeds. (EO1)

The incorporation of traditional collaborative practices such as seed exchange and *ilima* (the practice of seeking community help with farm activities without remuneration rather payment in kind) in the movement stimulates co-learning and leads to increased access to indigenous and biodiversity-friendly inputs through the transfer of knowledge, especially traditional knowledge,

We also promote the culture of working together for our farmers so that we can disseminate this information to other farmers because it doesn't assist much to have one farmer in the community who is practising agroecology, and the rest are doing conventional. After all, there is this genetic contamination, you know. So, what we advise our farmers is that they must share their seeds as widely as possible with their neighbours so that, in doing so, they also protect their seed materials or planting materials. (EO1)

For Farmer 3, implementing varying water harvesting and moisture preservation techniques has been helpful, especially considering the water scarcity at her farm.

We used to practise monocropping, but now we are intercropping in the same tiny space; we can plant many different crops, we are yielding more, and we do this while also saving water because, with the raised bed, you only irrigate after two weeks because of mulch which keeps warm and moist for a very long time. I had a very good experience because I noticed that when I implemented things like using raised beds, I realised that I would also be conserving water. At the same time, the raised beds produce nutritious and tasty food compared to the normal beds. The plants also grow very fast compared to normal beds. (Farmer 3)

The assertions above show that despite the challenges associated with the practice, certain aspects have helped farmers remain productive, especially in the context of climate change and water scarcity. We also wanted to understand agroecology's value to the wider community beyond the movement.

3.6. Enabling value

Because of the realised values, there is a growing interest in agroecology and demand for training; Zingisa partnered with other stakeholders who created enabling value through training lead farmers who then train their peers, using their farms as demonstration sites. EO2 mentioned that now the training is going beyond practising farmers, aiming for a broader environmental awareness,

For instance, in Quzin, there is a female farmer who was trained in agroecology, and now she is a trainer herself training even church and community members. (EO2)

This training and the operations of the movement, in general, are enabled by contributions of the stakeholders in the community of practice. This includes the commitment of the

members to persevere in agroecology; financial resources from the Ford Foundation; as well as training and expert advice from Rhodes University, Fort Hare University, the inputs and mentorships from the Department of Social Development, Department of Forestry, Department of Agriculture Land Reform and Rural Development and the existing farmer learning and support networks like Imvotho Bubomi and Ilizwi Lamafama Farmers Union. The partners also rely on support from their regional allies from almost all African countries, including Mauritius, Tanzania, Zimbabwe, Namibia, Senegal, and international partners from Brazil, Europe, and Asia.

3.7. Strategic value

Environmentally, the movement aims to address the challenges caused by climate change by promoting rainwater harvesting and management and various forms of mulching to keep carbon as much as possible within the ground rather than it going up into the atmosphere. These practices can also be seen to reduce causes of climate change on a bigger scale (e.g. reduced use of nitrogen fertiliser, less energy-intensive, creates less pollution, locks in carbon, etc.). This is strategic because it reduces climate change impacts, enhances adaptation to climate change (through local experimentation) and opens up access to climate change funding.

> *When you talk about climate change or resilience, potential funders are interested to see what you are doing about climate change and global warming because climate change is a worldwide phenomenon. As such, climate change is in the interest of global funders. We have been doing well in that regard because most of our funders are external, and when we talk about climate change and resilience, it resonates pretty well with them.* (EO1)

3.8. Transformative value

The communitarian approach to the movement's activities is critical in generating transformative value that includes community cohesion through dependence on each other and self-reliance. Through collaborative activities, the farmers involved are now more organised and have formed partnerships that have enhanced their collective bargaining power,

> *Because marketing has always been a big problem, they – in this group – identify markets and then bargain for prices that are also economical to them on their part. To ensure they don't run into a loss, but at the same time, not charge very exorbitant prices. We have assisted our farmers in forming groups whereby they discuss what they want to produce and then share what to produce and different quantities so that they don't all produce beetroot at one time. In terms of marketing, marketing becomes a problem if you want to go it solo, but mainly because the cost of transportation also becomes high, like recently there is a market that's going to be opened in East London.* (EO1)

The above assertion further shows that while it is built on traditional knowledge and cultural practices, agroecology does not work unquestioningly with all practices; in some instances, traditional practices are tweaked by engaging the community and political leadership,

> *The patriarchal issues long back, there has been a tradition which says that women are not allowed to own livestock, but now we are trying to address these practices that suppress the rights of others because everybody has the right to food. Also, the practice of not allowing women to own land; they can only own it when they are married or when they are the companion of a male. Now we are challenging the powers that be, including the Ministry of Cooperative Governance and Traditional Affairs and Municipal Department, to incorporate gender equity in their practices and allocation of resources.* (EO1)

Although the movement has registered considerable success in changing mindsets and access to healthy nutrition, its practices and potential growth and broad adoption are hampered by the challenges of access to land and credit for farmers to upscale their practices. Where the movement has made inroads, the participants acknowledged that the ideas are sometimes met with scepticism, especially regarding the appearance of organically grown food, requiring the movement members to explain to share more information.

> *We preach that this food is organic, so you must eat the organic food; even if we have cabbages, someone will ask, "why do these cabbages have holes?". And then we must talk, we must give a little briefing that this is organic veggies, so if you see holes, that means the cabbage is very healthy, even an insect can eat it, so that's why you see the holes.* (Farmer 1)

Overall, the presented findings show examples of how the value was created or not created for women farmers in the movement. The findings tabulated in Appendix A and discussed in this section are summarised in Figure 4, showing the flow of value through the eight cycles.

