A thesis submitted to the Department of Environmental Sciences and Policy of Central European University CEU PU in part fulfilment of the Degree of Master of Science

Harnessing cross-sector collaborations to mobilise smallholder farmers as agents of building resilient communities: A study on the Herding 4 Health programme in the Kruger to Canyons Biosphere Region, South Africa

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ABSTRACT OF THESIS submitted by:
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Harnessing cross-sector collaborations to mobilise smallholder farmers as agents of building resilient communities - A study on the Herding 4 Health programme in the Kruger to Canyons Biosphere Region, South Africa

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Tackling "wicked problems" require collaboration between organisations across sectors. This thesis research aims to (i) understand the impacts of cross-sector collaborations on smallholder communities, (ii) explore how cross-sector collaborations influence climate adaptation strategies in rural communities, and (iii) explore frameworks that could aid and enhance such collaborations. The research was conducted as a qualitative case study of the Herding 4 Health programme implemented in communal farming areas in the Kruger to Canyons Biosphere Region, South Africa. Findings highlighted the programme's significant impacts on livestock farmers, wider communities, and the environment through mechanisms including holistic rangeland management, market access, setting up community governance structures, and broader impacts like job creation. However, long-term sustainability without external support poses a significant concern. The study emphasized the necessity of multisectoral approaches, leveraging strengths from organisations across different sectors like Non-Governmental Organisations, enterprises, academia, governing bodies, and traditional authorities. The recognition of farmers as key partners in implementation of cross-sector collaborations was crucial for the success of community-based programmes. An analysis was also carried out by using the Donella Meadows's leverage points framework to identify leverage points of change within cross-sector collaborations in rangeland systems. Recommendations focus on directing funding and efforts towards factors of deep leverage. Creating robust information channels, building an enabling framework of enterprise and support structures, and establishing strong community governance structures are crucial in creating systems change. The highest leverage points are driving organisations towards a common systems goal and designing a holistic management approach that focuses on the livelihoods outcome of communities. These leverage points can be tapped into through herders and facilitators who are the key levers of change in rangeland systems.

Keywords: cross-sector collaborations, smallholder farmers, resilient communities, climate adaptation, leverage points perspective, systems thinking, communal farming, rangeland management

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List of Abbreviations

CA	Conservation Agreement
CEU	Central European University
CI	Conservation International
CSA	Conservation South Africa
DALRRD	Department of Agriculture, Land Reform and Rural Development
FMD	Foot-and-mouth disease
H4H	Herding 4 Health
K2C BR	Kruger to Canyons Biosphere Region
K2C-NPC	Kruger to Canyons Non-Profit Company
KNP	Kruger National Park
MOU	Memorandum of Understanding
MNA	Meat Naturally Africa
NBC	Nonprofit-Business Collaboration
NGO	Non-Governmental Organisation
NPC	Non-Profit Company
NPO	Non-Profit Organisation
PA	Protected Area
PPF	Peace Parks Foundation
SANParks	South African National Parks
SAWC	Southern African Wildlife College
SEF	Social Employment Fund
TA	Traditional (or Tribal) Authority
UP	University of Pretoria
Y4Y	Yes 4 Youth

1 Introduction

"It's in the system, you know, any natural management system. If you find those leverage points, you change one thing, and it's got a butterfly effect on a lot of them." (Megan, pers. comm.)

1.1 Background to Research

Developing smallholder agriculture is generally considered as an effective strategy for combating poverty, inequality and hunger, particularly in countries where a large section of the population are employed in the sector (World Bank 2007; Lowder, Skoet, and Raney 2016). Globally, almost 50% of the population belong to households that are dependent on agri-food systems for their livelihoods (FAO 2023). Three out of four agricultural households are poor, contributing disproportionately to global poverty (Bourguignon and Bussolo 2013). Smallholders are often majority stakeholders in the agricultural production sector, especially in the Global South, where about 70-80% of farms are smaller than 2 hectares and cultivate around 30-40% of the land (Lowder, Skoet, and Raney 2016).

Smallholder agriculture is generally used to describe producers in rural areas, predominantly in developing countries, who cultivate small areas of land generally using family labour, with earnings contributing to their primary source of income (Morton 2007). Climate change impacts are projected to increase in the coming years with rising temperatures, erratic rainfall, and an increase in extreme weather events. This disproportionately impacts smallholder farmers who mostly depend on rain-fed agriculture, farm in marginal areas, and lack access to resources that can help them adapt to the changing climate (Morton 2007; Harvey et al. 2018). In Sub-Saharan Africa, where economic and social wellbeing is highly dependent on agriculture, climate change poses a critical threat making communities highly vulnerable (Slayi et al. 2024).

South Africa has historically been an agrarian society practicing smallholder farming, particularly in rural areas. The agricultural sector is made up of a commercial sector and a subsistence agriculture sector which includes smallholder farms (Kapari et al. 2023). Economic insecurity and increasing diversification of incomes among rural households has led to the deagrarianisation of rural communities in South Africa (Pereira, Cuneo, and Twine 2014). Additionally, increasing commercialisation and complexity of global food supply chains have led to marginalisation of smallholder farmers, with inaccessibility to modern markets being a

major challenge in many contexts (Rapsomanikis 2015). Economic uncertainties, in addition to impacts of climate change, have led to poor livestock farmers being the most vulnerable (FAO 2018). Specifically, in the Kruger to Canyons Biosphere Region (K2C BR), such issues are exacerbated by the foot-and-mouth disease (FMD) policy that controls the sale of meat and livestock raised in the region, and restricts their movement outside this 'protected zone' (Sirdar et al. 2021).

Strengthening smallholders is crucial for climate mitigation and adaptation, as well as building resilience against growing climate uncertainties (Cohn et al. 2017). These solutions are 'cross-sector' in nature and require collaboration between various actors in different sectors. The goal of this research is to understand how cross-sector collaborations can contribute to climate adaptation by mobilising smallholder farmers to increase the resilience of rural communities. This research is designed to be a qualitative case study of the Herding 4 Health (H4H) programme which is implemented in communal farming areas in the K2C BR of South Africa. The analysis is carried out by using Donella Meadows's leverage points framework (1999) to analyse and evaluate the programme. This research would be relevant in understanding the holistic development of rural communities.

1.2 Aims and Research Questions

There are three main aims of this thesis: (i) to understand the impacts of cross-sector collaborations on smallholder communities, (ii) to explore how cross-sector collaborations influence climate adaptation strategies in rural communities, and (iii) to explore frameworks that could aid and enhance such collaborations. Based on the above aims, three research questions with sub-questions were developed to structure the field research and evaluate the case study:

RQ1: What are the perspectives of different stakeholders regarding the effectiveness of the Herding 4 Health programme?

SQ: What are the social, economic, and environmental outcomes of the programme on communities?

SQ: How does the programme contribute to resilience of the communities?

RQ2: How do different sectors foster resilience and adaptive capacity in rural communities?

SQ: What role do different organisations play in identification and implementation of climate adaptation strategies?

SQ: How do smallholder farmers contribute to the resilience of their communities?

RQ3: How can cross-sector collaborations be facilitated, and its impacts enhanced?

SQ: What are the key enablers that contribute to the sustainability and scalability of cross-sector collaborations?

SQ: What are the key barriers hindering the success of cross-sector collaborations?

1.3 Research Gap

The K2C BR presents an interesting site to research cross-sector collaborations given the dichotomy of complex socio-economic conditions of the rural communities and the immense knowledge and network of organisations and cross-sector initiatives in the region. Although there are a growing number of initiatives, there is limited research that assesses the impacts of cross-sector collaborations in the adaptation of smallholder rural communities to climate change.

Research indicates that smallholder farmers applying agroecological principles can increase food security in local systems without expanding the land base, while also supporting ecosystem services (Altieri 2009). Studies also indicate the potential of communal farming systems in enhancing climate change resilience and food security in sub-Saharan Africa (Slayi et al. 2024). However, there is scepticism regarding how effective smallholder farming systems can be economic engines, particularly in South Africa's former homelands, pointing to gaps in knowledge regarding types of agricultural interventions that contribute to rural sustainability and development (Mathinya et al. 2023). This research on cross-sector collaboration aims to contribute to this gap by presenting how cross-sector collaborations can be harnessed for climate adaptation among rural communities.

Furthermore, literature also indicates that although there are many concepts and research on cross-sector collaborations, there is limited research on collaborations within food systems, specifically addressing climate adaptation and resilience. As emphasised by Schultz et al. (2020), the literature on cross-sector collaborations is dominated by research conducted in the Global North, with limited studies based in complex contexts of the Global South. This thesis provides an opportunity to contribute to this research gap, using a case study in rural South Africa.

1.4 Disposition

The outline of the thesis is indicated in Figure 1. The first section is the literature review which follows a funnel approach starting from broader topics and moving on to narrower topics. It covers systems thinking framework, current knowledge about cross-sector collaborations, and the context of the K2C BR. The second part focuses on the methodology – the research design, case study description, and research methods used to collect and analyse data. The third part is the results and discussion section, which follows a reverse-funnel approach to address the three research questions. The thesis ends with the conclusion and recommendations.

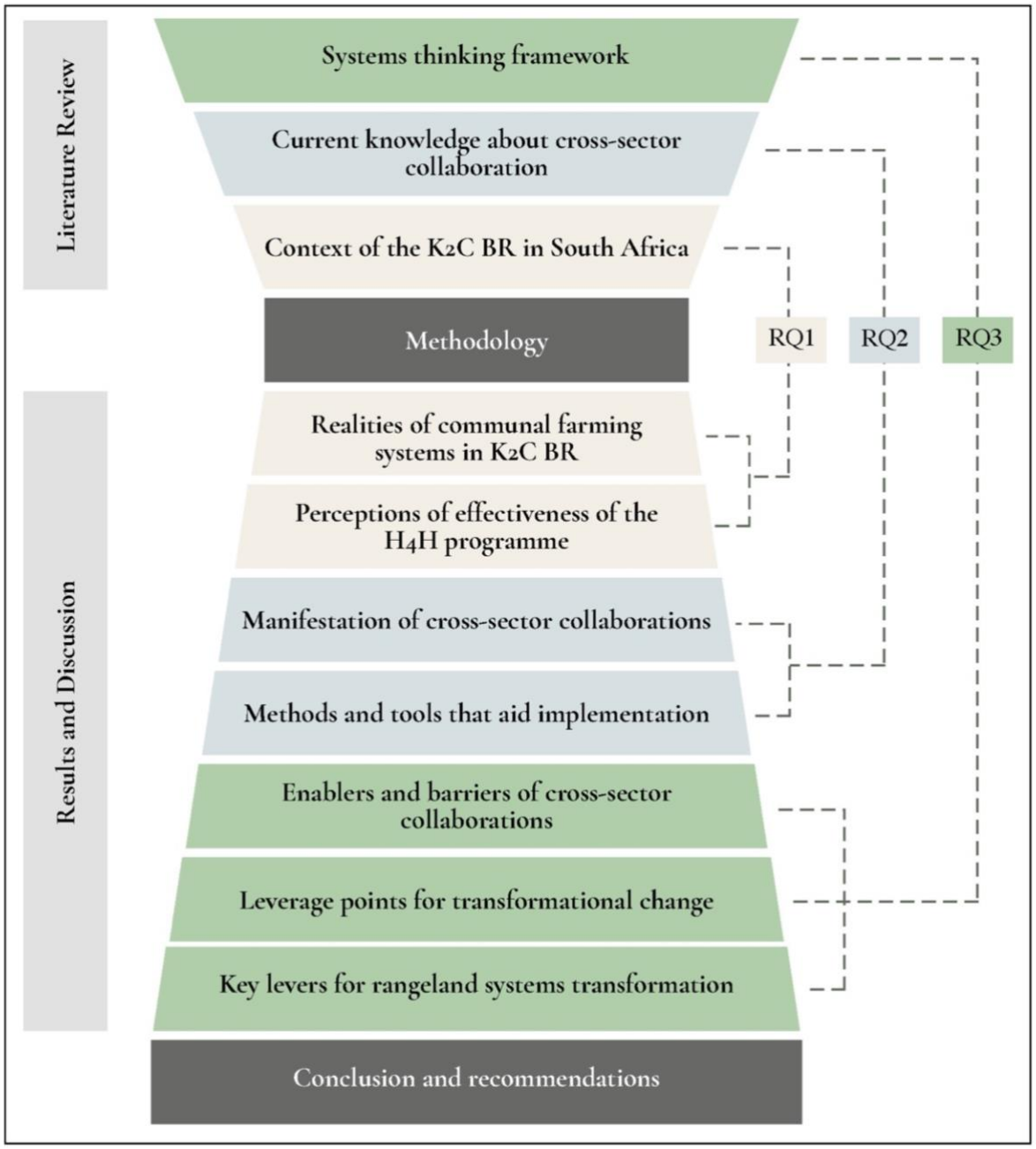

Figure 1: Outline of the thesis. Figure created by the author.

2 Literature Review

2.1 Overview

The literature review is divided into three sections. The first section dives into a brief description of the systems thinking framework, and a discussion on the leverage points perspective. This framework is used to explore how cross-sector collaborations can be enhanced. The second section explores the literature regarding cross-sector collaborations, focusing on current knowledge as well as theories and conceptual frameworks that are of relevance for this research. The third section narrows in on the relevant literature about South Africa and the K2C BR to understand the conditions of rural communities in the region.

2.2 Systems thinking framework

Sustainability challenges are often tackled within disciplinary silos that are insufficient to facilitate transformational change (Abson et al. 2017). The use of systems thinking transcends disciplinary boundaries in impactful ways (Arnold and Wade 2015). The term systems thinking was coined by Barry Richmond, who defined systems thinking as the "art and science" of developing a deep understanding of the underlying structure and devising inferences about the structure's behaviour (Richmond 1994; Arnold and Wade 2015). Over the years, many systems science experts have coined various definitions for systems thinking, encompassing some of its main elements like seeing systems as a whole rather than parts, interrelationships or interconnectedness, understanding the dynamic behaviour of systems, and seeing the system structure as a cause of its behaviour (Arnold and Wade 2015).

Essentially, systems thinking is a perspective, a language and a set of tools (Gannon and Monat 2015). Systems thinking perspectives involve viewing systems as interconnected collections of components, where the relationships between these components are just as crucial as the components themselves (Gannon and Monat 2015). Systems thinking employs a specialized language based on concepts like the Iceberg Model, unintended consequences, causal loops, emergence, and system dynamics (Gannon and Monat 2015). It also encompasses various tools that aid in understanding the existing systems (Gannon and Monat 2015).

2.2.1 Leverage points perspective

One of the most prominent theories in the field of systems thinking was put forth by Donella Meadows, in which she argued that a systems' behaviour can be altered by identifying and

altering its leverage points (Meadows 1999). A leverage point represents an opportunity for intervention within a system to influence its behaviour, trajectories, and outcomes (Dorninger et al. 2020). Meadows identified twelve leverage points with increasing order of effectiveness for systems transformations (Meadows 1999). These leverage points ranged from "shallow", where interventions are easily implementable but bring about limited change to the system as a whole, to "deep" interventions that may be difficult to alter but have the potential to bring about transformational change (Abson et al. 2017; Meadows 1999). Meadows argues that intervention focus should be on higher leverage points (Meadows 1999), although sustainability research and policy interventions over the years have mainly addressed shallow leverage points (Abson et al. 2017; Dorninger et al. 2020).

The list of leverage points put forth by Meadows (1999) starts from least leverage to highest leverage:

12. **Constants, parameters, numbers:** These include physical or numerical factors such as taxes and subsidies. Although parameters are important, particularly in the short term, they rarely change a system's behaviour.
11. **The size of buffers and other stabilizing stocks, relative to their flows:** Buffers stabilise systems from fluctuations and shocks, but the size of these buffers can lead to redundancy and inflexibility of systems.
10. **The structure of material stocks and flows and nodes of interaction:** The physical structure of a system is hardest and most expensive to change but can be a leverage in the design phase.
9. **The lengths of delays, relative to the rate of system changes:** Delays in feedback loops and response rates can cause oscillations in the system state.
8. **The strength of negative feedback loops, relative to the impacts they are trying to correct against:** Complex systems have numerous negative feedback loops that act as self-correction mechanisms when conditions are different. They are important for the long-term stability and welfare of the system. If the strength of impacts increases, the feedbacks need to be strengthened too.
7. **The gain around driving positive feedback loops:** Positive feedback loops are self-reinforcing. Reducing the gain around positive feedback loops are more effective than increasing the strength of negative feedback loops.
6. **The structure of information flows:** Creating new or missing feedback loops to deliver information can cause changes in the system behaviour.

5. **The rules of the system:** The rules are the scope, boundaries, and limits to freedom of a system, and mustn't exclude any stakeholders or feedback.
4. **The power to add, change, evolve, or self-organise system structure:** The evolution of a system by changing its aspects is called self-organisation. This has the highest potential to build system resilience.
3. **The goals of the system**: The system outcomes rather than stated goals, which have the ability to conform or influence all other lower leverage points.
2. **The mindset or paradigm out of which the system arises**: Paradigms are at the core of systems and give rise to all other elements of the system. Paradigms are one of the hardest elements to change but can be inexpensive and quick provided active change agents are targeted.
1. **The power to transcend paradigms**: Disassociating from paradigms and accepting that worldviews have limited understanding of the complexity of the world in which systems exist.