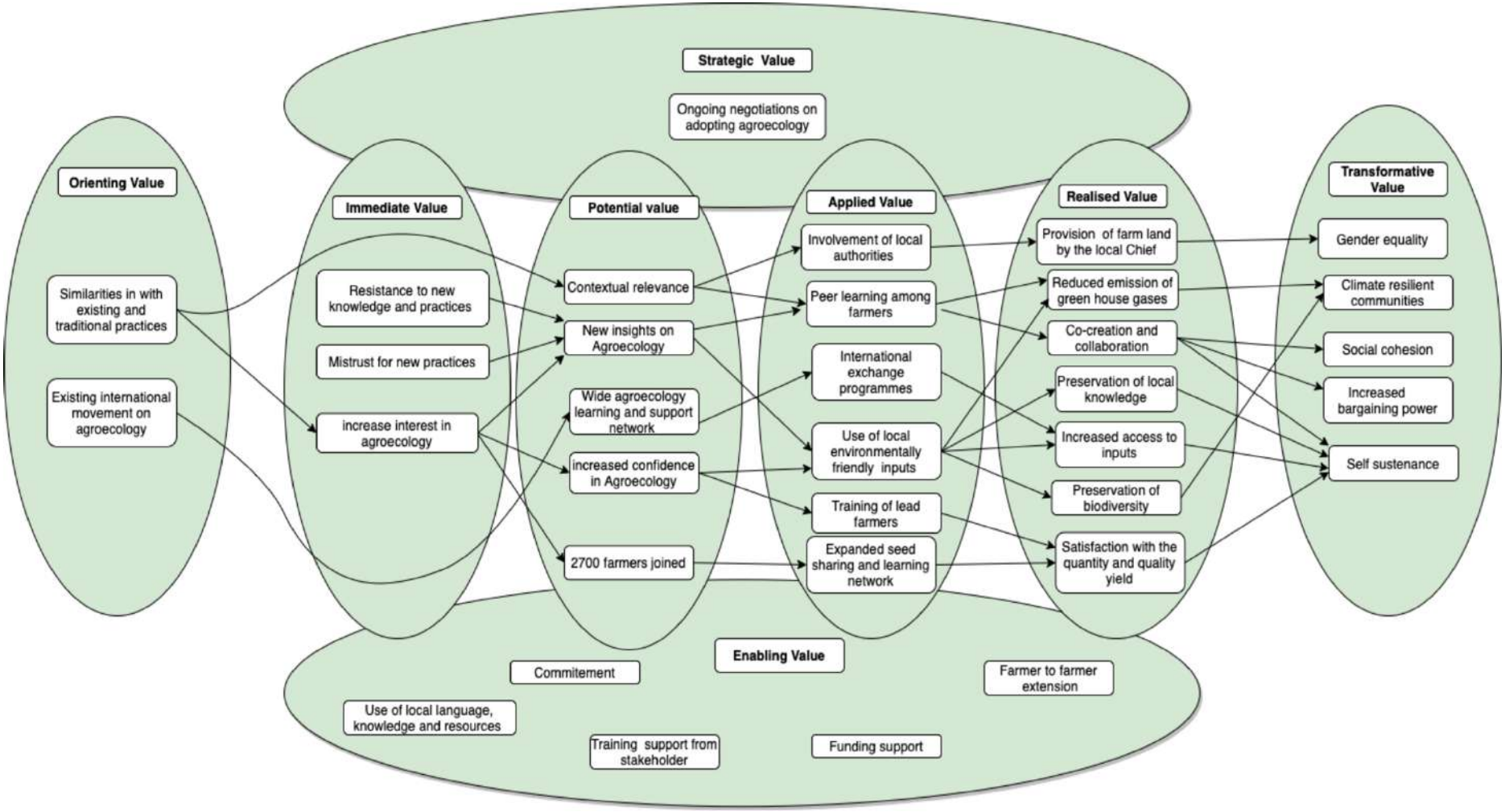

Figure 4: Heuristic presentation of the findings
Source: Adapted from Wenger-Trayner and Wenger-Trayner (2020)

4. Discussion

The study showed that introducing agroecology created an immediate negative value for farmers and stakeholders as the farmers and extension officers had faith in conventional practices. Correspondingly, preceding studies have shown that in several contexts, the resistance was often based on farmers' worry about the yield per unit of land; its viability to address existing challenges of one billion people going hungry in the Global South seemed doubtful(Gakpo, 2021; Muhumuza, 2022). A recent meta-analysis from 16 sub-Saharan African countries on conservation agriculture showed that the negative outcomes of agroecology outweigh the benefits because of the associated low crop productivity and food insecurity in the short term that ends up trapping smallholder farmers in poverty (Corbeels et al., 2020). Additionally, the mixed farming approach has, in most cases, been found to be complex with managing different animals and plants, unlike in monoculture, where farmers specialise in one crop (De Schutter, 2010). Additionally, in South Africa, most small-scale farmers are self-funded with limited access to credit, and have invested significantly in farm machinery, and are therefore reluctant to change, especially without financial incentives (Myeni et al., 2019)

In contrast, a study by De Schutter (2011) found that in recent agroecology projects in 20 African countries, crop yields doubled over 3-10 years and there was an average crop yield increase of 80% in 57 developing countries with an average gain of 116% for all African projects. This is consistent with my findings, which showed that although productivity levels may be lower in the early stages, in the long run, agroecology will pay off and the resistance to agroecology is likely to wane. More consistent findings across the globe showed that although the contemporary use of the term agroecology dates from the 1970s, the science and the practice of agroecology date back to the history of agriculture (Altieri, 1995; Altieri & Nicholls, 2008; Rivera, 2001). The practice is emerging from using locally adaptable inventions to support growing of crops within variability in the natural environment, protecting them from predation and competition (Gliessman, 2007). Consequently, the localised approach allows agroecology to utilise diverse and locally adapted agricultural systems, managed with time-tested indigenous practices that often lead to community food security, promote diet diversity, and maximise returns under low levels of technology and limited resources while supporting the conservation of natural resources and biodiversity (Altieri & Nicholls, 2005).

The study found that closing the gap between farmers and the market positively impacts farmers' bargaining power. For Davis et al. (2022), the effective transformation of food systems requires the participation of small-scale producers, including farmers and pastoralists. It should also include adjusting exploitative governance structures to ensure fair participation in circular economies. The overarching nature of agroecology requires strategic inter-ministerial and government partnerships to streamline policies to achieve multiple local and international sustainability objectives (Food and Agriculture Organisation, n.d.). The transformational power of agroecology is further evident in its advocacy for equitable distribution and equal contributions of all stakeholders which leads to a creative, versatile, and transformative movement.

In the present study, further evidence of the transformative power of agroecology is shown in how it can accommodate progressive ideas while also challenging non-beneficial practices. For example, a study participant built a sense of solidarity among participating farmers to challenge traditional practices and ensure women participants' access to land. Agroecology addresses power imbalances embedded in the social structures of society in contexts where women have long been disempowered. Recognition of women's key role in functional food systems is one of the critical pillars of social movements in agroecology (Sharma & Hansen-Kuhn, 2019). By recognising and supporting women's roles as skilled stewards of biodiversity and land, agroecology practices boost efforts to reduce and mitigate the impacts of climate change, increase resilience in the country and address gender imbalances (Government of Canada, 2021). The pillars of agroecology offer support systems for women to become self-reliant and autonomous and gain more power at productive, reproductive, and community levels (Paula Lopes & Jomalinis, 2011). Considering that the role of traditional African authorities in addressing ecological challenges has been overlooked (Chigwata, 2016), agroecology offers opportunities for changes in social relations by bringing new perceptions to the roles of traditional leaders beyond governing people to include the use of their authorities and traditional strategies to combat the environmental challenges faced by their communities.

Agroecology can be imagined as one manifestation of a global struggle for emancipation – achievable through solidarities, ally-ship and strategic action dismantling the current food system, which is fuelled by solid competition and governed by political interest where corporate actors peddle high-tech, profit-centred 'solutions' that preserve an unjust and unsustainable food system (Anderson et al., 2021). The engagement of traditional leaders and the provision of productive opportunities to women represents the attainment of realised value for moving towards social justice and the attainment of Sustainable Development Goal 5 on gender equality by addressing underlying power imbalances that perpetuate inequality (Food and Agriculture Organisation, n.d.). At the same time, the movement has adopted other traditional practices, such as relying on traditional knowledge and locally available resources. This versatility is critical in building the capacity of communities to respond to poverty, support livelihoods, and address the issue of dependence on external inputs, subsidies, and the volatility of the markets (Altieri, 2004). For some movement members, adopting agroecology has improved their diets and allowed them to earn income, which they use to support farm activities and other daily expenses. Furthermore, in Indonesia, Vietnam, and Bangladesh, the same approach recorded a 92 % reduction in insecticide use for rice, leading to substantial savings for poor farmers (Deguine et al., 2021).

The study found that the farmers participating in the movement are recruiting new members and mentoring them until they are experienced. The learning exchange between farmers also happens during and after training sessions. This farmer-to-farmer learning depends on the capacity to create a learning space where farmers of similar profiles, interests and locality can generate value from themselves through sharing information and collaborating to find solutions to their common challenges (Pamphilon, 2017).

5. Conclusion

While the agroecology movement is gaining momentum across the world and has been instrumental in supporting food security and sustainable livelihoods, farmers are still facing challenges that limit their production; these include limited access to credit, land and land rights, climate vulnerability and limited access to extension services (Wynberg & Pereira, 2018). This paper has showed how providing land, training and resources to women farmers in an agroecological project (Zingisa) enabled them to be part of a social movement that created a varying form of value essential for their well-being and their communities. Agroecology can also be liberating by supporting farmers' diets to become more diverse and healthy, reducing the cost of production, improving bargaining power, market share and profitability and enhancing community and environmental resilience against threats to their livelihoods. The transformative value was not only materialistic; it also included changes in mindset as farmers became aware of locally available resources and the importance of peer support and not being overly reliant on external support.

The VCF analysis of Zingisa in the Eastern Cape has demonstrated the value of locally adapted agricultural systems anchored in the community's socio-ecological climate and indigenous knowledge and practice systems. These systems can result in community food security and the conservation of agrobiodiversity by creating a range of value by minimising risk, stabilising yields, promoting healthy dietary diversity, and maximising returns using low technology and limited resources (Altieri, 2004). However, more support is needed for the agroecology movement to overcome barriers that restrict its successes and to establish avenues of strategic collaboration between farmers and stakeholders to strengthen the combination of local ingenuity and cutting-edge science to bring about the fundamental transformation that works for everyone (Velten et al., 2021).

The performance of agroecology is often considered on a small scale (as was done in this study), making it difficult to scale and generalise the findings (Dalgaard et al., 2003). We need to be cautious transposing the present study's findings to other contexts because agroecology is rooted in the dynamics of the context in which it is practised. Although the detailed conclusions of this paper may not be entirely generalised to other contexts, I am confident that the research has provided original and general insights on how agroecology can help farmers attain their desired livelihood and sustainability goals; it also revealed various blind spots linked to the involvement of stakeholders, the introduction of financial resources and new ways of practice in already existing cooperatives.

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Appendix 13: Paper 4

Provisionally considered for publication: *Agenda*

[https://www.tandfonline.com/journals/ragn20]

Tittle: Women farmers leading and co-learning in an agroecology movement at the intersections of gender and climate

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ABSTRACT

Women in the Eastern Cape Province of South Africa farm against the odds of historical intersectional inequalities continuing into the present: limited access to finance, insecure land tenure, little bargaining power and unequal access to water, exacerbated by climate change. This study was particularly interested in women farmers' access to social learning spaces for expanding their knowledge about farming in the context of climate change. Conventional extension services are often too limited and inappropriate in focus and methodology, centring on the top-down dissemination of an industrial model of agriculture that takes neither the on-the-ground realities of resource-constrained farmers nor climate risks into account. This paper provides a case study of an agroecology movement that, by contrast, promotes climate-appropriate, low-cost farming practices

that are tried out and further developed by the farmers themselves. Led by women farmers, the movement responds directly to their needs and not only allows for but requires co-learning and co-construction of new knowledge – that is, social learning. Following an ethnographic approach, the lead researcher joined in and observed farming and learning activities; and engaged farmers and other movement members in semi-structured interviews designed to explore the value derived from learning (Wenger-Trayner &Wenger-Trayner 2020). The paper concludes that the movement is responding to many of the inter-sectional challenges that women farmers in the Eastern Cape face and that its social learning approach holds much potential for expanding women farmers' ability to provide for themselves and others, despite the challenge of climate change.