Abson et al. (2017) developed this list further, by grouping the leverage points under four broad system characteristics, namely "parameters", "feedback", "design" and "intent". Parameters are the mechanistic characteristics like constants, buffers, and size and structure of stocks and flows, which are typically targeted by policymakers. Feedback includes the elements that drive the internal dynamics of a system like delays as well as negative and positive feedback loops. Design comprises of the social structures and institutions that manage feedbacks and parameters, and include structure of information flows, rules of the system, and the power to self-organise system structure. Intent is the direction to which a system is oriented, and comprises of the goals, values and worldviews of the actors that shape the system. Abson et al. (2017) argued that parameters and feedbacks are shallow leverage points, whereas design and intent are deep leverage points.

The appeal of a leverage points perspective extends beyond academia, making it valuable for both heuristic and practical purposes (Fischer and Riechers 2019). Engaging with the leverage points perspective from various methodological angles attracts diverse scholars fostering collaboration, and thereby creating potential as a "boundary object"[1], much like 'resilience' and

[1] Boundary objects facilitate communication and collaboration across disciplines by providing a common language, thereby aiding transdisciplinarity (Fischer and Riechers 2019).

'ecosystem services' that started out as concepts but evolved into qualitative and quantitative applications in sustainability science (Fischer and Riechers 2019).

2.3 Current knowledge about cross-sector collaborations

2.3.1 Role of cross-sector collaborations in climate adaptation

Global problems such as food insecurity, climate change and persistent poverty have been defined as "wicked problems" that require transformative change to tackle (Dentoni and Bitzer 2015). The need for cross-sector collaboration arises when social problems are too complex and multidimensional to be tackled by any single actor or sector (Crosby and Bryson 2010). The literature reviewed outline important factors that affect, influence, and enable cross-sector collaborations. One recurring topic of discussion was the importance of bridging organisations to initiate and sustain collaboration and adaptive governance (Schultz, West, and Florêncio 2020). These organisations, like international aid agencies and third-party facilitators, should ideally have no vested interest and play a crucial role in fostering trust (Hamann et al. 2008). They are flexible and serve as a bridge between government bodies and local actors by navigating the broader economic and socio-political environment (Olsson, Folke, and Hahn 2004). They also play vital roles in helping align and reshape interests of different actors, especially in the case of smallholder farmers who may have relatively less power and organisational capacity (Florini and Pauli 2018; Olsson, Folke, and Hahn 2004).

Some studies also highlight the role of leadership in cross-sector collaborations. Crosby & Bryson (2005) presented the "leadership for common good framework" as an approach for collaborative leadership. The framework emphasises the pursuit of collective well-being for society through inclusivity, collaboration, and long-term strategies to address complex social and environmental challenges. Crosby & Bryson (2010) also explored settings of cross-sector collaborations where the government was an important, but not the sole actor. The research posits that "integrated public leadership", which is built on the common good framework, is central in such settings. Integrated public leadership is defined as bringing varied organisations across diverse sectors together, in semi-permanent ways, to deliver effective solutions to complex problems by fostering relationships and resource flows (Crosby and Bryson 2010).

Cross-sector collaboration also requires coordination and a shared vision to ensure an integrated approach (Schultz, West, and Florêncio 2020). Strong institutional governance and policies that tackle agricultural transformation, environmental protection and climate change

are lacking integration across various levels – from individual smallholders and communities to high-level frameworks (Hamann et al. 2008; Silici et al. 2021). Collaborations also require institutionalisation that align with the actors' long-term objectives to enable partnerships and initiatives to go beyond short-term efforts that may be driven by individuals (Florini and Pauli 2018). Cross-sector collaborations can also increase value chain efficiency, although improvement of farmers' access to these value chains is crucial (Hamann et al. 2011).

Some studies also discussed importance of building adaptive capacity of smallholder farmers to climate change. The generation and dissemination of knowledge on climate change among smallholders is crucial, and they are most effective with community-based initiatives that are well integrated, multi-sectoral and participatory in their approach (Silici et al. 2021). In multi-stakeholder initiatives, academics serve as knowledge experts, agenda-setting advisors, and facilitators (Dentoni and Bitzer 2015). In communities of practice around these initiatives, they additionally contribute by developing new transdisciplinary knowledge and building bridges between the stakeholders and students for addressing complex challenges (Dentoni and Bitzer 2015).

2.3.2 Concepts related to cross-sector collaborations

Concepts and frameworks help in understanding how cross-sector collaborations are evaluated. Literature on current theories related to cross-sector collaborations reveal four important concepts outlined below that have guided the analysis of the data, particularly to address the second research question of understanding sectoral roles and implementation of cross-sector collaborations. Also, the knowledge gained from these theories helped in framing the structure and questions for the semi-structured interviews.

Adaptive co-management

Adaptive co-management is a dynamic system of resource management in which the responsibility is shared between stakeholders through a process of learning (Ruitenbeek and Cartier 2001; Folke et al. 2002). It is a place-based management system that brings together various organisations across different levels to support and enable community-based resource management (Olsson, Folke, and Hahn 2004; Armitage, Berkes, and Doubleday 2010). Transformation through adaptive co-management can be carried out through a three-phase process – by ensuring the system is prepared for change, using a window of opportunity, and by building social-ecological resilience of the envisioned system (Olsson, Folke, and Hahn 2004). Key features of adaptive co-management have been described by Armitage, Berkes, and

Doubleday (2010), including having a common focus, goal and problem definition among the different stakeholders, extensive collaboration among the actors, distributed control but shared responsibility for action and decision making, commitment to autonomy and pluralism, and knowledge sharing through flexible learning orientation.

Adaptive co-management has been gaining traction and momentum, but there is limited empirical evidence and evaluation regarding the outcomes of co-management (Plummer and Armitage 2007). Plummer and Armitage (2007) outline an evaluative framework for adaptive co-management using three components through the resilience lens. The first is the ecological component that is assessed through the ecological features, their functions and diversity. The second is the sustainable livelihoods component which addresses well-being, poverty, income, vulnerability food security and resource use. The third component addresses the role of institutions and power (Plummer and Armitage 2007).

Adaptive governance

Adaptive governance refers to governance across different scales and sectors in complex contexts, with the aim of adapting to evolving challenges and threats using learning-based approaches (Schultz, West, and Florêncio 2020). In sustainability science, the adaptive governance framework emerged from the socio-ecological systems perspectives where people and the environment are inherently and inextricably linked (Schultz, West, and Florêncio 2020).

The concept revolves around collaboration, learning and bridging organisations (Karpouzoglou, Dewulf, and Clark 2016; Schultz, West, and Florêncio 2020). Collaboration brings together actors through cross-scale interactions through arrangements that are collaborative and self-organising beyond government facilitation (Karpouzoglou, Dewulf, and Clark 2016). Learning through experimentation and monitoring, participation and facilitation, provision of financial and human resources, and through social networking, can enhance governance and decision-making (Cundill et al. 2015). Bridging organisations provide social networks that can draw on various knowledge systems and experiences to provide a common understanding of goals and policies by lowering the cost of collaboration and conflict regulation (Folke et al. 2005).

Schultz et al. (2020) address two research frontiers – the emergence of adaptive governance and the implementation of adaptive governance in complex contexts. This is done through an analytical lens of "people, practices and politics", where 'people' addresses the agential nature

of the stakeholders, 'practice' emphasizes the enactment of adaptive governance within boundaries of organisational routines, policies, and imperatives, and 'politics' refers to the plurality of interests, allegiances, values, and vision.

Nonprofit-Business collaboration

AL-Tabbaa et al. (2014) propose a conceptual framework to enable non-profit organisations to build partnerships with businesses, both quantitatively and qualitatively. The conceptual framework of AL-Tabbaa et al. (2014) summarises the factors that are relevant for non-profit organisations under the three elements of 'context', 'content' and 'process' which underpin the development of effective Nonprofit-Business Collaborations (NBCs). Context is the pre-existing conditions in which the organisation functions. This could be outer context like socio-economic issues or competitive conditions over which the organisation has less control, or inner context like company culture and policies. Content refers to the choices or strategic options that an organisation can adopt to achieve its goals and strategies. Process relates to the formulation and implementation of the strategy or the content element.

AL-Tabbaa et al. (2014) also identified the factors that address the above three elements in a conceptual framework for an NBC strategy. Under the 'context' element, the four external and internal factors that may facilitate or inhibit strategy adoption are NBC purpose, stakeholder expectation, nonprofit competition, and cultural barrier. The two factors that significantly influence the 'content' element are collaboration level and strategic position. Three factors that are key for the 'process' element of a successful NBC strategy are power imbalance, communication channels, and transaction costs. These three elements are also directly influenced by the size and mission of the non-profit organisation.

Dynamic capabilities for stakeholder orientation

Another important concept is the *dynamic capabilities for stakeholder orientation* which refers to the capacity of an organisation to adapt, innovate and align its processes and strategies to respond to the interests of its varied stakeholders (Dentoni, Bitzer, and Pascucci 2016; Florini and Pauli 2018; Teece, Pisano, and Shuen 1997). The concept emphasizes that it is beneficial for the participants in cross-sector collaborations and society if organisations are able to identify and engage with their stakeholders, and consequently redeploy their resources and capabilities. This is crucial for cross-sector collaborations to create a broader impact by understanding the changing nature of "wicked problems" (Dentoni, Bitzer, and Pascucci 2016).

2.4 Kruger to Canyons Biosphere Region, South Africa

2.4.1 Geographical context

The Central Lowveld and Escarpment region is located in the north-eastern corner of South Africa. It stretches between Kruger National Park's savannah ecosystems in the east to the Blyde River Canyon and Drakensberg Escarpment's afro-montane forest in the west (Schultz, West, and Florêncio 2020). The region comprises of multiple land uses including the state-owned conservation lands of the Kruger National Park and the Blyde River Canyon Nature Reserve, private conservation areas or game reserves that form the Greater Kruger, communally managed nature reserves, communal lands for used livestock grazing, land used for commercial agriculture or forestry, and dense human settlements that were former homelands (Davis, n.d.; Schultz, West, and Florêncio 2020). This region, situated in the Mpumalanga and Limpopo provinces, forms the Kruger to Canyons Biosphere Region (K2C BR) (Figure 2).

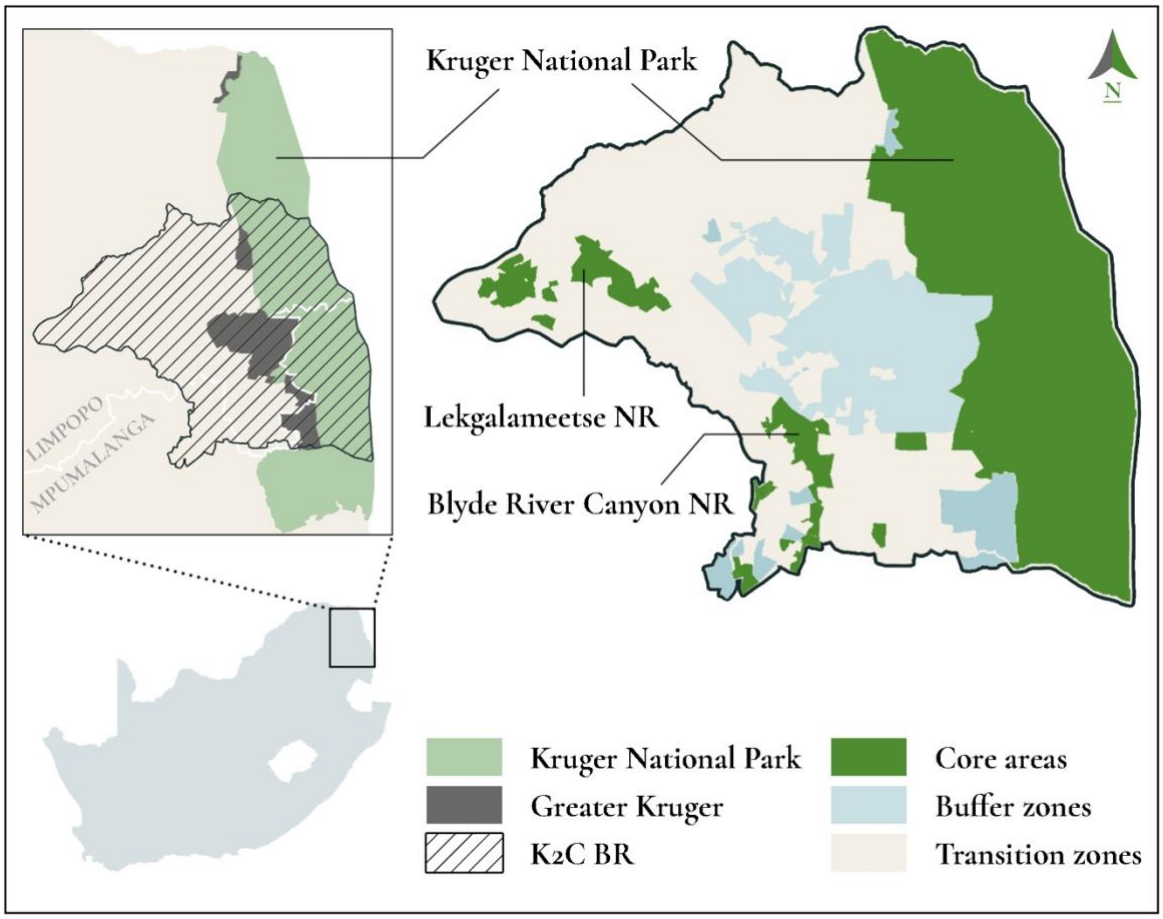

Figure 2: Location of K2C BR in South Africa (left), and zones within K2C BR (right). Map created by author. Source: K2C-NPC and Google Earth images.

The K2C BR was assigned as a Biosphere Reserve under UNESCO's Man and the Biosphere programme in 2001 to preserve the integrity and future of the conservation efforts and to uplift the socio-economic conditions of the local people (Davis, n.d.; Schultz, West, and Florêncio 2020). The Man and the Biosphere programme is a framework that integrates economic, social and environmental aspects with biodiversity conservation and sustainable development in landscapes containing protected areas (PAs) (K2C-NPC, n.d.). To fulfil these functions, the biosphere reserves are divided into three main zones through a process known as zonation – core areas, buffer zones and transition zones (K2C-NPC, n.d.).

In the K2C BR, the core zone is formed by three main nature reserves, namely Kruger National Park, Blyde River Canyon Nature Reserve, and Lekgalameetse Nature Reserve. These securely protected sites focus on conserving and monitoring biodiversity in minimally disturbed ecosystems. The buffer zones surround or are adjacent to the core areas and follow strong ecological practices. These buffer zones are used for activities such as research, ecotourism, and recreation. In the K2C BR the buffer zones are formed by communally or provincially managed nature reserves and private game reserves. The transition zone contains all other activities such as agriculture, towns, and settlements. The K2C BR extends 2,474,700 hectares, of which the core zone amounts to roughly 35% of the area, the buffer zone about 20%, and the transition zone occupies about 45% (K2C-NPC, n.d.). The human population of the core zone is approximately 1,155 permanent residents, the buffer zone is 10,475, and the transition zone is the highest with 1,488,684 residents (K2C-NPC, n.d.).

2.4.2 Social context

The K2C BR has long been at the crux of dynamic migrations of three broad cultural groups – Tsonga/Shangaan from the east, Pedi from the west, and Swazi from the south (K2C-NPC 2024). Over the 18th and 19th century, there was continuous flow of people to and from the surrounding regions of what is today Mozambique and the KwaZulu-Natal Province of South Africa (Ritchken 1995). Diverse groups of people speaking different languages and belonging to different tribes were dispersed around the region where they sometimes clashed with each other and sometimes lived harmoniously together (Thornton 2002). Today, the K2C BR is one of the most culturally diverse regions of South Africa (Thornton 2002).

However, this region is starkly demarcated along ethnic lines as a result of the apartheid regime (Schultz, West, and Florêncio 2020). In the 19th and 20th century, the white Afrikaans and English settlers created the KNP and many of the private reserves which form a network of

PAs to cater to wealthy national and international tourist markets (Schultz, West, and Florêncio 2020). During the apartheid regime between 1948 – 1994, land was also surveyed, divided into farms and allocated to white (male) owners, where the resident African population were forced to work in or were displaced (Ritchken 1995). This region is characterised by systematic displacements of the indigenous black populations, who were stripped of land and productive assets leading to "black pauperisation" (Pereira, Cuneo, and Twine 2014). These populations were relocated to 'homelands' or black reserves, which were fragmented and isolated pieces of land with poor infrastructure and only accounted for 13% of the land area of South Africa (Pereira, Cuneo, and Twine 2014). Continued forced removals led to population densities increasing in these homelands drastically (Zazu and Manderson 2021; Pereira, Cuneo, and Twine 2014). The years after the apartheid regime ended was marred with political and legal conflicts involving the nature of land and restitution rights (Ritchken 1995). The struggle for land was driven primarily for cultural reasons of reclaiming their historical identities, rather than for economic reasons of becoming subsistence farmers (Ritchken 1995).