Keywords: agroecology, climate change, women farmers, social learning, value creation

Introduction

Black women in the Eastern Cape Province of South Africa farm against the odds of historical intersectional inequalities continuing into the present. These include limited access to finance, insecure land tenure, little bargaining power and unequal access to water, the latter being exacerbated by prolonged droughts in the region, that render food security and income generation activities even more marginal. This study was particularly interested in women farmers' access to social learning spaces for expanding their knowledge about farming in the context of climate change. Other research showed that conventional extension services are often inadequate in scope and inappropriate in focus and methodology, centring on the top-down dissemination of an industrial agriculture model that takes neither the on-the-ground realities of resource-constrained farmers nor climate risks into account. This paper provides a case study of an agroecology movement in the Eastern Cape that, by contrast, promotes climate-appropriate, low-cost farming practices that are tried out and further developed by the farmers themselves. Led by women farmers, the movement responds directly to their needs and not only allows for but requires co-learning and co-construction of new knowledge – that is, social learning.

Focusing on the experiences of the involved partners, extension officers and the practical utility of the methods used for facilitating social learning, the paper shows that the movement is responding to many of the inter-sectional challenges that women farmers in the Eastern Cape face, and argues that its social learning approach holds much potential elsewhere, for expanding women farmers' ability to provide for themselves and others, despite the challenge of climate change.

The problem statement and context

Studies from the Eastern Cape province in South Africa and elsewhere showed that conventional extension services are often inadequate in scope and inappropriate in focus and methodology, centring on the top-down dissemination of a capital-intensive industrial model of agriculture that neither takes climate risks into account nor matches other realities on the ground (Cobban et al. 2020; Loki, Mudhara & Pakela-Jezile 2020; Mzuyanda et al. 2022; Pesanayi 2018). The public extension services' contribution to farmers' adaptative capacity is dwindling, and farmers have to increasingly rely on other sources of information, including their peers and media (Popoola, Yusuf & Monde, 2020). These challenges could be traced to pre-service extension service training methodologies that do not prepare trainees for unforeseen socio-ecological challenges and lack opportunities for in-service extension officers to learn to deal with the contemporary intersectional challenges faced by farmers (Pesanayi 2018). Access to extension services that do not limit women farmers' access to knowledge and resources, and effectiveness of the available extension services in terms of institutional arrangements, training approaches and the available resources, are challenges (Karubanga et al. 2016).

Although these the challenges are being felt across the agricultural sector (see e.g. Cobban et al. 2020), they are more pronounced among black farmers (Sinxo 2022), and especially among black women, whose limited access to secure land tenure, water and resource support can be traced to social-cultural practices reinforced by policies. The Native Land Act of 1913 restricted black South Africans from owning land and participating fully in agriculture (Redding 2020; Mokhele 2022). The aftereffects of these discriminatory practices in South Afrtica and elsewhere are still evident in contemporary agricultural systems. This also applies to gender discrimination. Resources and innovations central to agricultural adaptations are often reserved for men as they are frequently channelled through traditional channels dominated by men, reinforcing women's exclusion in development discourse and practice (Maziya et al. 2020; Satyavathi, Bharadwaj & Brahmanand 2010). Evidence from Limpopo and the Eastern Cape provinces show structural inequalities between men and women in the agricultural sector; the existing support structures deprive women of fair participation and access to on and off-the-farm opportunities (Aphane, Dzivakwi & Jacobs 2010). These patriarchal channels have a monopoly on resource allocation, compromising women's adaptation capacity and often confing them to time-intensive and laborious farm work with less reward (Jost et al. 2015). Research on agricultural financing in South Africa for emerging farmers showed that the gender-skewed farmer support model favours those with substantial social capital

but limited experience and interest in agriculture, resulting in huge investments benefiting the wrong people and being lost in failed agricultural projects (Sebola 2018)

Added to these challenges, a growing amount of research on gender-differentiated impacts of climate change shows that women are affected the most by climate change (Glazebrook 2020). Yet, their involvement in the climate discourse remains peripheral, with climate change generally being treated as a "scientific problem requiring technological and scientific solutions'' (Gaard 2015, p. 20). Nonetheless, the reality in practice is quite different; women are at the coalface of interventions on environmental health and sustainable livelihoods (Denton 2002; Gaard 2015;). Rural women's experiences as small-scale farmers are often ignored in agricultural research and innovation, and they are often not considered clients for new technologies and training that could improve the efficiency of their practices and the quality and quantity of their output (Satyavathi, Bharadwaj & Brahmanand, 2010). To try and improve their precarious position and adapt to their challenges, women farmers often rely on traditional knowledge and tools that bring the triple jeopardy of high labour demands, poor adaptive capacity and far-reaching environmental costs (Graciele Seibert et al. 2018), further entrenching the conjunction of the feminisation of poverty and environmental degradation caused by climate change (Glazebrook 2020). To remedy this dire systemic situation, Sachs and Alston (2010) make a clarion call, to which the present paper is a response, for gender-specific research that recognises the dire situation of women in agriculture and propose workable solutions.

> In the future, we will need to research the impact of climate change, especially the changing availability of water, on women's work in agriculture. Women farming in vulnerable and drought-prone regions will face increased pressure as they attempt to cope with and adapt to climate change. (p.286)

A review of farm-based and farmer-led learning and research have registered gains in some contexts of women-led social movements to address the complexities of climate change and meaningful farmer learning in the drylands (Waters-Bayer et al. 2015). At the heart of the success of these movements has been their ability to generate locally appropriate solutions to socioecological challenges in agriculture, with a high uptake rate by farmers compared to the prevalent top-down approaches usually adopted by extension services (Waters-Bayer et al. 2015). Among these approaches is agroecology, a transdisciplinary, participatory, and action-oriented approach to agriculture that values diverse forms of knowledge and experience in challenging monopolies in the capitalist food system, and advocates for the involvement of all stakeholders, from the farm to the table and everyone in between (Gliessman 2018, p.599). The practice of agroecology challenges existing power dynamics at all levels of decision-making – from the village to the national level – and

the exploitative monopolies of the current food systems, in favour of a context-driven and gender-sensitive approach that considers the interplay between one, the society and the environment and two, the interface between agricultural science and traditional knowledge (Graciele Seibert et al. 2018). Its success is nonetheless not universally accepted; some question the utility of agroecology and argue that it has limitations in transforming agriculture and ensuring the welfare of small-scale farmers (Mugwanya 2019). This paper seeks to make a contribution to the contention as to whether agroecology and farmer-led learning and practices are effective in addressing social and ecological challenges; it furthermore adds to the desktop review by Waters-Bayer et al. (2015), through a field-based evaluation. Between August 2022 and April 2023, the lead author conducted ethnographic research to explore the experiences of women farmers in a social movement on agroecology in the Eastern Cape, through an evaluative lens, which adds to the insights in the literature and hopes to inform further advances in practice, in particular, the practice of agricultural extension.

The case study

The agroecology movement that informed this paper is 20 years-old and is led by the Zingisa Educational Project (ZEP). As an agroecology movement, ZEP's key objective is to facilitate co-learning and knowledge co-creation, building on existing and traditional knowledge of local ecology and cultures, to confront the socially and environmentally unsustainable status quo of the mainstream food systems, and to contribute towards ecologically sustainable and viable food systems that work for everyone.

The women-led movement is part of a local community of practice for climate adaptation whose practitioners include students and lecturers from local tertiary institutions, government officials, members of ecofeminist organisations such as Rural Women's Assembly (RWA), and farmer learning and support networks such as Imvotho Bubomi Learning Network, Ilizwi Lamafama Farmers Union, Mxumbu Youth Project, and others who provide learning opportunities and resource support to farmers and other members. The various organisations and networks overlap, and they are quite extensive. For example, RWA has over 9000 members involved in gender-related projects; some of them have also joined the ranks of the ZEP agroecology movement, which has over 2700 members in the Eastern Cape alone.

Internationally, the agroecology movement is connected with broad solidarity and knowledge-sharing networks, especially in the Global South. Greenberg and Drimie (2021) link this connection to increased recognition of its ability to empower farmers to create practices relevant to their resource contexts, climate vulnerability, resilience, and adaptive capacity.

The methodology followed for the case study and the theory that informs it

The case study of the ZEP agroecology movement was part of multi-case study research on the learning experiences of women farmers in social learning spaces for climate action led by Chanyau. The study's overall objective was to understand how women farmers access social learning spaces and knowledge about climate change and assess their experiences and the value they derive from their participation (Chanyau, forthcoming). The ZEP movement was identified with the assistance of a key informant with whom the lead researcher established contact while working on the first case study. The Amathole District Municipality, shown in Figure 1, forms part of the ZEP's catchment area in the Eastern Cape Province of South Africa, and was selected as a suitable site because the movement has been actively involved in the area; climate change had been included in its work; and it had some clear results to share with the researcher.

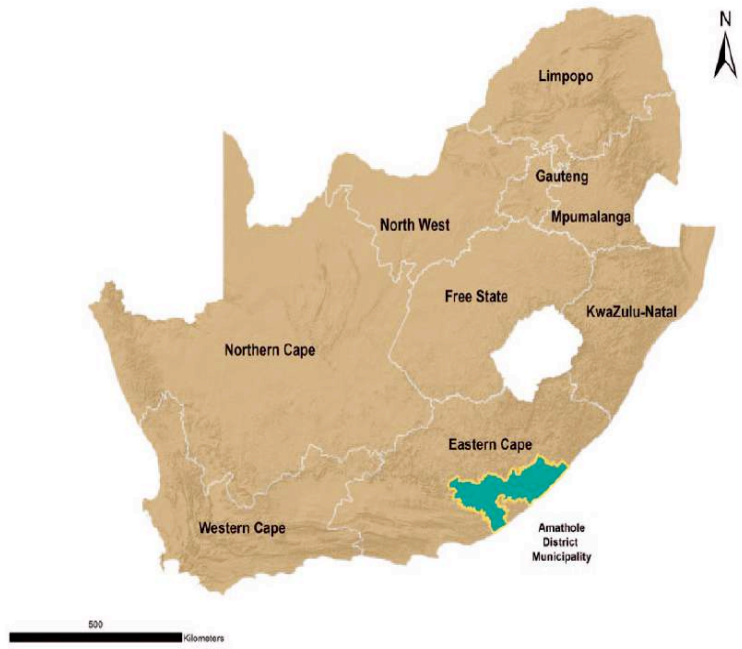

Figure 1: Location of the case study area, Amathole district on the South African map
Source: Fisher (2017)

To guide the data collection and analysis, we adopted Wenger (2010)'s theory of social learning and Wenger-Trayner and Wenger Trayner (2020)'s concept of the Value Creation Framework (VCF). Social learning here refers to the engagement among people in pursuit of a difference they care to make (Chanyau ibid). Value refers to the extent to which participation in a social learning space is seen as leading to a difference that matters to the participants (Wenger-Trayner & Wenger-Trayner, 2020). Over the years, development education spesialists Wenger-Trayner and Wenger-Trayner

(ibid.) developed a framework suitable for evaluating the processes and outcomes of social learning processes; in this framework the researcher engages participants in social learning spaces to ascertain whether they have experienced any *immediate value* from participating in the social learning space; any *potential* or *applied* value; any *realised* value and any *transformative* value. The framework also probes for *orienting* value (that enables the social learning space in the first instance) and *strategic* value, that goes beyond the immediate context of the learning space. These are the value 'indicators' that will be used in this evaluative study, and both the presence of the value, and its absence, should be noted

The data collection methods consisted of:

1. Document analysis to gather information on the background and impacts of the Zingisa Education Project.

2. Participant observation of the farmers and other movement members in social learning spaces and the agroecology plots, providing a vantage point on real-time farmer learning and farming practice.

3. Ten value-creation 'storytelling' interviews in English and isiXhosa conducted with the help of a local research assistant. The 10 interviewees consisted of two extension officers, one man and one woman who spearheaded the movement, two representatives of partner organisations, five small-scale women farmers and one male farmers. The participants were varied in terms of their forms of land tenure, number of years in the movement, skills and specialities, roles in the movement, and location in the Amathole District. Research participants were purposefully sampled when they were shown to be knowledgeable about the movement and its value for farmers. A key informant familiar with the movement and aware of other considerations such as physical accessibility, language, safety and security, assisted with their identification.

We utilised a deductive data analysis approach to make sense of the data, code it and develop themes to share and discuss the findings.