These conflicts also led to shifts in governance structures, and the level and extent of control that different forms of governing bodies had (Ritchken 1995). Today, the Constitution of South Africa recognises the legal-political overlay of co-operative governance where the role of Traditional (or Tribal) Authorities (TAs) are recognised and acknowledged in the political and administrative structures of the local governments (K2C-NPC 2024). The institutional arrangements of the local governments revolve around municipalities and wards, and focus primarily on community development in line with the national governance structures (K2C-NPC 2024). The TA system comprises of chiefs who oversee a group of villages, with each village having a village headman or *Induna*. These chiefs and *Indunas* along with their councils are responsible for land allocation, local natural resource management, village level conflict management, and liaison with businesses and projects (K2C-NPC 2024).

2.4.3 Economic context

The trauma of the Apartheid's forced removals and the underdevelopment of the former homelands have not been adequately addressed, leading to complex socio-economic challenges ranging from unemployment to poor infrastructure of many rural areas (Zazu and Manderson 2021). Massive relocations into the densely populated homelands have led to shortage of land available for livestock farming (Pereira, Cuneo, and Twine 2014). Historically, the household incomes in the rural areas were directly dependent on local ecosystem services, resource harvesting, and land-based activities like crop and livestock farming (Ragie et al. 2020). But the

combined effect of deagrarianization and climate variability has led to rural areas shifting away from agriculture as the main source of income (Pereira, Cuneo, and Twine 2014).

Deagrarianization is the cumulative process of changes in occupation, income-earning and social identity, and the shift of rural populations away from traditional livelihoods, subsistence activities and agriculture (Shackleton et al. 2019). Although smallholders are important for global food production, there has been a decline in smallholder farms, both globally and in South Africa (Shackleton et al. 2019). National agricultural policies in the country are typically top-down and have yielded short-term production increases in some places, but not long-term sustenance (Shackleton et al. 2019). Uneven resources, inputs, and land access between smallholders and commercial farmers, and insecure land tenure on communal land under traditional governance has led to further decline in rural agricultural production (Pereira, Cuneo, and Twine 2014; Shackleton et al. 2019).

Smallholder farming units comprise approximately 70% of South Africa's poorest households (Tibesigwa et al. 2016) producing food crops on less than 0.5 hectares of land per household which can only meet subsistence levels (Shackleton et al. 2019). Even in cases of commercial sales of crops, it contributes very little cash income for households (Ragie et al. 2020). These factors have fuelled the shift from agrarian to cash-based rural economies, where there is an increased dependence on external forms of income like remittances and state grants, leading to complex livelihood networks (Pereira, Cuneo, and Twine 2014). The growing access to non-farm cash has also led to a reduced dependence on fields for income or home-grown food (Shackleton et al. 2019) and increased the dependency on retail markets for nutritional requirements (Pereira, Cuneo, and Twine 2014).

Although agriculture makes up only a small part of the rural household income, there is a growing trend towards subsistence farming which is oriented towards domestic use and gifting rather than commercial sale (Pereira, Cuneo, and Twine 2014). Also, in case of cattle farming, the income generated could be considerably higher due to sale of the animals or their products (Ragie et al. 2020). However, this is limited to wealthier households who have the financial and human capital to bear the cost of maintaining livestock (Pereira, Cuneo, and Twine 2014; Ragie et al. 2020). Additionally, the selected study area is a protected zone due to the prevalence of foot-and-mouth disease (FMD), which is a contagious transboundary animal disease which causes reduced productivity in livestock (Sirdar et al. 2021). This adds a further layer of complexity, as FMD control policy restricts the movement of livestock species and products,

curtailing the market access of the smallholders in the region (Department of Agriculture, Land Reform and Rural Development 2022; Sirdar et al. 2021).

Modernisation and urbanisation have led to the change in values and perception of farming, and is now considered as an activity of the elderly leading to a rural demographic skew towards elderly population (Pereira, Cuneo, and Twine 2014; Shackleton et al. 2019). There is also a loss of household labour due to outmigration of youth to urban areas in search of work, and better schooling access which has led to reduced time available for young boys to contribute to farming activities (Shackleton et al. 2019). Despite all these challenges, an agrarian culture, particularly of cattle farming, is firmly embedded among the rural population (Shackleton et al. 2019). The non-monetary benefits obtained from cattle ranges from draught power and household meat consumption, to socio-cultural activities (Stroebel et al. 2008). Cattle is also considered as prestige and status symbols within rural communities, and also act as a form of informal banking system and wealth savings mechanism (Stroebel et al. 2008). In many households, cattle are used to provide financial stability by supporting other livelihood strategies (Ragie et al. 2020).

2.4.4 Environmental context

In South Africa, land degradation affects both communal lands and commercial farms, with nearly 60% of land degraded and 90% prone to desertification (Mani, Osborne, and Cleaver 2021). The apartheid regime enforced high density settlements of people and their livestock, which led to subsequent land degradation of rangeland areas in many of these settlements (Mani, Osborne, and Cleaver 2021) due to overutilisation of natural resources and a lack of proper management (Zazu and Manderson 2021). This, coupled with climate change, has resulted in loss of soil nutrients and moisture, soil erosion, and woody plant encroachment (Mani, Osborne, and Cleaver 2021; Zazu and Manderson 2021).

Woody plant encroachment is the increase of tree or shrub densities in savanna ecosystems which alter ecosystem functions by reducing water availability and vegetation productivity (Mani, Osborne, and Cleaver 2021). This has a ripple effect on other important aspects including the soil's carrying capacity, carbon storage capacity, biodiversity and also altering fire regimes (Mani, Osborne, and Cleaver 2021). Woody encroachment is also considered a catalyst for soil degradation and desertification, which has led to more households discontinuing field cropping (Shackleton et al. 2019; Zazu and Manderson 2021; Mani, Osborne, and Cleaver 2021). Perceived weather related challenges like rising temperatures and changing rainfall

patterns have led to many farmers disengaging from farming (Shackleton et al. 2019). Rural smallholder households are particularly vulnerable to such environmental stresses and climate variability as most farms are rain-fed and have lower capacity to adapt to changes due to the lack of resources (Tibesigwa et al. 2016). Studies show there is a need for interventions that focus on climate change literacy which can contribute to the farmers' awareness about climate change and improve their knowledge on adaptation strategies (Zazu and Manderson 2021).

2.5 Summary

The literature overview begins describing the broader concepts of systems thinking framework. This segment goes into the details of the leverage points perspective to understand how interventions can lead to behaviour changes or transformations of systems. The second section deep dives into cross-sector collaborations, to understand its role in adaptive measures against the world's wicked problems. This segment outlines some important concepts based on cross-sector collaborations in literature, including adaptive co-management, adaptive governance, and nonprofit-business collaborations. The literature emphasises the need for more studies on cross-sector collaborations, particularly in the field of climate adaptation. The last segment narrows in on the geographical, social, economic, and environmental aspects of the K2C BR which provides context for the case study and the rest of the thesis.

3 Methodology

3.1 Research design

The thesis was carried out as qualitative research (Creswell and Creswell 2018) using the case study method (Gomm, Hammersley, and Foster 2023) within the research setting of rural communities and livestock farming in the K2C BR. The research analyses cross-sector collaborations working with livestock farming communities, to understand the impact and efficacy of such collaborations on climate adaptation of rural communities, and the factors that aid and enhance these collaborations. By using an established collaboration as a case study, the goal is to understand the role of cross-sector interventions and the potential of communal or smallholder farmers to increase the resilience of rural communities in a changing world.

The first step was to explore organisations working with the rural communities in the study region to understand the dynamics of interventions being implemented there. This was carried out by reviewing grey literature, documents, and publicly available information regarding the K2C BR. By tapping into existing networks of experts in the region, and through email and online discussions with key practitioners, the research scope was finalised and a case study was selected. The next step was the literature review, which was carried out in multiple steps with literature pertaining to the topic and context gathered from different sources.

The field research commenced with identifying key actors through stakeholder mapping with the guidance of experts in the region. Qualitative research was carried out through in-depth, face-to-face interviews in a semi-structured format. Reflexive thematic analysis was used to analyse the data gathered. Triangulation was employed by interviewing different stakeholders from various organisations within the collaboration framework, as well as community members in the study sites. Details of the methods employed for data collection and analysis are discussed in the following sections.

The main challenge of the research design was the difficulty in recruiting participants for the interviews since they were from various organisations, sectors, and communities. This was managed by working with a representative of Conservation South Africa (CSA) who helped by connecting me to the practitioners, and by working with a translator who guided me in the study area, and helped me communicate and recruit interviewees from the communities.

3.2 Case study: Cross-sector collaboration through the Herding 4 Health programme in K2C BR

The initial scoping study revealed that there are multiple stakeholders in the K2C region, across different sectors, with varying interests and stakes in livestock farming. The Herding 4 Health (H4H) programme was selected as a case study, as it brings together various partners under one umbrella programme. The stakeholders in this research are organisations belonging to various sectors (NGOs/NPOs, governing bodies, private sector enterprises and academia) with interests and influence in the area, as well smallholder livestock farmers and community members in the K2C BR.

3.2.1 Inception of the H4H programme

The H4H programme is a partnership between Conservation International (CI) and Peace Parks Foundation (PPF) and is a community-driven livestock management model that focuses on the livelihoods of the communities living along protected areas, as well as rangeland restoration and biodiversity conservation ('Conservation International', n.d.). CI works towards protecting and restoring nature and expanding nature-positive economies by engaging with strategic partners as well as indigenous communities ('Conservation International', n.d.). PPF is involved in the establishment of community centred, sustainable, and regionally cohesive network of transfrontier conservation areas[2] (TFCAs) in southern Africa ('Peace Parks Foundation', n.d.). The H4H programme is based on the institutional mandates of the two organisations.

The H4H programme revolves around four main pillars – thriving communities, healthy rangelands, healthy animals and an enabling policy framework ('Conservation International', n.d.). The programme works towards better livestock and rangeland management, capacity building, setting up enterprise frameworks and strengthening community governance structures ('Conservation International', n.d.). The CI website lists the 2030 goals of the H4H programme, which sets targets for hectares under H4H rangeland management, number of direct and indirect beneficiaries, creation of nature positive jobs, market access, and removal of greenhouse gases from the atmosphere ('Conservation International', n.d.). The H4H programme is being implemented across several African countries – South Africa,

[2] TFCAs are ecological regions comprising of protected areas and multiple resource use areas, and spans across boundaries of two or more countries ('Peace Parks Foundation', n.d.).

Mozambique, Botswana, Madagascar, Zambia, Zimbabwe and Kenya ('Conservation International', n.d.). In South Africa, the programme is currently being implemented in three regions – Namaqualand, Eastern Cape and K2C BR ('Conservation International', n.d.).

The programme brings together different implementation partners across southern Africa. The initiative is built on collaborations with various organisations including (i) the Department of Agriculture, Land Reform and Rural Development (DALRRD) for herd management and animal healthcare, (ii) local municipalities and the local TAs for land use management and community driven development, (iii) universities and academic organisations for research, monitoring and capacity building, and (iv) enterprise partners to create market access for communal livestock farmers ('Conservation International', n.d.). The H4H programme was piloted in the K2C BR through by Conservation South Africa (CSA), the South African chapter of CI.

3.2.2 Description of programme sites

The programme is implemented in the communal rangelands of the K2C BR. These areas fall under the Bushbuckridge Local Municipality (BLM) which also includes protected areas like KNP and other reserves. The BLM has a total population of over 750,000 people, with an exponential population growth of 3.2% per annum between 2011-2022 ('Census 2022 Municipal Fact Sheet' 2023). BLM comprises of over 99% of black Africans, with Xitsonga being the most widely spoken language ('Wazimap', n.d.).

The communities of this region are mainly comprised of farmers and pastoralists who are heavily dependent on land resources for food and livelihoods (Conservation South Africa 2023). The area is characterised by high levels of unemployment and low access to infrastructure and services (Conservation South Africa 2023). Considerable income of the households is earned outside Bushbuckridge through remittances (Business Trust 2005). However, the communities are considered poor with around 85% of households living below the household subsistence levels (K2C-NPC 2024). Reports suggest that tourism and agriculture, particularly smallholder farming, can be harnessed to contribute to economic growth in the region (Business Trust 2005).

A report assessing the baseline conditions of the implementations areas in the K2C BR indicate that the communal rangelands are characterised by low productivity, bare soil and bush encroachment with reference to surrounding conservation areas such as the KNP

(Conservation South Africa 2023). This is caused by overgrazing and unrestricted herd movements, inhibiting the recovery time of rangelands and reducing the growth and production of grass (Conservation South Africa 2023). The lack of vegetation and increased bare soil leads to high run-off and loss of topsoil within the rangelands (Conservation South Africa 2023). This causes flooding events, which also affects the flora and fauna downstream in the KNP and other protected areas (Conservation South Africa 2023). Unrestricted grazing is caused by the overutilization of communal areas and lack of sustainable management practices, which are a result of the legacy of Apartheid, segregated homelands, and the inequality of land ownership (Conservation South Africa 2023).

Livestock, specifically cattle, have significant financial and cultural value for the communities. Despite the long history of livestock farming in the region, few farmers keep cattle for the purpose of market sales (Conservation South Africa 2023). A survey with farmers of the Mnisi community showed that 57% reared cattle due to cultural reasons, 80% considered them to be financial assets and 95% used cattle for household consumption (Conservation South Africa 2023). Hence, there were limited market-related governance structures in place before the commencement of the H4H programme.

3.2.3 Implementation in K2C BR

The main goals of the programme as indicated in the mandate ('Conservation International', n.d.; Conservation South Africa 2023) are to restore rangelands, which would contribute to the resilience of communities that are dependent on its resources. The programme aims create employment and help with knowledge transfer and capacity building, thus leading to improved livelihoods and long-term wellbeing of the communities. The programme also intends to raise awareness about conservation with the goal of restoring biodiversity in the rangelands and conservation of endangered flora and fauna. Reduction of greenhouse gas emissions through herd management and soil carbon sequestration are also key areas of focus under the programme.

The programme primarily works on rangeland restoration by supporting and capacitating livestock farmers with sustainable rangeland practices. The main project action is planned rotational-rest grazing, which involves grazing plans where one camp will be rested from grazing while the adjacent area is open. This allows grass to grow in the rested camps during growing season and hence improves the recovery rate and ground cover of the rangelands.

This is done through adaptive practices like strategic herding and kraaling[3] based on a predetermined grazing plan. The plan is formulated and carried out collectively by the farmers who use the communal rangelands, through associations like the farmers cooperatives.

These cooperatives help establish local governance structures and are composed of locally elected livestock farmers. The foundational actions that help set up these structures include capacity building of the community members, mentoring and guiding the farmer cooperatives and by formally registering the cooperatives. Conservation Agreements (CAs) are used as tools to guide the project actions, by providing corresponding benefits or incentives. The CAs are negotiated with each cooperative, along with the benefits provided. These benefits mainly focus on providing market access for livestock, provision of fodder when needed, provision of eco-trainers and monitoring of herd management. With these objectives, the programme was started in 2018 in the K2C BR by signing agreements with the farmers cooperatives.

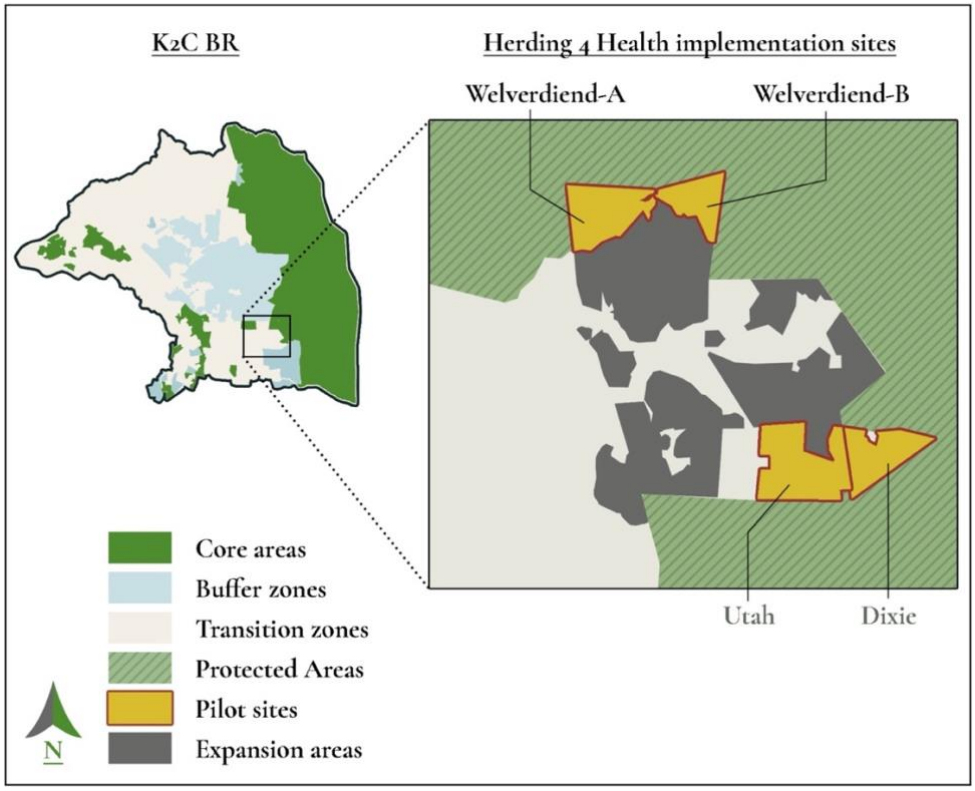

Figure 3: Map of H4H implementation sites in K2C BR, indicating the pilot sites of Welverdiend-A&B, Dixie, and Utah, as well as expansion areas. Map created by author. Source: CSA and K2C-NPC.