Findings

Value created in response to the Covid-19 pandemic

The ZEP-led agroecology movement in the study site consists of various social learning networks, farmer field schools and local and international exchange programmes. In recent years social media platforms have been added and their use is growing rapidly. The increased use of digital

communication has been intensified by the COVID-19 pandemic, which restricted person-to-person interactions among farmers and support structures. These media platforms were found to be a form of potential value, because not all participants had the necessary know-how and connectivity to use them.

The pandemic, which threatened food security in many marginal areas, also created a moment where existing calls for agroecology acquired new relevance to disrupt the centralisation of food production in order to allow for more dispersed and resilient food production(Altieri & Nicholls 2020). The increased calls for efforts to create more equitable and resilient food systems for those on the margins of the mainstream economy are a form of potential value and if they were to be heeded, they would have strategic value for the movement and its beneficiaries.

Enabling Value: Zingisa's recruitment and learning approaches

When attending the movement's information sharing days we found that the learning sessions were done predominantly in isiXhosa, the language spoken by most of the participating farmers in the Eastern Cape. Community gardens are places for active and observational learning and mobilisation. Demonstrations with explanations were given by extension officers and farmers taking turns doing the same activities and asking questions of the onlookers.

Figure 1: Extension officer demonstrating proper plant spacing in Mdantsane, emphasising the need for space for the growth of roots and leaves

Phote credit: Lead author

Figure 2: Farmers palnting seedlings following instructions on spacing

Photo credit: Lead author

Interview data indicates that movement members regularly go on learning-oriented recruitment drives where they exchange information and resources with other farmers and interested parties.

On the learning drives, experienced members and newcomers co-create knowledge as they share their own and others' research findings and experiences from practice, and propose solutions to commonly experienced challenges, through open dialogues based on the needs of each participating community and individual farmers. The leaders in the movement argued that their approach to farmer engagement has resulted in ongoing and effective learning not only among but also from the new members and their communities:

> When we go for [community engagement] dialogues, we set up the meetings in advance, we then do our programmes here [at the offices], but then when we are with them [the community], we change the programme to go with the learning interests of the participants because we learn from each other ... we engage in a two-way process where we all learn … it

> has been a great learning experience for me. I didn't know as much about climate change and agriculture as much as I do now. [Interview: Dimpho, 10 March 2023, Ntabuzoko]

Further enhancing the potential value of the training is the 'train the trainers' aspect where a team of women-dominated extension officers work directly with women movements that are feminist-based to recruit and train farmers (mostly women who are interested ini agroecology). In turn, the trainees are expected to train others in their communities. As one key informant noted:

> We encourage them [members] to share skills, we encourage skills transfer to others in their communities. We also established learning network with an alliance of non-governmental organisations (NGOs); we work with them in crop production, we train a small number of women in agroecology, and they go back to their communities and train other people, this is how we share the skills and information with others. (Interview: Thabi, 10 March 2023, Mdantsane)

However, the learning processes are not without hurdles. The movement has adopted more gradual approaches to learning that accommodate the scepticism and hesitation they often face when introducing topics that are not closely aligned with the existing social-cultural practices in the areas where they work. As one trainer mentioned:

> It's not always easy [to get women to fully participate in our projects] because patriarchy is endemic in the areas that we work, we try by all means to rub-off that mindset, sometimes we face resistance, but when we do dialogues, things work better, these dialogues do work because the reason for resistance is usually lack of knowledge. (Interview: Thabi, 10 March 2023, Mdantsane)

Thabi's interview shows that value is not always immediately recognised; sometimes, the uncertainties surrounding new practices and attachment to ingrained sociocultural beliefs and practices, which are also at times reinforced by policies, restrict the reach and effectiveness of the movement. However, while the collaborative learning and practice approaches are time and resource intensive, they do often make breakthroughs eventually, and another trainer, Dimpho, mentioned that the effects of the participatory learning approach and the liberation that comes with new knowledge and less dependence is evident in the participants' "growth in confidence and energy to start and continue with crop production" [Interview, Dim, 10 March 2023, Ntabozuko]. Newfound confidence and renewed energy among farmers has of course great potential and orienting value.

Potential value: New knowledge shared

Although members of the movement interviewed expressed satisfaction with their engagement with various key stakeholders, including government departments, they were concerned about the general lack of climate-related information that farmers need to be proactive. This included the lack of adequate and relevant weather forecasts and information regarding access to markets. Some

interviewees said they struggled to comprehend some of the key information that is pertinent to their farming practices, even when it is available.

The study participants' consensus regarding information was that, although the information is in most cases available, it is not always easily comprehensible; sometimes it does not speak to their realities, making their farming practice less productive and more vulnerable to unfavourable climate conditions. The movement has stepped in to stimulate and support expansive social learning on climate change not only relevant to farmers but also to the broader community for comprehensive and collective climate action:

> Weather forecasts do not provide enough and early information for farmers, so they tend to be vulnerable to every adverse effect of climate change. We are also trying to raise awareness of deforestation and veld fires, which are some of the causes of climate change. We also encourage our members to ensure broad climate resilience and adaptation by sharing information with the public, especially during market days, where farmers sell their produce. [Interview: Dimpho, 10 March 2023, Ntabuzoko]

Realised value: Mobilisation of resources

Against the precarity of the members and their communities in confronting changing environmental conditions, the agroecology movement has had encouraging results, reflected in an increase in membership and varying gains on climate justice and socio-ecological resilience.

For the farmers there are also real tangible benefits of participating in the movement. For example, after each training session, they receive seeds or seedlings and pamphlets on topics like crop care and harvesting procedures. But much of the mobilisation of resources takes place through means other than handouts, namely exchanges among members, establishment of new collaborations and coordination.

The learning network conducts seed sharing and members refer to themselves as ‘the guardians of seeds’; this has potential value but also applied and realised value, as access to more seed varieties leads to enhanced crop diversity and productivity, resulting in the members producing more for themselves and the market, with the financial proceeds supporting other pressing needs, like school fees for children.

For some movement members, the establishment of community gardens was a response to the impacts of climate change like prolonged droughts, associated social justice issues such as loss of employment on commercial farms, and increasing socio-economic difficulties. The adoption of

agroecology into their food gardening practice came at a later stage as a measure to maximise crop output without much financial investment:

> I decided that *hayi* no man, let me call women in my area and let us start this project because we also know that climate change affects us women the most. And also, you know people are losing jobs, and there's this talk about food insecurity, it is poverty, people are hungry, and it's affecting us, especially as women. (Interview: Busi, 2 October 2022, Mdantsane)

The community plots are mostly unused urban spaces and school backyards; these are conduits for group learning through joint experiments. They have also been effective in risk pooling, thus mitigating against widespread losses. Members with backyard spaces at their homes are expected to establish home gardens and implement what they learnt; they are also expected to loop back their new knowledge and skills into the learning space for other farmers or prospective farmers, who may not have been able to be part of the initial learning activities but have expressed an interest in learning. The organisations involved provide various services that enable the movement to run 'training of the trainers' projects that significantly open more learning opportunities for the communities they work with. This mobilisation of human resources is another example of potential value created in the movement.

Strategic value: Confronting sociocultural norms and intersectional injustices

Agroecology learning spaces are also used to advance community awareness campaigns connected to the overall objectives of the movement. As one of the trainers explained:

> We established a learning network with an alliance of NGOs [non-governmental organisations]; [and] in every gathering we have, we raise issues of gender-based violence. (Interview: Thabi, 10 March 2023, Ntabuzoko)

As noted earlier:

> It's not always easy [to get women to fully participate in our projects] because patriarchy is endemic in the areas that we work, we try by all means to rub-off that mindset, sometimes we face resistance, but when we do dialogues, things work better, these dialogues do work because the reason for resistance is usually lack of knowledge. (Interview: Thabi, 10 March 2023, Mdantsane)

The need for many more women to be effectively involved in agriculture through more just and equitable land access, resources and learning opportunities is strategic to achieving climate justice in the context of increased vulnerabilities among rural women who face a double burden to adapt their livelihoods and socioeconomic activities to the changing environment. Behind the Rural Women's

Assembly(RWA) practice is the conviction that without women's effective participation, climate change will further exacerbate their vulnerability to poverty, exploitation, and gender-based violence:

> We work directly with women's movements that are feminist-based [working closely] with women farmers and those interested in agriculture on the issues of access to land. The work aims at helping women cope with the challenges of the modern world, like climate change, especially how it disproportionately affects rural women and children [through agriculture learning projects]. We know that women who are most vulnerable to gender-based violence are the ones who are reliant on their husbands, so we try to help them become independent [through agroecology and other empowerment projects]. (Interview: Thabi, 10 March 2023, Mdantsane)

The importance of climate injustice is emphasised in the quote above; the quote goes a step further to show that although access to land only by women is one of the pillars of the movement and agroecology in general, land on its own is a means and not an end in itself, because it does not automatically lead to the desired social justice outcomes. Effective learning and support in the context of evolving social and ecological challenges is important in achieving climate justice and better livelihoods for all and in addressing the ripple effect of climate vulnerability.

There is a great sense of social cohesion and solidarity in the movement, and the traction built by its partners, especially RWA and its "One Woman, One Hectare with Water Campaign", has yielded results. The solidarity has engaged the local traditional leadership and the Department of Traditional Affairs to seek the provision of land to meet the demand of landless women, as reported below:

> The women have acquired close to 88 hectares of land from the Chief. So, Chiefs are not only there to reign over people, but they must also look at the welfare of their subjects. So, we try and interact with them, engage them for such needs as the land, because our focus in agroecology is also land access, water access, and then access to seeds, good quality seeds. (Interview: Eddie, 7 October 2022, Ntabuzoko)

Additionally, Eddie mentioned that the movement has stimulated gradual change in the negative perception of women as capable food producers. However, it sometimes requires them to showcase examples of successful land use by women as a way of proving their capabilities and their key contribution to food production:

> We are focusing on household food production so that it can showcase that women are able to produce their own food and not go hungry. So, what we do is that we take the traditional leaders and show them the projects to prove that women are using the land successfully and there is a need for more land. (Interview: Eddie, 10 March 2023, Ntabuzoko)

Figure 3: An extension officer visiting one of the agroecology plots in Potsdam East

Photo credit: Lead author

Figure 4: Extension officer demonstrating land preparation at a community agroecology plot in Mdantsane, with RWA'S banner in the background reading, 'One woman, One hectare with water"

Photo credit: Lead author

Figure 5: Members of the movement at the launch of a new agroecology centre at an Early Childhood Development centre in Dimbaza

Photo credit: Lead author

Potential and strategic value: Partnerships

Information-sharing days include relevant government departments in a quest to align their extension and development practices more closely with the needs of the small-scale producers threatened by climate change and market monopolies. This is an example of the potential and strategic value of the movement. But much is also to be gained from the new and better informed collaborations that emerge through the movement among farmers themselves. As Eddie from Zingisa, the leading extension officer in the movement, pointed out, through the camaraderie and trusting relationships that exist between the members of the movement, they can streamline their farming activities and plan for better bargaining power during the selling season, as part of a fight against the food monopolies that pose significant threates to small-scale producers:

> Marketing becomes a problem if you want to go it solo, mainly because the cost of transportation also becomes high, ... there is a market that's going to be opened in East London. What we have done is assisted our farmers in forming groups whereby they discuss what they want to produce, and then they share what to produce and different quantities so that they don't all produce beetroot at one time. (Interview: Eddie, 7 October 2022, Ntabuzuko)

The movement has built other participatory and collective strategic activities, such as seed saving through seedbanks and the practice of *ilima,* where farmers help each other execute difficult or labour-intensive farm work such as land preparation. Creating and supporting social cohesion amongst communities brings out the spirit of *Ubuntu* (relating to each other for the benefit of the

community) and community members' interdependence for livelihoods and improved productivity. Additionally, the social cohesion in the movement has allowed the members to increase their market access by pooling resources together to meet the needs of clients of varying needs, mostly in their communities:

> When there's a funeral, we go to the group and say: "there's a funeral or a ritual ceremony here, and is there anyone who is having vegetables so that I can take the veggies to the funeral?" and then someone will say, "yeah, I'm having potatoes", the other one, "I'm have beetroot", the other one "I have this and this". And then we collect the produce and go and sell them at the funeral, or at the place of ritual ceremonies. (Interview: Thabi, 5 October 2022, Mdantsane)

The importance of solidarity is emphased by all the participants and the data has shown its importance in the functioning of the movement, from land and resources access, land preparation and crop production to access to favourable markets.