[3] Kraaling is the practice of keeping livestock in enclosures overnight for protection of the cattle or other stock (Conservation South Africa 2023).

Figure 3 indicates the first 'demonstration sites' of the programme – the four villages of Welverdiend-A&B, Utah, and Dixie, along with the subsequent expansion areas. The implementation sites are in the transition zones of the K2C BR and are nestled between the protected areas of KNP on the east, Manyeleti Game Reserve and Andover Nature Reserve on the north, and Sabi Sand Nature Reserve to the south. The field research was conducted in the villages of Welverdiend-A and Welverdiend-B. Both the villages fall under ward 34 of BLM, and are spatially overlaid with land ownership of the Mnisi Tribal Authority (K2C-NPC 2024). This region is dominated by the Tsonga/Shangaan cultural influence (K2C-NPC 2024).

3.3 Methods used for data collection and analysis

3.3.1 Stakeholder mapping

Given the complexity of the programme and numerous stakeholders involved in the implementation, the first step was to map out the stakeholders involved in the programme in the K2C BR. This was done through meetings with key members of CSA and CI. Based on the inputs of the experts, the list of stakeholders in the K2C BR was prepared (Table 1.

The stakeholders are grouped under two broad categories:

1. Practitioners – Representatives of individual organisations either directly or indirectly involved in the programme.
2. Beneficiaries – Community members and livestock farmers either directly or indirectly impacted by the programme.

Table 1: Stakeholders of the H4H programme in the K2C BR

Stakeholders	Role or interest in the programme
Practitioners	
Conservation South Africa (CSA)	Main proponent and implementing partner of the programme in the K2C BR.
Kruger to Canyons Non-Profit Company (K2C-NPC)	Manage landscape restoration work like alien vegetation control, and employ herd monitors to assist eco-trainers.
Conservation International (CI)	Parent organisation of CSA providing technical support and funding.
University of Pretoria (UP)	Development of H4H model and research partners.
Meat Naturally Africa (MNA)	Providers of market access and market readiness services to farmers cooperatives.

Southern African Wildlife College (SAWC)	Responsible for the training programmes of eco-trainers and herders.
Traditional Authority (TA)	Responsible for land-use planning and management, and endorsement of the programme in the communities.
Department of Agriculture, Land Reform and Rural Development (DALRRD)	Support livestock farmers with herd management and infrastructure maintenance. Responsible for animal husbandry through the state veterinary services.
Bushbuckridge Local Municipality (BLM)	Mandated to implement development plans in the project area.
South Africa National Parks (SANParks)	Responsible for alien plants and bush clearing, and monitoring of fences of the PAs.
Eco-trainers / Supervisors	Trained members of the community responsible for on the ground monitoring, assisting CSA and the cooperatives with activities.
Beneficiaries	
Farmers Cooperatives	Implementers of the conservation agreements, and key governance structures among livestock farmers of the communities.
Livestock farmers	The main beneficiaries of the programme.
General workers	Employees of CSA who assist livestock farmers.
Wider community	Direct beneficiaries of the enterprise development projects of the H4H programme, and indirect beneficiaries of the community development work like rangeland management, skills workshops, ICT centres etc.

Based on the above stakeholder mapping, participants were recruited from the organisations and community to conduct semi-structured interviews. The selection of interviewees was a deliberate process to yield a representative sample for the research. The following criteria were considered while recruiting the participants:

1. To gain inputs regarding the K2C BR implementation, specifically in Welverdiend-A and Welverdiend -B.
2. To gain inputs regarding the broader perspectives of the H4H programme, from inception to implementation in other regions.

3. To gain inputs and perceptions of the representatives of various organisations from different sectors, like NGOs/NPOs, businesses, governing bodies, and academia.
4. To gain inputs from the various direct beneficiaries of the H4H programme.

A total of 23 participants were recruited (Figure 4).

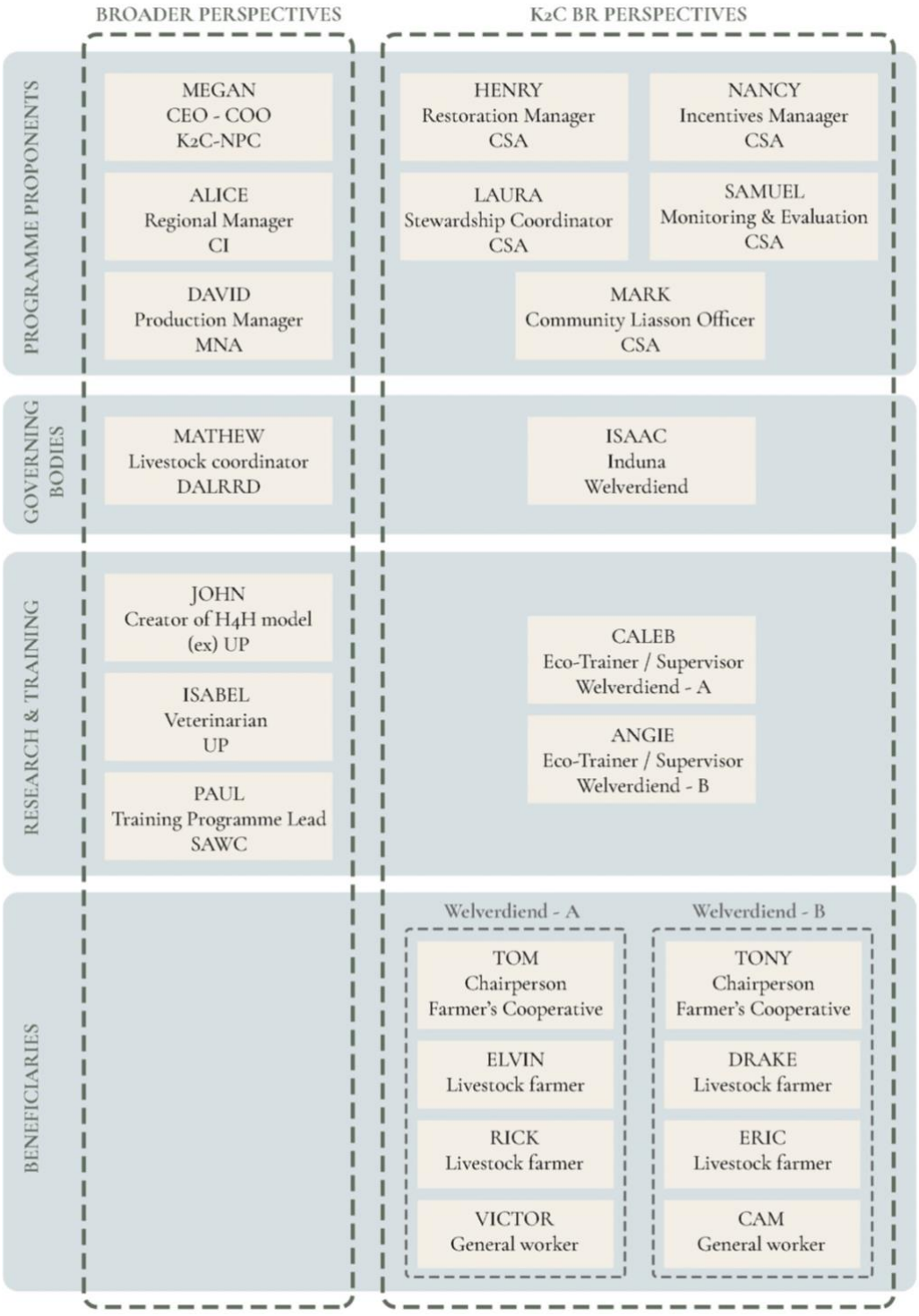

Figure 4: Overview of research participants with pseudonyms and organisational roles, categorised based on the sector they belong to and the type of data they contributed.

Given the limitation of time, stakeholder mapping was picked as the method to finalise participants as this allowed for a more representative sample for this research, as opposed to methods like snowball sampling. Fifteen practitioners interviewed, of which eight were members of the programme proponents – CSA, CI, K2C-NPC and MNA. There were two interviewees belonging to governing bodies – DALRRD and the TA (*Induna* of Welverdiend). Five interviews were conducted from the field of academia, research, and training. Eight participants were recruited to get the perspectives of the beneficiaries from the two villages of Welverdiend-A and Welverdiend-B.

3.3.2 Semi-structured interviews

Qualitative research was carried out through in-depth, face-to-face interviews in a semi-structured format that included open-ended questions as well as targeted questions based on the research questions. Each interviewee was verbally informed about the purpose of the research, voluntary participation, their right to privacy, methods of data storage and the right to withdraw from the interview. Additionally, all participants were given a printed or digital copy of the Participant Information Sheet[4] with details of the research, information on the use of data, and the researcher's contact details. The participants were then asked to sign a Consent Form[5]. While the interviews with the practitioners were conducted in English, the interviews with the community members were carried out in the local language (Xitsonga) with the support of a local translator. For interviews not conducted in English, the consent form was translated and agreed upon with the guidance of the translator. Two interview guides were prepared beforehand, with different sets of questions for the practitioners[6] and beneficiaries[7].

The interview guide for the practitioners was structured in different sections based on the aims of the research:

1. Introduction: The interviews began with ice-breaker questions such as brief descriptions of the organisations' work and the participants' role in their respective organisations.

[4] Appendix 1: Participant Information Sheet

[5] Appendix 2: Consent Form

[6] Appendix 3: Interview Guide (Practitioners)

[7] Appendix 4: Interview Guide (Beneficiaries)

Aim 1: Perspectives regarding the effectiveness of the H4H programme.

2. Effectiveness: This section focussed on understanding the goals of the programme, how the impact is measured by different organisations, the practitioners' perspectives regarding the achievability of these goals and the without-project scenario.
3. Socio-economic outcomes: This section addressed the socio-economic impacts as measured and observed by the H4H programme, as well as the practitioners' perspectives regarding the outcomes.
4. Community development: This section focussed on the participants' perspectives regarding the programme's impacts on the long-term resilience of the communities, and mechanisms in place to encourage active participation of the farmers and marginalised communities.

Aim 2: Roles played by different sectors in fostering resilience and adaptive capacity among rural communities.

5. Roles of organisations/sectors: This section focussed on the role played by the participants' organisation within the H4H programme, as well as the participants' perspectives on how the other organisations involved provide support or expertise.
6. Role of smallholder farmers: Participants' perspectives regarding the importance of smallholder farmers within the H4H programme and in building resilient communities were gathered.

Aim 3: Factors essential for facilitating and sustaining cross-sector collaborations.

7. Key enablers and barriers: The last segment was designed to collect insights based on the practitioners' experiences on the key factors required for the sustainability and scalability of programmes such as H4H, factors required for successful collaboration between different actors, and challenges faced due to such collaborations.
8. Closing remarks: The interviews were concluded with open ended questions like "Is there anything else you would like to add?" and "Would you recommend I look into something further?".

A separate interview guide was prepared for interviews conducted with beneficiaries and community members. The main purpose of these interviews was to understand the impacts of the programme and the perspectives of the beneficiaries regarding its effectiveness. The sections followed a similar structure as the practitioners' interview guide, but the framing of the questions was changed to understand the community perspectives. The guide was structured as indicated below:

Aim 1: Perspectives regarding the effectiveness of the H4H programme.

1. Effectiveness: This section focussed on the perspectives of the beneficiaries regarding their expectations of the programme, whether these expectations have been met, changes they have incorporated as a result of the programme, and the benefits and long-term sustainability of these changes.
2. Socio-economic outcomes: This section focused on understanding perspectives regarding the socio-economic impacts for the farmers and the community.
3. Community development: This section focussed on the opinions of the beneficiaries regarding opportunities for them to actively participate in the planning and implementation of the programme, and the opportunities for marginalised communities to take part in the programme.

Aim 2: Role played by different sectors in fostering resilience and adaptive capacity among rural communities.

4. Role of organisations: In this guide, this section is limited to understanding how the H4H programme was implemented, and which organisations are actively involved with the community.

Aim 3: Factors essential for facilitating and sustaining cross-sector collaborations.

5. Key enablers and barriers: This section was limited to understanding the factors affecting the implementation of the programme within the communities.
6. Closing remarks: The interviews ended with the open-ended question "Is there anything else you would like to add?" similar to the practitioners' interviews.

All interviewees were asked similar questions so that the answers could be comparable. The interviews with the partitioners lasted between 45-60 minutes and the interviews with beneficiaries lasted 20-30 minutes. All interviews were conducted in-person in the participants' natural setting, except two (of Alice and John) that were conducted through an online video call on Zoom. All interviews were audio recorded upon receiving consent of the participants and were then transcribed for analysis. All 23 interviews were transcribed individually on Microsoft Word. The transcriptions were then uploaded to the software NVivo to carry out the analysis of data.

3.3.3 Reflexive thematic analysis

The data gathered through the semi-structured interviews were analysed using the reflexive thematic analysis framework (Braun and Clarke 2019). This method acknowledges and highlights the role of the researcher in interpreting patterns of meaning in the gathered data

(Braun and Clarke 2019; Byrne 2022). Reflexive thematic analysis is conducted at the intersection of the data, the theoretical assumptions of the analysis and the analytical skills of the researcher, and hence this method is not meant to yield similar results when carried out by different researchers (Braun and Clarke 2019; Byrne 2022). This method was selected for two main reasons. First, because the research was a case study, experiences during the field research contributed to the reflexive and thoughtful engagement of the data as well as the analytic process (Byrne 2022). Second, reflexive thematic analysis discourages the use of multiple coders for the analysis (Byrne 2022), and since this thesis was carried out as an individual research project, using this method was deemed most apt. Reflexive thematic analysis offers flexibility in the process of coding, and the themes were developed iteratively through the process of analysis (Braun and Clarke 2019; Byrne 2022).

The analysis followed a six-phase process as proposed by Braun and Clarke (2012). The first step of the analysis was to familiarise myself with the data and the transcriptions, and initial patterns and sections were highlighted (Naeem et al. 2023). I also re-read the transcripts and made preliminary notes of my thoughts and observations. The next step was the process of coding on the software NVivo, where phrases, sentences or sections of the discourse were highlighted based on their significance (Naeem et al. 2023). These segments of text were then coded either through semantic coding by identifying keywords in the text (Naeem et al. 2023; Braun and Clarke 2006) or through latent coding by recognising underlying meanings and patterns in the discourse (Braun and Clarke 2006; 2019) as was appropriate. The coding and subsequent categorising of the codes mostly followed an inductive process (Braun and Clarke 2006). However, it is not possible to conduct coding exclusively through inductive analysis (Byrne 2022), and the research questions and concepts from the literature review did play a role in influencing some of the codes.

The next step was to generate initial themes. This was done by categorising the codes into themes and sub-themes to produce a coherent and lucid picture of the data (Braun and Clarke 2012; Byrne 2022). This was followed by the next step of analysis of reviewing the themes and revising them (Braun and Clarke 2012). This was carried out by reviewing the relationship between codes and how they feed into the theme, as well as reviewing the themes and how they interpret the data and codes within them (Byrne 2022). Codes and themes that did not add to the meaningful interpretation of the data were edited or removed in this phase (Byrne 2022). Once the codes and themes were finalised, they were defined and interpreted under the Results and Discussion section.

3.4 Limitations

One of the main limitations of the field research was that due to the lack of time and resources, the interviews with the beneficiaries of the programme was limited to two villages only. Although Welverdiend-A and Welverdiend-B were one of the first villages where the programme was implemented, exploring the impacts and perspectives of other communities and villages may have provided insightful data regarding the implementation. Additionally, the research was designed as a case study of the Herding 4 Health programme in the K2C BR. But during the field research I discovered that the implementation of the programme in other Southern African countries like Botswana and Mozambique were starkly different despite following the same model. Although this was beyond the scope of this thesis, it offers promising avenues for further research in this area.

Another challenge that was particularly difficult to navigate was the language barrier. Most of the community members were interviewed in their native language Tsonga with the help of a translator, and some information may have been lost in translation. By repeating similar questions with all the participants from the community, I was able to get more representative data. Also, not all the participants were particularly articulate due to the language barrier. So although they had valuable experience and knowledge about the research topic, some participants divulged limited information. As a researcher, not knowing the local language and relying heavily on the translator limited the insights that I could gather from community meetings and gatherings where information regarding day-to-day activities were extensively discussed.

A limitation of the thesis topic is the exclusion of crop farmers from the study given the limited time available for the master's thesis. This decision was taken based on the inputs from the experts and practitioners regarding the complexity and high variance of crop farming in the region. This is however an area of research that is much needed in the region and could be a topic that can be studied further beyond the scope of this thesis project.

Lastly, a limitation of the research is that it is context specific, and given the unique historical, social, and environmental complexities of the K2C BR, the data cannot be directly extrapolated to a broader context. However, all contexts and regions have their own complexities, and data regarding the broader perspectives were also collected to ensure that the data can be generalised to a certain extent.