Discussion

Mobilisation and growing the network through other women, learning in and through networks

The adopted farmer-led learning approaches rooted not only in the needs of the farmers but also in those of the wider community are an empowering, value-creating asset that generates increased interest in innovative farming practices and new knowledge and restructuring agricultural practices, especially enhancing and recognising the critical role of women in food production. Correspondingly, the prevailing policy discourse leans towards improved access to information, resources, and opportunities to create knowledge and innovations that enhance the competitiveness of women farmers as key in ensuring the social transformation of women's social and economic position in society (Food and Agriculture Organization [FAO] 2011; Manfre & Nordhen 2013).

Unlike conflict-prone top-down approaches to extension that often reinforce the gap between extension, farmers and stakeholders and are out of step with the practical realities of farmers (Pesanayi 2018), the movement's learning approach accommodates and stimulates a sense of ownership and responsibility as reflected by the involvement of the members in establishing new food gardens or plots and recruiting new members. Responsibility and ownership seem to make it easier for the members to confront embedded social and cultural issues that cause resistance to new forms of practice and which traditionally constrain the full participation of women in agricultural activities and benefits. Similarly, in rural communities of Ghana, Kenya and Zambia, sense of ownership was seen to accelerate gender equality by creating opportunities for alternative resources mobilisation and female participation (Kelly et al. 2017).

Contextualised learning through practice, experimentation, adaptation

Farmer-centred experimentation seem to be central to the movement's success. The method differs from top-down and linear extension services; it is an empowering learning approach because it accommodates varying pieces of knowledge, contextual differences, interests, and competencies towards a successful shared outcome. The utility of such learning approaches is not only recognised in Zingisa, but a global survey also showed their utility has been seen in improved rural communities' human, social, natural and financial capital, all important for improved livelihoods (Berg et al. 2020).

Women's increased participation and access to learning, especially about climate change, is critical in ensuring sustainable food systems, food security, and community resilience, as climate change is tied to their livelihood outcomes. However, it is important to emphasise that learning and practice strategies should align with the contextual climate vulnerabilities and the social profiles of the intended beneficiaries, especially women farmers.

Although, farming groups cannot satisfy the entire agricultural resource needs of women (Othman, Outghton & Garrod 2020, p.596), our study established that group farming in the form of community gardens was important in reducing potential individual loses, establishing and cementing social cohesion, improved market access and bargaining power for better profit margins.

Learning and acting in the context of the on-the-ground realities, including farmer diversity, power imbalances and resource inequalities

This paper has shown that farmers are not a homogenous group; they have different levels of agency, they learn and practice in different contexts with varying tenure systems, especially between the increasing urban farmers and rural farmers. Therefore there is a need for a nuanced approach to extension services which goes beyond just inclusion and strives for effective representation of all groups of farmers in decision-making about their learning and resource needs. Leveraging on the utility of CoPs as conduits of the two-way flow of learning between extension services and farmers is key because effective CoP are important in strengthening existing extension services and transform the hostile environment within which small-scale producers operate, especially women farmers, operate and prepare to adapt to unforeseen socioecological changes.

In the conventional markets, Courtois and Subervie (2015) noticed that small-scale suppliers are generally viewed as having limited bargaining and balance of power due to the competition in the market and the remoteness of farms and poor communications that leave farmers uncertain about market prices. It has been consistently shown that when farmers pool resources, they gain power to negotiate for a fair market (Velázquez, Buffaria & European Commission 2019). In Latin America,

such markets were key in helping small-scale farmers escape the monopoly of conventional markets that already lack the capacity to absorb agroecology-based produce (Muñoz et al. 2021). The case of the ZEP agroecology movement showed that effective learning for farmers goes beyond understanding production processes; it sets the conditions for collaborations leading to reduced cost of production through *ilima*, low-cost farming practices that are tried out and further developed by the farmers themselves, open-source seed stocks and improved market access for better profit margins and better livelihoods, thereby addressing some of the challenges caused by power imbalances and resource inequalities in agriculture and other spheres of livelihoods including access to education for children. Furthermore, a key feature of this agroecology movement is that the intersectional socio-cultural dimensions of agriculture, including women's status and access, are addressed, alongside the details of agricultural practices, in context-appropriate and transformative ways.

Facilitating example-based learning through highlighting quality case studies of women success and leadership in agriculture

The role of women in agriculture, as key players across the food system, has significantly shifted over the past two decades, despite the slow changes in policy and programme strategies to ensure their full participation and the visibility of their contribution to the global developmental agenda (Akeredolu 2008). However, the literature and the evidence presented in this paper shows that the shifts are happening at a slow pace. The analysis of women's participation in agriculture often masks cases of impactful women leadership at subnational and national levels. For ZEP, in some instances they have to show evidence of women successes to lobby for more land, because their success stories are not enough, there is a need for empirical evidence. It is therefore important for research to raise awareness of evidence-based success stories as is the case of ZEP to act as inspirational quality case studies of women's actual contributions to generate transformative value beyond the agricultural sector and to spark change in other spheres of development. In a world facing so many uncertainties and challenges, there is a need for positive news, especially around women farmers who are often portrayed as victims, to share their contribution to addressing one of the key challenges, climate change just and resilient food production practices.

Conclusion

This paper details a successful example of an agroecology movement in the Eastern Cape province of South Africa, which is enabling the access of new and established black women farmers to timely and context-specific agricultural and climate information, towards a broader community resilience and

adaptive capacity. With contextually grounded and collaborative learning methodologies, extension services in social learning spaces have a great chance of helping farmers create value for themselves and their communities. It is evident that it is not only the existence of the movement or access to extension services that has enabled women farmers to attain the differences that they care about – improved climate adaptive capacity and sustainable agricultural practices – but the importance of effective social learning that accommodates farmers of different competencies and encourages learning and practical collaborations among them to address individual and collective socio-ecological challenges. The study showed women as key players in food production, signalling the need for extension services and other stakeholders to shift the discourse from the problematic framing of women as either victims or as survivors and to see them as drivers of sustainable societal change.

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