3.5 Research ethics

The research was financially supported by the Mobility Research Grant of Open Society University Network (OSUN) that enables master's students to carry out field research on topics focussed on sustainability and climate change adaptation. The research was guided by the ethics protocols of Central European University (CEU), CSA, and the local communities.

The code of ethics form was submitted to CEU and approval was obtained before the start of the field research. During the initial stages of scoping, the code of ethics was discussed and agreed upon with representatives of CSA for interviews to be conducted within the organisation, with their partners and the community members. Before commencing the research within the communities, permissions were obtained from the village headman (*Induna*) of Welverdiend-A and Welverdiend-B, and the Mnisi Tribal Authority under which the study area falls. As discussed earlier (Section 3.3.2), ethics protocol of the interviews involved briefing the participants of their rights, handing over the participant information sheet and getting signed consents before interviewing the participants.

Before transcribing the interviews, the participants' names were pseudonymised and codes were assigned to each interview. The data collected was stored and managed on a password protected hard disk during the research. The raw data will be stored up to a period of five years after which it will be deleted. On completion of the thesis, the final paper along with an executive summary and research findings will be shared with the practitioners and partner organisations to help strengthen their future endeavours. The paper will also be shared with representatives of the TA and the *Induna* of Welverdiend-A and Welverdiend-B as agreed upon before commencing the research.

3.6 Researcher's positionality

In qualitative research, the researcher is the key instrument in data collection and analysis. This necessitates recognising and acknowledging their personal background, values and biases that may influence the interpretation of the data and results of the research (Creswell and Creswell 2018).

Over the summer of 2023, I had the opportunity to carry out research on rural sustainability in the K2C BR in South Africa, where I documented challenges and adaptation strategies of smallholder livestock farmers. This not only strengthened my passion for working with rural communities in the Global South, but also gave me a glimpse of the inspiring work that is

being carried out by various private and public organisations in the region. This sparked my curiosity about how the nexus between policy, business and communities can contribute to the successful implementation of climate adaptation strategies. The research design was motivated by my observations during my time in the region, and through the various conversations I had with community members, farmers and practitioners working there. I believe that understanding the context enhanced my awareness of complexities and sensitivities of the region and enabled me to carry out effective field research.

This thesis is a culmination of all my learnings through the master's programme and my years of experience in the field of sustainable agriculture. The research has allowed me to pursue my interest in rural sustainability and climate adaptive strategies that build resilient systems. My work experiences have helped me understand the complexities involved in the sustainable development of rural communities. As a South Asian, I have been exposed to the socio-economic disparities in countries of the Global South, where smallholder farming communities are at the bottom of the economic ladder while also being the most vulnerable to the impacts of climate change. I have long recognised the need to uplift rural farming communities, and I believe that it is crucial to building resilience. My experiences and beliefs may have caused me to lean towards certain themes. I acknowledge that this may have shaped my views and results, and also influenced how I understood the data.

4 Results and Discussion

The data from the 23 interviews was analysed and coded using reflexive thematic analysis, and grouped into themes which are presented in Figure 5.

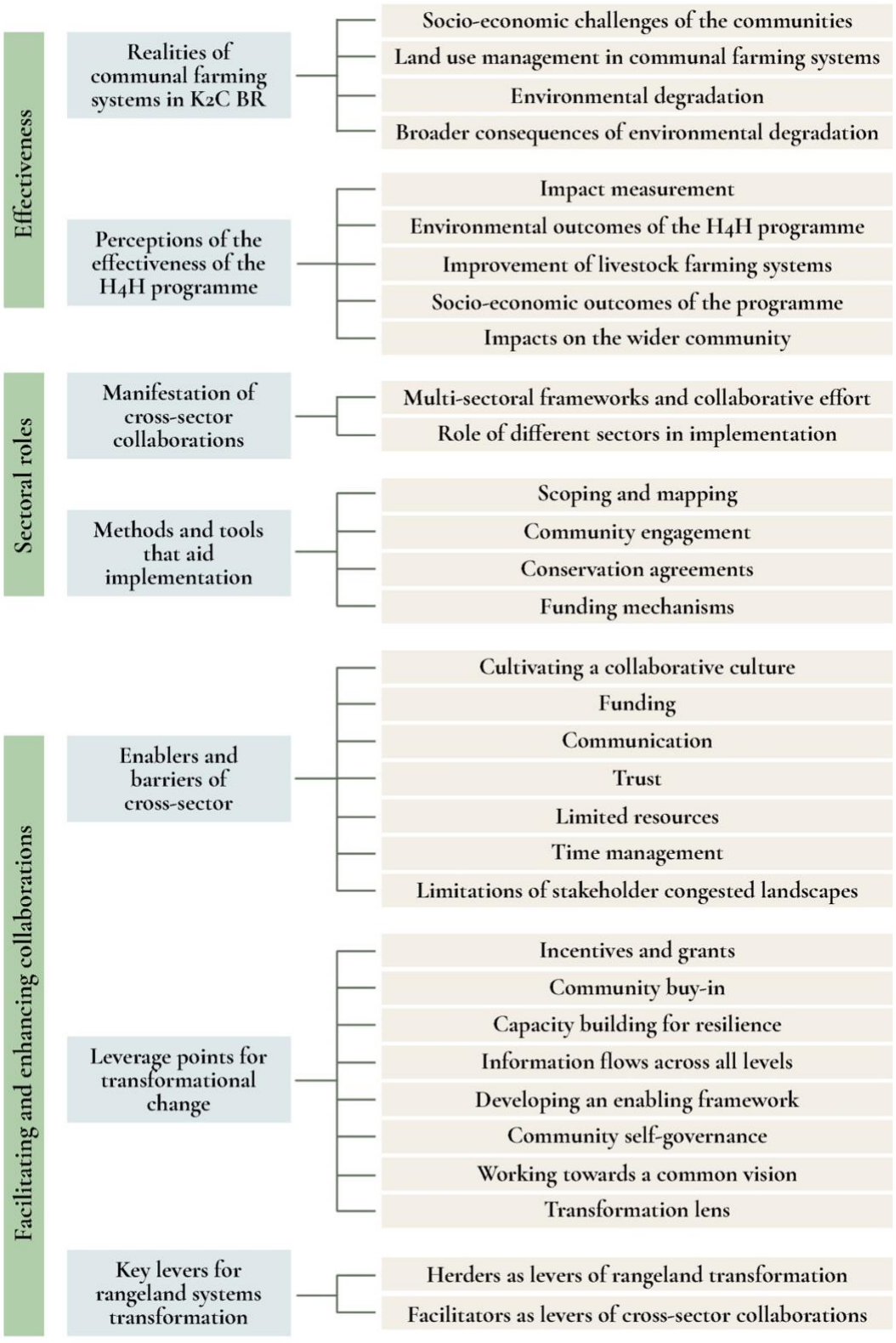

Figure 5: Mind map of themes and codes from the reflexive thematic analysis of data. Figure created by author.

The structure of this section follows a reverse-funnel approach, starting at the 'narrow' end with findings regarding the effectiveness of the H4H programme, and moves on to 'broader' topics of cross-sector collaborations in practice and factors that facilitate and enhance collaborations. The section ends with a discussion on how leverage points perspective can be used to identify points of action for maximum impact.

4.1 H4H model vs. H4H programme

Before presenting the results of the research, it is important to understand the distinction between the 'H4H model' and the 'H4H programme'. The H4H model was designed by John through the lens of the One Health programme. One Health has gained traction over the recent years to tackle zoonotic diseases at the human-animal-environment interface (Ghai et al. 2022). The approach is multi-sectoral, transdisciplinary and collaborative, and builds on the interconnectedness of people, animals and the environment (Ghai et al. 2022). This One Health framework underpins the H4H model, illustrating its foundational principles of cooperation across different sectors and stakeholders to achieve outcomes that benefit people, animals, and the environment (John, pers. comm.; Paul, pers. comm.).

John (pers. comm.) and Paul (pers. comm.) extensively discussed the design of the H4H model. It is designed as a livelihoods model with four main pillars or goals. These are healthy rangelands, healthy animals, healthy people and healthy governance and policy. These pillars enable four actions – building hope in communities, strategically herding the livestock, healing the rangelands, and harvesting or reaping the benefits of a healthy system. Through these actions that impact the four pillars, the model aims to build landscape resilience. The model is built on two main interlaced and interdependent frameworks that aid in efficient implementation.

1. The 'enabling framework' has four main tenets which are required to build a support system – community buy-in and community governance, policy and landscape level governance, funding and investments, and industry and enterprise.
2. This enabling framework is built through a 'collaborative framework' which brings together different actors and stakeholders like science partners, implementation partners, enterprise partners and training partners.

The model requires key practices to be incorporated that are crucial to unlock opportunities like market access and enterprise development support. These are strategic herding, strategic kraaling, animal identification, planned grazing, wildlife-friendly methods, reducing poaching

and wildlife crime, heard health, low stress handling, and record keeping. These practices have a knock-on effect, with strategic herding being the key factor that influences all the subsequent practices (Paul, pers. comm.). The organisation Herding 4 Hope was created to facilitate the implementation of the H4H model based on system objectives of improving livelihoods and to set up a communal farming system that is functional and resilient (John, pers. comm.).

The H4H model when implemented becomes a 'programme', but the implementation varies based on the needs and complexities of the landscape, as well as the organisations that are implementing it. Although the H4H programme in the K2C BR is based on the H4H model, it is a loose adaptation of the structure and practices of the model. The programme is built on the enabling and collaborative frameworks of the H4H model. But the implementation is significantly different. Among the practices outlined by the H4H model, planned grazing, animal identification, and heard health are the main focuses in the K2C BR. And since strategic herding and kraaling are not practiced, planned grazing is not done as intensely as designed in the H4H model (with bomas and daily/weekly grazing paddocks), but through grazing camps which are three or four large divisions of the rangelands where livestock is grazed seasonally. This research explored the implementation of the H4H programme in the K2C BR, but also captured the perspectives of practitioners who are involved with implementation of the H4H model in other sites, like Mozambique, Botswana, Zimbabwe, etc. These interviews contributed to the richness of the data, by providing critical insights on lessons learned from the implementation of the model in different contexts.

4.2 Realities of communal farming systems in K2C BR

Although the literature review covered the challenges and context of the K2C BR, it was a recurring theme in many interviews. The participants emphasised the need for interventions that take into consideration the diverse issues faced by the communities. This section presents the views and comments of the participants that emphasise and strengthen the literature, and provides deeper understanding of the other themes.

4.2.1 Socio-economic challenges of the communities

Value systems built on livestock

> "People invest in cattle. There was a headmaster in Welverdiend for twelve years. When he retired, he took all his pension money to buy cattle. It was like a bank. And that value – how to create wealth – is linked to cattle" (Megan, pers. comm.).

The above statement sums up the importance of cattle in the communities. Although the region has had an influx of many people and tribes (K2C-NPC 2024), cattle has always played a vital role (Megan, pers. comm.). Cattle is associated with generations of wealth and has always held a unique value among the people (Megan, pers. comm.). Cattle are traditionally used for many ceremonial purposes, such as "buying a wife" or to slaughter at funerals (Isabel, pers. comm.). It is also a status symbol or a symbol of wealth, and is considered to be a "bank" (Isabel, pers. comm.; David, pers. comm.). These communities rely on cattle more that their own national currencies to stay on trend and to reap benefits when the need arises (David, pers. comm.). A survey carried out by Stroebel et al. (2008) revealed that the smallholder cattle owners made decisions based on the benefits they gained from cattle, in which "cattle complex" or cattle seen as a symbol of prestige and status played a significant role. This is one of the biggest reasons why they aim to have large herds and big bulls, that they can proudly pass on to their kin as inheritance (Isabel, pers. comm.). But such decisions also make them vulnerable to external challenges that not only affect their cattle, but also their "savings" and their "bank" which can get wiped out over a season of drought or disease (David, pers. comm.).

Impacts of apartheid on livestock farming

There have been well documented studies that emphasize the devastating environmental impacts of apartheid, particularly deterioration of land and depletion of natural resources (Durning 1990; Stull, Bell, and Ncwadi 2016). The communities in the K2C BR, particularly in and around the study sites, have been heavily impacted by the apartheid regime with one of the biggest impacts being forced displacements and moving people into the former homelands (Schultz, West, and Florêncio 2020). Some practitioners provided more details on how this affected the K2C BR.

Megan (pers. comm.) described how the people were moved into the former homelands from the escarpment region, which is richer in terms of natural resources and more conducive for agriculture.

> "They were dumped there to make way for the plantation of the pine trees up in the mountains, because they needed the wood for the mining sector… That had an impact on people, and they were moved with the cattle to this dry area, where there's very little rain" (Megan, pers. comm.).

The establishment of KNP and other PAs in the region led to further marginalisation of the people (Megan, pers. comm.). The wildlife areas were fenced off to restrict movement of

animals, which was starkly different from the open systems of other southern African countries which allowed people to live more harmoniously with nature (Megan, pers. comm.). Studies show that the communities depend on natural resources for sustenance and nutrition (Ragie et al. 2020). The restriction of the use of natural resources not only led to a strain on the communities' access to food and resources, but also had deeper impacts where people lost their connection with nature and their land (Megan, pers. comm.). The lack of resources coupled with neglect and marginalisation by those in power had a big impact on how livestock farming was practiced within the communities even after the apartheid regime ended (John, pers. comm.).

Disease control restrictions

The establishment of KNP and other PAs was accompanied by strict disease control restrictions on the areas bordering these PAs. These restrictions led to one of the most regulated market systems for beef export (Megan, pers. comm.), with compliances such as weekly inspection of cattle by veterinary services (Laura, pers. comm.), dipping of cattle[8] to remove parasites (Isabel, pers. comm.), and access to only state authorised buyers for cattle (Laura, pers. comm.; Isabel, pers. comm.). These policies were not conducive for livestock farming, and most farms that were owned by white farmers with title deeds were converted to PAs to cater to wildlife tourism (Megan, pers. comm.). But the restrictions had – and continue to have – harsh consequences on the African communities who raise cattle on communal land, particularly with market access (Laura, pers. comm.).

> "The consequence for us is - these guys cannot sell meat. They have nowhere to sell meat. They've got no economy. But meat that is not in the red line - from outside - can come in, but these guys can't sell anywhere here. And they definitely can't go out. So there's an economic sanction. Based on governance. Because of export." (Paul, pers. comm.)

Even interventions and initiatives that aim to give market access, such as mobile abattoirs have had to be decommissioned and redesigned due to the strict regulations, leading to losses for organisations and enterprises (Laura, pers. comm.; David, pers. comm.). These statements are

[8] Cattle dipping is a process employed to control the ticks and tick-borne diseases by 'dipping' the cattle in water-based solutions. In South Africa, this done in plunge dip-tanks, spray race or a handling facility (DRDLR 2018). In the study sites of Welverdiend-A and -B, dip-tanks managed by the state veterinarians are used on a weekly basis.

indicative of the resentment of practitioners regarding the complexities posed by these regulations.

Social changes

The growing challenges of communal livestock farming and rapid modernisation has led to the migration of the younger generation to the cities in search of work (Paul, pers. comm.). This has led to a cultural shift in the rural communities (Megan, pers. comm.). The kinship culture which formed the basis of the social fabric has started to erode, with changes in gender dynamics and how households are structured (Megan, pers. comm.). Although the extended family households are still the most common household structures (Hall and Mokomane 2018), studies show that there has been a fall in the standard 'three-generation' and 'multi-generation' households with increased heterogeneity of household heads in terms of gender and age (Visagie 2009).

These changes in social dynamics due to migration has also changed the way in which livestock farming is practiced. While in other countries farmers tend to be just farmers, in South Africa many 'farmers' live in cities, but own livestock that is taken care of by herders or family members in their villages (David, pers. comm.). This adds a layer of complexity when managing communal farming systems, because many farmers in the community are disconnected and do not actively take part in the management of the herds or maintenance of the rangelands (Paul, pers. comm.).

4.2.2 Land use management in communal farming systems

Eleven out of the twenty-three participants raised the issue of land use and management of communal rangelands. These communal lands are not large privately owned areas that would allow for livestock farming to be conducive or convenient (Megan, pers. comm.). Unlike titled land and private feedlots, communal rangelands are shared by the entire community or village who tap into its resources (Nancy, pers. comm.).

Tragedy of the Commons

Often the farmers are faced with issues like the "Tragedy of the Commons" due to the lack of resources, causing increased stress on the communal rangelands (Paul, pers. comm.; Alice, pers. comm.). Tragedy of the Commons occurs when individuals who have access to public resources or 'a common' make decisions based on their own interest and personal needs

regardless of the negative impact on others, and as a result lead to the depletion of resources (Hardin 1968).

Most farmers leave their livestock in the rangelands to graze freely, with the goal of "making their cattle fatter" (Paul, pers. comm.). This leads to degraded rangelands and subsequent loss of food for the cattle (Alice, pers. comm.). Because the rangelands are common property of all members of the community, individuals cannot make decisions on its use and management (Laura, pers. comm.). Any management actions and interventions require not only farmers, but also the wider community to be on board (Laura, pers. comm.). Communities often face issues where some farmers or other community members do not follow set practices and management plans (Angie, pers. comm.; Caleb, pers. comm.; Samuel, pers. comm.). Practitioners cited compliance as one of the biggest challenges of implementation of any intervention (Laura, pers. comm.; Paul, pers. comm.).

Although practitioners cited the Tragedy of the Commons as the reason for environmental degradation, the issue faced by the communities is the resource regime of 'open access'. Open access regimes are free and open to everyone with no well-defined property rights (Ostrom 2015). It results from the absence of management systems to enforce behaviour norms (Ostrom 2015). Communal lands are shared by the community with no private land rights as emphasized by the interviewees. Studies indicate that this does not always occur due to the inherent failure of the common property, but due to external factors (Berkes and Folke 1998). In the case of the K2C BR, factors like displacements due to apartheid, the increase in population, and socio-economic conditions contribute to the overuse of common property (Durning 1990; Zazu and Manderson 2021; Pereira, Cuneo, and Twine 2014). Additionally, in open access regimes, users often employ inefficient methods of resource-use to out-harvest other users, similar to overgrazing in rangelands (Berkes and Folke 1998).

Expanding village sprawl

One of the biggest challenges to livestock farming that was cited by many practitioners was the high rate of development, with buildings and infrastructure taking up more land space (Henry, pers. comm.; Nancy, pers. comm.). This has led to unplanned and haphazard land use management (Isabel, pers. comm.). The increasing population in these rural areas has also led to more land being used for housing (Laura, pers. comm.; Nancy, pers. comm.). While cattle are still considered a symbol of wealth, social changes and modernisation have led to the rise of new status symbols within the communities, like building "beautiful homes" in the villages

with the remittances that migration workers send to their families (Megan, pers. comm.). The houses and village sprawl (Figure 6) has slowly encroached the grazing lands, and the area available for grazing has reduced (David, pers. comm.).

Figure 6: Expanding village sprawl has reduced land available for grazing. Image taken by author and colleagues as part of the CORUSUS project, July 2023.

Over the years, while the human population has grown, the livestock population has not declined (Isabel, pers. comm.). The population in Bushbuckridge has been increasing at 3.2% every year, considerably higher than the population growth of Mpumalanga province which is at 2.4% ('Census 2022 Municipal Fact Sheet' 2023; City population, n.d.). However, the population of cattle has remained at around 77,000 (DARDLEA 2019) over the years. The TA, who is in charge of land allocations and land use management within communities, are often conflicted by the needs of the livestock farmers and the needs of the wider community (Henry, pers. comm.; Nancy, pers. comm.). These rangelands have become too small to support both people and livestock (Caleb, pers. comm.; Nancy, pers. comm.). This points to the strain on the carrying capacity of the rangelands (Arrow et al. 1995), which is exaggerated by the current management practices.

4.2.3 Environmental degradation

Soil degradation due to overgrazing

Environmental degradation is a result of the complex socio-economic challenges like historical land tenure and post-apartheid land-use reforms, that are exacerbated by climate change (Mani, Osborne, and Cleaver 2021). These layered problems lead to overgrazing and unplanned grazing of livestock, which subsequently cause degraded land, soil erosion and bush encroachment (Laura, pers. comm.; Isabel, pers. comm.)

> "There are other land users, but in terms of degradation, you would see like the biggest contribution coming from livestock farming, and that's through overgrazing – so an uncontrolled movement of cattle herds and not really having a uniform grazing regime" (Laura, pers. comm.).

Mark (pers. comm.) recalls that there was no grass in the villages of Welverdiend-A and -B when he started working there in 2017, because the "cattle had grazed everything in the landscape". This was also affirmed by farmers in the villages, who said that previously the cattle were allowed to graze everywhere, and they would often not have enough food in the drier months (Tony, pers. comm.; Eric, pers. comm.). Herding of cattle was historically taken care of by the younger boys of the family, but because of modernisation and access to education, the young are no longer involved in the day-to-day farming activities (Megan, pers. comm.). So, the cattle were left out with no control of herd movements (Samuel, pers. comm.; Laura, pers. comm.), leading to selective grazing where the cattle ate only the best or most palatable grass until it ran out (Henry, pers. comm.; Paul, pers. comm.).

Overgrazing and unplanned herd movements cause soil degradation (Mark, pers. comm.). The soil gets stripped of its nutrients, and there is no grass or barely few pockets of grass that are mostly unpalatable or not preferred by cattle (Henry, pers. comm.; Mark, pers. comm.). Visually, the landscape starts looking grey and sandy, with not much greenery, and eroded with gullies due to all the soil washing away (Mark, pers. comm.; Henry, pers. comm.). One of the direct results of degraded rangelands is bush encroachment or woody encroachment, where one bush species dominates the landscape (Henry, pers. comm.). This can be seen in Figure 7, where a fence demarcates the biodiversity rich savannah landscape of KNP (upper left segment) and the degraded landscape of communal rangelands with excessive bush encroachment (lower right segment) (Megan, pers. comm.).

Figure 7: Aerial photograph showing the difference in ecosystems between KNP (upper left segment) and communal rangelands (bottom right segment). Credits: Dr. Wynand Uys. Source: K2C-NPC.

Although many practitioners pointed towards higher population of cattle as the reason for rangeland degradation, Paul (pers. comm.) argued that overgrazing is more a result of unplanned grazing with uncontrolled and unattended cattle, rather than having too many animals. His argument aligns with Arrow et al.'s (1995) proposition that carrying capacities are not fixed or static numbers. With structural and management changes aimed at resource conservation, the carrying capacity can be sustainably increased, at least to a certain extent (Arrow et al. 1995). This emphasizes the need for better rangeland management practices.

Extreme weather events and climate variability

> "We have low market because of drought, so the market is not good. We are selling the cows at the low price. Because they are so slim, they are not healthy." (Cam, pers. comm.)

The consequences of soil degradation are most evident during dry spells and droughts (Isabel, per. comm.). The K2C BR is prone to droughts, and a direct result of such climate extremes is that the farmers start losing their cattle (Alice, pers. comm.; Tom, pers. comm.). The farmers who have access to money and can afford to buy supplementary feed survive such challenges, but this is not the case for most farmers who depend mostly on their livestock for income (Tom, pers. comm.). There is lack of knowledge among the farmers on how to mitigate these

challenges (Rick, pers. comm.). Practitioners point out that impacts of droughts is higher due to overgrazing, and more droughts lead to more overgrazing due to lack of access to food, leading to a vicious cycle of soil degradation and deteriorating cattle health (Isabel, pers. comm.; Henry, pers. comm.). Droughts also lead to disease outbreaks in livestock (Isabel, pers. comm.). And given that most farmers bank their money in cattle, droughts that affect cattle can wipe out their banks in one bad season (David, pers. comm.). On the flipside, due to lack of grass and plant roots that hold the soil in place, during the months of higher rainfall the top layer of the soil gets washed away (Henry, pers. comm.). This not only strips the rangelands of soil, but washed-up soil ends up in the KNP and PAs causing adverse effects like alien species invasion (Henry, pers. comm.; Isabel, pers. comm.), which is a growing concern for the conservation areas (K2C-NPC 2024). These impacts are aggravated by the growing uncertainty of weather patterns and increasing climate variability (Nancy, pers. comm.). Extreme weather changes and events such as cyclones, heat waves and unpredictable rainfall has affected how farmers carry out their day-to-day activities making them more vulnerable in the face of climate change (Samuel, pers. comm.).

4.2.4 Broader consequences of environmental degradation

The challenges faced by the farmers has led to increasing uncertainty of livestock farming. If better rangeland management actions are not implemented, the livestock numbers will reduce as the communities will move away from livestock farming (Henry, pers. comm.; Nancy, pers. comm.; Samuel, pers. comm.). This will lead to less income for many households (Henry, pers. comm.). And given the high rate of unemployment, this reduced income leads to higher crime rates within the communities and in the PAs (Nancy, pers. comm.; Victor, pers. comm.). In communities living in high biodiverse regions alongside wildlife conservation areas, there is inherent conflict between conservationists and farmers, and PAs and buffer zones (Alice, pers. comm.). This makes it necessary for any interventions in these regions, conservation related or otherwise, to also address the livelihoods component to ensure that there is upliftment of the communities around the PAs (Paul, pers. comm.).

Challenges faced by rural communities and smallholder farmers are multi-faceted and complex. Naturally, climate adaptation should also consider more than just environmental adaptation and strive for holistic solutions. The relationship between communities, conservation and livelihoods has been extensively documented emphasizing the need to focus on livelihoods for conservation initiatives to be effective (Charles 2021). The interdependence and interconnectedness of environmental conservation and rural livelihoods must be

acknowledged and addressed holistically, for any intervention to be sustainable in the long-term (Charles 2021). Wright et al. (2016) argued that focussing on pre-existing livelihood strategies (like livestock farming in the case of K2C BR), where possible, can lead to resilient livelihoods, promote sustainable use of resources, and strengthen the relationship between conservation areas and local communities.

4.3 Perceptions of effectiveness of the H4H programme

To understand the impacts and effectiveness of the programme, perspectives of practitioners and beneficiaries were gathered. The effectiveness has been analysed based on the evaluative framework for adaptive co-management put forth by Plummer and Armitage (2007). Three main components are evaluated and discussed – environmental outcomes, socio-economic impacts, and the role of different organisations. The first two components address the first aim of the research, while the latter addresses the second aim of the research.

4.3.1 Impact measurement

The impact of the programme is measured extensively using different criteria by the organisations involved to ensure full traceability of the work being carried out (David, pers. comm; Alice, pers. comm.). CSA, the project proponents, carry out most of the impact measurement with a monitoring and evaluation team on the ground, as well as a team of analysts who study the broader impacts of the programme (Alice, pers. comm.; Laura, pers. comm.; Samuel, pers. comm.). Additionally, other organisations like MNA also gather and record data pertaining to market activities (David, pers. comm.). The impact measurement follows a three-tiered approach. The bottom tier is the ground monitoring carried out by eco-rangers who monitor rangeland management, compliance of management strategies, and environmental conditions of grazing camps (Alice, pers. comm.; Caleb, pers. comm.). The middle-tier is the monitoring and evaluation team that manages and compiles the ground data into a dashboard system (Alice, pers. comm.; Samuel, pers. comm.). The top-tier utilizes tools including satellite imagery to measure broader impacts and changes in the rangelands (Alice, pers. comm.). The three main components measured are human socio-economic well-being, the ecology and biodiversity of the rangelands, and livestock and animal health (Alice, pers. comm.).

In terms of the environmental outcomes and rangeland restoration, the components measured and recorded are grass cover over time, biomass quantity, changes in species, etc. (Nancy, pers. comm.). The rate of recovery of gully profiles and the rate of gully erosions are also measured

to understand the rate of land restoration (Laura, pers. comm.). Soil carbon is an important metric that is measured to monitor carbon sequestration (Nancy, pers. comm.). Herd monitoring is also a big component of the programme. Body condition scoring is carried out to record data regarding herd conditions like weight and head girth, birth rate of the calves, and gender composition of the herds (Laura, pers. comm.; Nancy, pers. comm.; Samuel, pers. comm.; David, pers. comm.).

In terms of socio-economic impacts, household surveys are conducted on a regular basis to assess the number of animals owned by households, number of cattle sold, the price received for cattle, and income generated from livestock sales (Samuel, pers. comm.; Henry, pers. comm.; Nancy, pers. comm.). Other data regarding impacts on the wider community are also recorded, including number of small business enterprises developed (Henry, pers. comm.; Nancy, pers. comm.). Jobs created through the programme are tracked by recording the number of people employed and number of trainings conducted (Henry, pers. comm.). Capacity building and training is a big component of the programme, and training is provided on various topics like low stress herding, market access training or resource management (Henry, pers. comm.; David, pers. comm.). Attendance registers are maintained to record the level of participation as well as track the participation of women and youth (Nancy, pers. comm; David, pers. comm.).

David (pers. comm.) pointed out, that since South Arica is an anomaly in the African context with households having multiple sources of income, it is a lot harder to get accurate indicators on livelihoods or socio-economic outcomes. Although socio-economic indicators are measured, the impact on the rangeland remains the main focus, partly because it is easier to measure. Alice (pers. comm.) indicated that CI and CSA are only now carrying out full evaluations of the socio-economic impact with the support of external researchers.

4.3.2 Environmental outcomes of the H4H programme

One of the most concentrated foci of the H4H programme is rangeland restoration, because better rangeland health will also lead to healthier cattle which will help farmers fetch better prices for their cattle (Mathew, pers. comm.; Isabel, pers. comm.). Due to the management practices employed through the programme, soil erosion, which has been one of the biggest challenges in the rangeland, has been curtailed. (Isaac, pers. comm.; Rick, pers. comm.). Rangeland restoration work is done using a range of mitigation techniques that both practitioners and the farmers discussed at length.

The principal concept from which most of the mitigation techniques stem from is to mimic nature to restore the rangeland (Nancy, pers. comm.; Henry, pers. comm.). The impact that large herbivores, particularly elephants, have on landscapes is mimicked through techniques like bush thinning, brush packing, and resting grazing areas (Nancy, pers. comm.). Research on degraded savannah rangelands indicates that the combination of bush clearing and brush packing promotes grass diversity and growth, particularly in communal lands that have high grazing pressure (Mangani et al. 2022). In areas of heavy bush encroachment, bush thinning is done by manually by cutting the bushes to create more open spaces and grazing areas (Henry, pers. comm.). Brush packing (Figure 8) is also done manually by spreading shrubs on eroded soil so that it acts as a barrier against flowing water and help with grass growth (Cam, pers. comm.; Nancy, pers. comm.). These techniques have significantly improved grass cover in the region (Megan, pers. comm.).

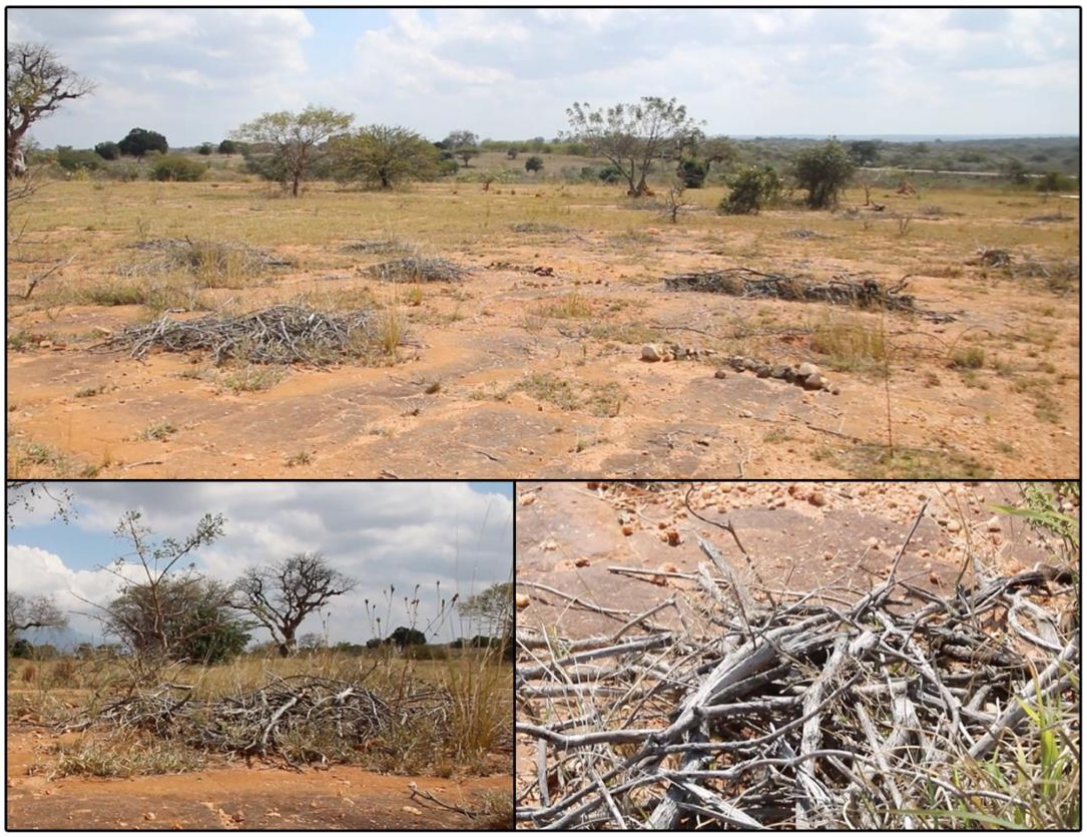

Figure 8: Brush packing on degraded soil by creating mounds of dried shrubs to promote grass growth. Image taken by author and colleagues as part of the CORUSUS project, July 2023.

4.3.3 Improvement of livestock farming systems

Planned grazing

Most farmers mentioned that one of the biggest benefits of the programme was the incorporation of grazing plans and camps for grazing.

> "Since we've started that system of resting the camps, we never had a drought. Because previously the cattle were grazing all over. And then every year we experience a drought. Cattle are dying. And then those who have money, they start buying another one, something like that. But since we have started that system of getting an assistance from CSA, no drought." (Tom, pers. comm.)

Figure 9: Rangelands are demarcated into grazing camps with fences to control animal movements. Image taken by author and colleagues as part of the CORUSUS project, July 2023.

Interestingly, the farmers use the terms drought and lack of grass interchangeably. This stems from the fact that when drought hits, the impact of having lesser grass increases multi-fold (Isabel, pers. comm.). The grazing camps (Figure 9) are planned by the farmers with guidance of CSA (Alice, pers. comm.). The camps are fenced to control animal movement, and to ensure that some areas are allowed to rest without cattle grazing (Mark, pers. comm.; Laura, pers. comm.). This method is used to control overgrazing in the rangelands and help the soil recover (Laura, pers. comm.; Mark, pers. comm.). The camping system ensures that there is sufficient grass cover year-round, by resting areas in intervals to promote grass growth (Nancy, pers. comm.). The plan usually follows a three or four camp system where rotational grazing is

practiced, which creates a fodder bank for the drier months and makes these rangelands more resilient to droughts (David, pers. comm.; Samuel, pers. comm.; Tony, pers. comm.; Rick, pers. comm; Drake, pers. comm.; Cam, pers. comm.). Having a resilient fodder bank also means that the farmers don't have to spend their money on cattle feeds and supplements to keep their livestock alive (Samuel, pers. comm.). The benefit of practicing rotational grazing is acknowledged and appreciated by the farmers, with Cam (pers. comm.) and Rick (pers. comm.) asserting that they would like to continue with these practices even if the programme is discontinued in their communities.

Although planned grazing with camps are relatively better than unplanned grazing, it relies heavily on resources like fences as well as manual labour to clear bush encroachment and make way for cattle. Studies also indicate that contrary to what grazing camps are intended to do, enclosed management units are unable to mimic the grazing impact of large herbivores that migrate across landscapes (McGahey et al. 2014). Paul (pers. comm.) argued that strategic herding has a much higher impact on rangeland restoration. Strategic herding is a practice designed under the H4H model that is based on the principles of 'holistic management' proposed by the biologist Allan Savory (2016). This approach is based on intensive animal impact for short durations in a paddock system, interspersed with appropriate periods of rest. Proponents of this management approach argue that this system maintains the biological diversity of the rangeland management systems, and helps increase stocking rates for grazing through continuous management (McGahey et al. 2014; Hawkins, Short, and Kirkman 2017).

Herd management

In South Africa, considering that many farmers are not directly involved in farming and raising animals, herders were employed to manage cattle. Farmers claimed that lack of management and care affected the herd health significantly (Tom, pers. comm.; Rick, pers. comm.). With the H4H programme, herders and farmers were trained to manage herds better, thus improving the conditions of livestock (Tom, pers. comm.; Tony, pers. comm.). Animal husbandry also improved under the programme monitoring, with support to carry out regular dipping, branding, and veterinary care of cattle (Victor, pers. comm.; Henry, pers. comm.). This allows the farmers to sell their cattle at higher prices since the cattle are healthier and stronger (Cam, pers. comm.; Laura, pers. comm.). The programme also offers other incentives like fodder bales and supplements for the cattle, particularly in the event of droughts (Henry, pers. comm.). Because the programme is involved in supporting the dip tanks, the area around the tanks is maintained regularly (Henry, pers. comm.).

Herd management involves controlling the herd size to manageable and sustainable numbers (David, pers. comm.; Alice, pers. comm.; Nancy, pers. comm.). Large herd sizes and big bulls are equated to higher prices at the time of cattle sales, thus farmers are often reluctant to sell their cattle leading to overstocked landscapes (Alice, pers. comm.). And when extreme weather like drought hits, it could wipe out cattle (Samuel, pers. comm.). Through education and training, the farmers are taught to sell unproductive animals, at the right age, and those not needed in the breed stock (David, pers. comm.; Nancy, pers. comm.; Megan; pers. comm.). The farmers are also encouraged to stick to breeds that are indigenous to South Africa or southern Africa, which ensures more resilient herds (Nancy, pers. comm.). Herd management allows farmers to become more productive and move away from informal structures to more formal systems that help them get better prices for the animals (David, pers. comm.).

Livestock changes

With changes in household dynamics, and growing numbers of female household heads, the composition of livestock varieties in the communities is also changing (Isabel, pers. comm.). Small stock is cheaper and easier to get off the ground and is the most viable option for women to foray into livestock farming (Isabel, pers. comm.; David, pers. comm.).

> "Ten years ago, when I started working here, the only patients you ever saw were cattle, and dogs. Now you see a lot more goats. You used to see maybe a goat once a week. Now you see goats few times a day as patients. And also pigs." (Isabel, pers. comm.)

Isabel (pers. comm.) argued that it's not just the social dynamics that has influenced this change, but also the change in market demand. Goats and pigs have a higher turnover rate or birth rate compared to cattle, making it more profitable to own them. Additionally, since a substantial number of sales of livestock happen within the community for household consumption, it is more viable to have a small stock that can be finished within the weekend, as opposed to cattle that weigh between 300-400kg (Isabel, pers. comm.).

Research shows that goats are more resilient livestock to own over cattle, particularly with changing climate and increasing stressors like heat waves and droughts (Nair et al. 2021). Goats are also ideal for smallholder farmers, particularly in communal areas, as they are more resilient to diseases and pests requiring low input and relatively inexpensive maintenance (Nair et al. 2021; Khowa et al. 2023). Goats are also better skilled to cope with water and food scarcity, as well as navigate bush encroachment (Nair et al. 2021), making them ideal for the communal rangelands of K2C BR. Additionally, as Isabel (pers. comm.) pointed out, goats have a high

reproductive potential with early maturity and less inter-kidding intervals compared to cattle (Khowa et al. 2023). These factors show that goats have a higher potential to increase the resilience and livelihoods outcome for communal farmers, even with increasing scarcity of resources.

More initiatives and policies that encourage ownership of goats are needed. The H4H programme in the K2C BR focusses only on cattle, but given the growing population of goats in the landscape, it is crucial to also include small stock management within the programme. With sustainable management of small stock, they have higher potential to contribute to better livelihoods outcomes.

4.3.4 Socio-economic outcomes of the programme

Market access

In the K2C BR, much of the cattle sales happened locally within the community for traditional purposes like weddings and funerals. But this was inconsistent, and the farmers usually received negotiated prices that did not match competitive market prices (Laura, pers. comm.). Due to disease control restrictions, there is a dearth of licensed buyers that farmers have access to, with one buyer dictating the prices (Laura, pers. comm.). Farmers noted that before the programme was implemented, they did not get substantial benefits or income from cattle sales (Tom, pers. comm.; Rick, pers. comm.).

> "So through that mobile abattoir they convince our previous market to increase the price and then that's a sort of benefit to us. And then from there I'm sure we had about seven auctions through that year. So had a lot of benefit." (Tom, pers. comm.)

With the H4H programme, MNA (the enterprise partner) brought mobile abattoirs into the landscape which gave the farmers the platform to sell at competitive prices based on government regulations and standards (David, pers. comm.; Laura, pers. comm.; Tom, pers. comm., Drake, pers. comm.). With auctions and mobile abattoirs, the cattle are weighed, body conditions checked, and prices offered based on the quality and weight of the cattle (David, pers. comm.; Rick, pers. comm.). This fetches higher prices for the farmers, making a positive impact on their incomes (Alice, pers. comm.; David, pers. comm.; Samuel, pers. comm.; Isabel, pers. comm.).

Auctions and sales organised by MNA creates more competition among cattle buyers within the landscape and encourages other buyers to buy cattle from the communities, which levels the playing field for communal farmers (David, pers. comm.). By having reliable market access, the income generated from cattle sales is ploughed back into the community through the farmers (Alice, pers. comm.; Mark, pers. comm.; Isaac, pers. comm.)

Setting up of farmers cooperatives

Farmers cooperatives are the vessels through which herd management and grazing plans are implemented in the rangelands (Rick, pers. comm., Eric, pers. comm.). The cooperatives are set up to meet on a regular basis, which help with information sharing, planning, managing dip tanks, and coordinating with different stakeholders (Rick, pers. comm.; Tom, pers. comm.). An important aspect that many farmers emphasised on was how they were learning to save money as a group and maintain a cash fund within the communities (Drake, pers. comm, Rick, pers. comm.; Tom, pers. comm.). Cooperatives are registered as business units, thus setting up enterprises within the communal farming systems (Alice, pers. comm.; Laura, pers. comm.). Through these cooperatives, farmers essentially run the farms as businesses and take responsibility of their actions and outcomes (David, pers. comm; Mark, pers. comm.).

Figure 10: A farmers cooperative meeting led by Mr. Tom (chairperson of the cooperative) in Welverdiend-A with livestock farmers and general workers. Image taken by author, March 2024.

CSA focuses on capacity building of the farmers by mentoring them on recruitment processes, management of funds, and managing employees, which help farmers hire and manage people under these cooperatives (Laura, pers. comm.). The cooperatives are meant to eventually absorb workers and create jobs (Mark, pers. comm.; Laura, pers. comm.; Nancy, pers. comm.). Seven cooperatives in the K2C BR have absorbed community members so far by hiring two workers each who were previously paid by CSA (Laura, pers. comm.; Mark, pers. comm.). This has created job opportunities within the communities (Samuel, pers. comm.), and set up frameworks that allow organisations to work with the communities with ease.

In communal farming systems, the land belongs to everyone and no one at the same time. Thus, one of the challenges that many organisations face is finding someone or some entity who can be accountable and can take responsibility of the actions being implemented. These cooperatives address that issue and act as links between the organisations and the livestock farmers of the community. However, in the case of Welverdiend-A and -B, the committees are not yet equipped to absorb employees, or independently function in the absence of CSA and the funding they bring in.

Education and capacity building

Capacity building was mentioned by seventeen participants, emphasising its importance in implementation, but also highlighting the community's main expectation from the H4H programme. Isaac (pers. comm.) and Mathew (pers. comm.) hoped that the biggest takeaway from the programme will be the knowledge and skills sharing that has been passed on to the communities.

> "Skills transfer is the best. So I want to believe that the skills that the farmers have acquired will stay with them forever, whether Conservation South Africa is there or not." (Mathew, pers. comm.)

Practitioners stressed the importance of capacity building, and the efforts taken to drive education in the communities. Workshops and training programmes with both farmers and youth focussed on rangeland management, herd management, running enterprises, and accessing markets (Henry, pers. comm.; Nancy, pers. comm.; Laura, pers. comm.; Samuel, pers. comm.). Workshops on animal husbandry have also been conducted regularly over the years, with changes in animal conditions observed by the veterinary services (Isabel, pers. comm.). The goal is to empower the communities and provide guidance for better resource management (Samuel, pres. comm.; Henry, pers. comm.).

The farmers mentioned that workshops were held where they were taught about holistic rangeland management and techniques such as rotational grazing and brush packing, as well as running the farmers' cooperative (Tom, pers. comm.; Elvin, pers. comm.; Cam, pers. comm.; Tony, pers. comm.; Drake, pers. comm.; Angie, pers. comm.). They also indicated that they are now more confident and equipped to tackle issues such as droughts and food shortage because of the workshops and trainings they have received (Rick, pers. comm; Tony, pers. comm.). The workshops with the youth are also seen as highly beneficial as they are the next generation of farmers, and are now equipped to take care of the cattle and rangelands (Rick, pers. comm.; Isaac; pers. comm.; Cam, pers. comm.).

Although the impact of education and capacity building is harder to assess, practitioners and members of the governing bodies believe that the benefits of learning about climate adaptation and mitigation will be tremendous in the long run (Alice, pers. comm.; Mathew, pers. comm.; Isaac, pers. comm.). However, from the interviews what came across was knowledge sharing happened only in one direction, from the organisations to the communities and farmers. It is crucial to build knowledge creation pathways to incorporate local, traditional and/or indigenous knowledge to improve problem-solving (Charles 2021). Drawing from a wide range of knowledge sources helps create workable outcomes through better community engagement (Charles 2021; Armitage, Berkes, and Doubleday 2010).

Marginalised groups

Livestock farming is predominantly considered a male profession, within a culture and society that is still patriarchal (Laura, pers. comm.; Isabel, pers. comm.). Practitioners discussed the challenges of involving women and youth in the programme, although they believe it is crucial to build resilient communities (Alice, pers. comm.; Isabel, pers. comm.; David, pers. comm.). There are cultural taboos and barriers to participation for women, for example the extent to which they can participate in meetings, or holding ownership of cattle on paper (Isabel, pers. comm.; Laura, pers. comm.). This also affects how much liberty they have when making decisions regarding cattle sales (Laura, pers. comm.).

Although the system is changing with more female farmers taking the lead, particularly with small stock with a potential of graduating to cattle after a few years, some practitioners said that the change was not happening fast enough (David, pers. comm; Isabel, pers. comm.). However, steps are being taken to encourage more women and youth to take part in the H4H programme. The organisations have goals and targets on how many women and youth should

be involved in the training sessions and meetings (Samuel, pers. comm.). Registers are maintained to record attendance, and over the years, practitioners have noticed more increasing participation of women and youth (Samuel, pers. comm.; Laura, pers. comm.).

Although practitioners spoke of gender inclusivity and the increasing number of women participating in the profession, this wasn't evident at the cooperative meetings I attended in Welverdiend-A and -B. Additionally, all farmers I interviewed and had access to in the study sites were men, despite actively trying to recruit female farmers for the research. As highlighted by the practitioners, and the general feedback I received from community members during the recruiting process, most women farmers owned small stock like goats and pigs, with men still dominating cattle farming. Participation of women and youth were limited to the general workers' programme.

4.3.5 Impacts on the wider community

Job creation

A large focus of the H4H programme in South Africa is green jobs creation (Alice, pers. comm.), and it was also a recurring topic in almost all the interviews. The Social Employment Fund (SEF) is a fund started by the South African government to tackle the issue of unemployment, and support NGOs and NPOs to create jobs for the common good of the communities, particularly by tapping into the agriculture sector (SEF 2023). Through the SEF, CSA started the Yes 4 Youth (Y4Y) programme, which employs 'general workers', particularly women and youth from the community to assist the farmers in their day-to-day activities (Laura, pers. comm.; Nancy, pers. comm.; Henry, pers. comm.). The general workers help in various community activities such as bush clearing, brush packing, erosion control, and maintaining grazing areas (Nancy, pers. comm.; Henry, pers. comm.). They also help farmers with the dipping activities, patrolling the grazing camps and maintaining the fences of the camps (Henry, pers. comm.; Samuel, pers. comm.; Caleb, pers. comm.).

The Y4Y programme has contributed to socio-economic stability in the wider community (Samuel, pers. comm.; Isaac, pers. comm; Mathew, pers. comm.; Tom, pers. comm., Eric, pers. comm.). By employing numerous young people to assist farmers, it provides financial stability and is believed to have reduced crime by offering alternative livelihoods to previously unemployed youth (Elvin, pers. comm.; Tony, pers. comm.; Victor, pers. comm.). The economic impact is significant, with job creation helping to uplift the local economy by

increasing purchasing power and improving living standards (Isaac, pers. comm.). Such employment initiatives have also been praised for their impact to not only provide immediate employment but also equip participants with skills for future job opportunities (Isabel, pers. comm.).

Despite the benefits, some challenges exist, such as the temporary nature of many contracts (Isaac, pers. comm.). This has led to concerns about the sustainability of such largescale employment while the need for job creation in these communities keeps increasing (Paul, pers. comm.). Additionally, the job application process can sometimes lead to conflicts within communities due to the limited number of positions available compared to the high demand for jobs (Laura, pers. comm.; Nancy, pers. comm.). There is a strong desire within communities for these programmes to be expanded and for contracts to be extended to ensure long-term stability and continuous improvement of local livelihoods (Victor, pers. comm.). The goal is for the farmers cooperatives to absorb these workers under their payroll (Mark, pers. comm.; Laura, pers. comm.), but the cooperatives are only now starting to employ community members and cannot match the scale of the Y4Y programme in the near future. The continued success of these programmes will depend on their ability to adapt and expand to meet the ongoing needs of the communities they serve, and also the availability of funding to support employments of such scale.

Supporting local enterprises

The H4H programme has significantly contributed to local economic development by supporting recycling initiatives, promoting value addition, aiding local enterprises, and enhancing market access. There are opportunities for community members to utilize by-products and local resources, such as livestock skins from mobile abattoirs and seeds from bush clearing, for crafts, thereby promoting small business development and encouraging the community to find innovative ways to generate income (Nancy, pers. comm.). Local recycling businesses are supported by supplying wastes collected from the rangelands, which help communities manage waste while generating revenue and income within the community (Cam, pers. comm.; Laura, pers. comm.). Supporting local enterprises is a core component of the programme's strategy in K2C BR. There are programmes aimed at improving livelihoods by supporting small businesses and helping them access markets (Laura, pers. comm.).

> "So we have an example. We have one group of women; they make arts and crafts through things that they collect from rangelands. So we are working to help… we've

> connected them to some partners in this area in Hoedspruit, and also are working towards connecting them to some buyers as well. So that's also part of improving the livelihoods aspect of things." (Laura, pers. comm.)

Such market access and commodity-based trade opportunities are significant and beneficial for the communities. It not only provides a stable income source but also leverages local resources to access broader, more profitable markets. Another example is the sale of cattle skins to tourist areas which provides a lucrative market for local products (Isabel, pers. comm.). These initiatives have broader social and environmental benefits. Supporting local enterprises and enhancing market access empower communities, particularly women, by providing them with the tools and opportunities to improve their livelihoods. Such opportunities are vital for sustaining local economies, particularly in rural areas with limited employment options.

Waste management

Several community members describe active involvement in cleaning and waste management. Elvin (pers. comm.) discussed the role of the Y4Y programme in maintaining cleanliness, while Rick (pers. comm.) highlighted the benefits of litter collection, emphasizing that it prevents burning rubbish and air contamination, contributing to a healthier environment. Cam (pers. comm.) underscored the direct benefits of clean up campaigns, noting that streets have become cleaner. Some participants noted that local rivers and streams have become cleaner compared to the past, indicating the positive environmental impact of these initiatives (Mark, pers. comm.; Samuel, pers. comm.). The general workers are engaged in picking up plastics to prevent contamination tackle pollution in rangelands, where waste disposal is a significant issue due to the lack of formal municipal waste management services (Laura, pers. comm.; Henry, pers. comm.). The collected wastes are usually recycled through enterprises within the community (Laura, pers. comm.). These efforts are all part of managing the rangeland quality.

Mindset change

One of the biggest impacts of the programme is the significant shift in the mindset of the communities involved. This transformation reflects a growing commitment to sustainable practices, environmental stewardship, and the recognition of the importance of animal health. Rick (pers. comm.) notes a cultural shift towards making sustainable practices a norm, and extending these practices to the youth to ensure long-term commitment. He highlights how the holistic farming techniques they have been practicing has been crucial for livestock and rangeland management. Cam (pers. comm.) emphasizes the willingness among farmers to

continue the beneficial practices such as brush packing and nature conservation even if the programmes end. This indicates that the community has internalized these practices, recognizing their long-term benefits for both the environment and future generations.

The emphasis on teaching the next generation further underscores a deep-rooted commitment to sustainability (Tony, pers. comm.; Eric, pers. comm.). There is also heightened awareness of ecosystem impacts, particularly regarding rangeland restoration (Laura, pers. comm.). Isabel (pers. comm.) observed a notable change in the community's approach to animal health over the past decade. The community's increased willingness to invest in animal health signifies a recognition of the long-term benefits of maintaining healthy livestock (Victor, pers. comm; Isabel, pers. comm.). This shift is attributed to the educational and practical interventions provided by the programme (Angie, pers. comm.).

The educational efforts in the K2C BR have been instrumental in driving home the reality of climate change and the necessity of safeguarding ecosystem services.

> "If not for the H4H programme, I think there would be less realisation of the importance of nature and ecosystem services. I think especially in the K2C, they've done, you know, really driven in a lot of that education component, and really pushed hard on why climate change is the reality, and to build resilience. This is why we need to really start thinking about safeguarding our ecosystem services and natural capital… I think that is important and rare. And when you see farmers like Tom talking about how important it is to ensure that we actually farm the grass and farm the soil, then you realise that we've made that sort of mindset change." (Alice, pers. comm.)

These changes in perspectives reflect a move towards a more holistic and sustainable approach to environmental management, livestock care, and community resilience, ensuring benefits for both the current and future generations.

4.4 Manifestation of cross-sector collaborations

4.4.1 Multi-sectoral frameworks and collaborative effort

The success of initiatives like the H4H programme hinges on the involvement of multiple disciplines and institutions. This was a recurring concept in the discussions by various practitioners, highlighting the integration of various organisations and fields in a cross-sectoral approach. Several types of partners were mentioned, each contributing uniquely to the

initiatives. The programme includes science partners, implementation teams, and enterprise partners, indicating a structured cross-sectoral collaboration where each partner has a distinct role (Paul, pers. comm.; Isabel, pers. comm.). John (pers. comm.) also touched on the historical context of the K2C BR, illustrating how existing institutional frameworks facilitated early efforts of implementation. The K2C landscape already had an established multidisciplinary and inter-institutional framework, which played a crucial role in kickstarting initial steps towards the H4H programme and One Health goals (John, pers. comm.).

Diverse entities can work together effectively by leveraging each other's strengths to achieve common objectives (Henry, pers. comm.). Complementarity between organisations ensures that no organisation needs to cover all aspects independently, fostering a more efficient division of labour, allowing each entity to focus on what they do best (Alice, pers. comm.; Isabel, pers. comm.). Organisations support each other with technical expertise, advice, and additional resources when needed, indicating collaborative efforts to reach the programme goals (David, pers. comm.). This collective effort is vital for creating an enabling environment where programmes like H4H can thrive (John, pers. comm.). This shows that the organisations have cultivated 'dynamic capabilities for stakeholder orientation', which is the ability to align their processes in response to the needs of the collaboration (Dentoni, Bitzer, and Pascucci 2016; Florini and Pauli 2018; Teece, Pisano, and Shuen 1997).

A critical element discussed is the involvement of the community. For successful collaboration, especially in communal grazing systems, the community must be engaged, and they must buy into the initiatives (Isabel, pers. comm.). This underscores the importance of grassroots involvement and local buy-in for sustainable outcomes. Active and meaningful engagement of communities which includes all segments and groups of people is crucial for wider reach and impact of solutions (Charles 2021).

4.4.2 Role of different sectors in implementation

NGOs / NPOs

NPOs play a pivotal in bridging the gap between theoretical practices and real-world implementation (AL-Tabbaa, Leach, and March 2014). NPOs (particularly CSA in the case of K2C BR) are the project proponents in the H4H programme, and carry out most of the implementation work on ground. CSA is responsible for the monitoring of activities, something that the Department of Agriculture has on its agenda but does not have the

resources to manage (Mathew, pers. comm.). This includes monitoring fences and rangelands, ensuring that rotational grazing practices are adhered to, and assisting communities with livestock transactions (Mark, pers. comm.). This proactive approach ensures the continuity and effectiveness of grazing management practices that might otherwise falter without proper oversight (Mathew, pers. comm.). CSA also provides financial assistance to farmers, such as subsidies for supplementary feed, which the government cannot offer. This financial support is essential for the sustainability of farming practices, especially in times of need, such as during food shortages or droughts (Mathew, pers. comm.). By helping communities in buying and selling livestock, CSA supports better market access and financial stability for farmers (Nancy, pers. comm.). This includes inviting sellers to purchase cattle, which can improve local economies and provide more consistent income for farmers (David, pers. comm.; Laura, pers. comm.). CSA also collaborates effectively with other organisations and brings different experts on board for specific tasks by coordinating collective action (Henry, pers. comm.; Megan, pers. comm.).

The work of the NPO sector goes beyond mere overseeing of work, extending into financial aid, market facilitation, and the creation of effective partnerships. The H4H programme in K2C BR is a partnership between Peace Parks Foundation (PPF) and CSA, with PPF tapping into its funding mechanism that helped kickstart the implementation of the programme (Alice, pers. comm.). K2C-NPC has a long-standing relationship with CSA, supporting work in local communities, contributing funding for herd monitors, and engaging in bush thinning and alien plant control (Megan, pers. comm., Henry, pers. comm.; Mark, pers. comm.; Laura, pers. comm.) Organisations like SANParks collaborate with CSA on bush clearing projects and provide resources like fencing to farmers (Henry, pers. comm.; Megan, pers. comm.). SANParks also has an alien invasive plant control project that CSA utilizes to avoid investing its own resources in this area (Henry, pers. comm.; Laura, pers. comm.).

Enterprise partners

> "The one thing that none of the other NGOs can't do though, or NPOs, is the market access part. Because they are non-profits. So they can't sell anything or buy, so they can't go to the community and say, we will assist you because there's no structure within an NPO to make sales. So that's where Meat Naturally sort of comes in. We do have both legs, so we've got an NPO leg and we've got a proper business leg as well. The business leg helps with the market access in the end, because we can handle the

transactions and facilitate the transactions as such. And that's the main thing I suppose that sets us apart from the implementation partners." (David, pers. comm.)

The above statement summarises the importance of enterprise partners within the H4H programme. MNA engages in buying and selling activities, thereby bridging a critical gap in market access for the communities. This ability to handle transactions and conduct auctions is a key differentiator of enterprise partners and other organisations in the framework (David, pers. comm.). MNA is also responsible for the creation and functioning of mobile abattoirs for use in FMD zones, which assist communities in achieving better prices for their animals by creating competition and driving up prices (David, pers. comm.). MNA also provides technical assistance to organisations like CSA. This includes expertise in body condition scoring, grazing management, and animal nutrition (David, pers. comm.).

Academia

Academic institutions, notably the University of Pretoria (UP), has been instrumental in the inception and development of the programme. UP spearheaded the One Health concept, which integrates human, animal, and environmental health (John, pers. comm.; Isabel, pers. comm.). The H4H programme originated from academic research, particularly John's PhD research at the UP (Isabel, pers. comm.; John, pers. comm.). This underscores the critical role of academic inquiry in identifying and addressing community challenges.

Academic institutions are primarily responsible for the scientific research within the H4H programme (Isabel, pers. comm.). Researchers and PhD students are involved in impact evaluations and research to quantify the success and limitations of the program, providing data necessary for securing funding and demonstrating efficacy to stakeholders (Isabel, pers. comm.; Alice, pers. comm.). This ensures that changes and outcomes are rigorously measured, moving beyond anecdotal evidence to scientifically validated results (Alice, pers. comm.). Additionally, academia contributes substantially with the training programmes regarding herding and herd management for farmers. The Southern African Wildlife College (SAWC) is responsible for these training and has conducted various programmes that help with education and capacity building (Nancy, pers. comm, Paul, pers. comm.).

While universities excel in research and training, the actual implementation of the H4H model requires partnerships with organisations that have practical experience and operational capacity (John, pers. comm.; Isabel, pers. comm.). The collaboration between academic institutions and

organisations like CSA and K2C-NPC leverages the strengths of both parties, where universities provide the research expertise, and organisations offer on-the-ground implementation and technical know-how (Isabel, pers. comm.). Over time, UP's role evolved from leading the project to providing clinical services and research support, illustrating the dynamic nature of these collaborations (Isabel, pers. comm.).

Governmental bodies

In the H4H programme, the main governmental bodies involved are the DALRRD and the local municipalities. These organisations play a supportive but somewhat limited role in the implementation of the H4H programme. The DALRRD assists livestock farmers with various aspects of livestock management, including production and marketing. This technical support encompasses guidance on grazing management and the establishment of grazing camps (Mathew, pers. comm.). The department has a mandate to provide certain inputs to communities. This includes financial assistance for purchasing materials such as fencing for rangelands, setting up of dip tanks in the communities, and provision of anti-parasitic solutions for the dip tanks (Laura, pers. comm.; Nancy, pers. comm.; Mark, pers. comm.). Additionally, the department employs veterinary doctors who offer necessary veterinary services (Mark, pers. comm.), which is crucial in the K2C BR due to the disease control restrictions. Such support is crucial as NPOs cannot afford to provide all infrastructure and services independently.

The municipality partners (BLM in case of K2C BR) have mandates to mitigate climate change through various programmes, and programmes like the H4H are encouraged and supported (Mark, pers. comm.). The involvement of municipalities is important as it is part of the broader government structure that facilitates project implementation and community engagement (Mark, pers. comm.). Municipal authorities, along with traditional leaders and councils, play a critical role in supporting and legitimizing projects (Mark, pers. comm.). Their endorsement helps overcome local resistance and ensures community cooperation (Mark, pers. comm.).

Traditional Authority

TAs operate through structured councils, which include chiefs, traditional councils, and village headmen (*Indunas*) (Mark, pers. comm.). These entities are the primary decision-makers within the traditional authority framework. In each village, the *Induna* is responsible for land allocation, natural resource management efforts, and liaising with various projects, businesses, and organisations (Mark, pers. comm.). A structured approach to engaging with traditional

authorities ensures that projects are effectively integrated into the community, fostering trust and cooperation.

> "So if there's good governance – traditional governance, not municipal governance – good traditional governance makes a huge, huge difference. Because good governance leads to people trusting their leaders. And then they would be able to implement something much, much quicker because the trust is there. If the governance, traditional governance is not there then there's always people who are going to second guess the traditional government's decisions that they are making." (David, pers. comm.)

After the apartheid regime ended, much of the social structures with traditional leadership was undermined and eroded (Paul, pers. comm.; Megan, pers. comm.). But the TAs are indispensable in community-based projects, providing the necessary legitimacy and support, and fostering trust within the community (Laura, pers. comm.). They act as custodians of the land, and their approval and cooperation are essential for the acceptance of initiatives (Megan, pers. comm.). Organisations must engage with TAs from the outset by presenting their projects to gain necessary approvals (Megan, pers. comm.; Mark, pers. comm.). Their role is essential in addressing any community resistance or misunderstandings regarding the projects, and their involvement ensures smoother project implementation (Megan, pers. comm.; Mark, pers. comm.).

Livestock farmers

Farmers, especially livestock farmers, play a pivotal role in the H4H programme. They are the implementors of the programme on ground, and translate the programme from concepts and theories to action. By understanding the impacts of their practices and learning how they can contribute positively, farmers become more invested in sustainable practices (Mark, pers. comm.).

> "They are like the glue to the programme." (Nancy, pers. comm.)

Farmers' involvement is crucial for its success, given their significant impact on rangelands and their central role in land use (Laura, pers. comm.), making their participation essential for effective rangeland management and restoration efforts (Samuel, pers. comm.). They play a crucial role in shifting perceptions about livestock farming, agriculture, and the impacts of climate change (Nancy, pers. comm.) Although the H4H programme targets livestock farming, it also employs people from the wider community. This employment is tied to the presence of

farmers, demonstrating the economic interdependence between farmers and the community (Mark, pers. comm.). There is a reciprocal relationship where the community sees the value of farmers, and farmers see the benefits of taking care of the land. This mutual recognition fosters a cooperative approach to land management (Mark, pers. comm.).

4.5 Methods and tools that aid implementation

The H4H programme employs a range of methods and tools that aid in implementation, both in terms of collaboration between organisations as well as implementation with the communities. The methods that came up in more than three interviews are discussed below.

4.5.1 Scoping and mapping

Effective partnerships are fostered through memorandums of understanding (MOUs), strategic mapping, and skills audits. This structured yet flexible approach enables the organisations to work synergistically by maximizing their collective impact.

MOUs were highlighted as a critical tool for formalizing partnerships and ensuring clear communication and division of responsibilities among collaborating entities (Henry, pers. comm.; Nancy, pers. comm.). MOUs help in understanding each partner's mandate, scope of work, and future plans, and also aids in strategic planning and coordination (Nancy, pers. comm.). These MOUs define responsibilities, but are not rigid, allowing for flexibility in collaborations (David, pers. comm.). Interestingly, Henry (pers. comm.) mentioned that CSA was in the process of finalizing an MOU with its partners in spite of already working together, indicating the MOU's role in aligning projects and mapping areas to achieve common objectives. The practitioners underscored the importance of strategic alignment through mapping and clear delineation of project areas (Henry, pers. comm.). By mapping implementation sites and aligning projects geographically, partners can ensure their efforts are complementary and not repetitive (Henry, pers. comm.) This also helps understand each partner's geographic focus, and mutually decide where to collaborate intensively and where to let another partner take the lead (Nancy, pers. comm.).

A skills audit is undertaken before CSA begins working in a village. It involves assessing the skills available within the community to ensure that projects are effectively tailored to local capabilities (Samuel, per. comm.; Mark, pers. comm.). The process also involves gathering community members to map out the village and identify existing and future projects (Samuel, per. comm.; Mark, pers. comm.). The purpose of these audits is to facilitate smooth

communication, particularly with TAs and the community, and ensure that any changes or new developments in the rangeland are communicated and managed effectively (Mark, pers. comm.).

4.5.2 Community engagement

CSA adopts a comprehensive approach to community engagement, involving initial outreach, structured introductions, and continuous communication with community leaders and stakeholders. The initial engagement process involves CSA visiting the community where representatives actively engage with various stakeholders and beneficiaries (Tom, pers. comm.; Elvin, pers. comm.). The process is structured, with engagements starting with the TAs (Laura, pers. comm.; Mark, pers. comm.; Eric, pers. comm.). It is important to report to the traditional authority and ensure that community leaders and their councils are well-informed and involved in the project introduction (Mark, pers. comm.). Studies also show that drawing from community mechanisms and respecting the traditional structures help garner greater acceptance of proposed measures (Charles 2021). Proposals for land use changes are handled sensitively, acknowledging the communal nature of the land (Laura, per. comm.). The community does not hold land user rights individually, and changes may lead to potential conflicts between different users like livestock farmers, people tapping into natural resources like firewood, or the wider community that may deem other needs as more crucial (Laura, pers. comm.). This process of community engagement emphasizes inclusivity and transparency, ensuring that all land users and community members are informed and involved.

Community engagement must have a flexible timeframe, but Paul (pers. comm.) insists that there should be a point where the effectiveness of the engagement is evaluated, and it is productive to shift efforts elsewhere if the community does not indicate willingness. The engagement with farmers begins with discussions about protecting grazing areas and implementing grazing plans to manage drought and improve cattle management (Caleb, pers. comm.). It also includes training on the conservation agreement (CA) framework and peer learning exchanges to other villages where the programme is being implemented, so that the farmers and community leaders can learn about the impacts of the programme (Laura, pers. comm, Mark, pers. comm.; Tom, pers. comm.). Once the initial engagements are done, work towards signing the CAs is carried out (Laura, pers. comm.).

4.5.3 Conservation agreements

Conservation agreements framework

The CAs facilitated by CSA are strategic tools designed to formalize mutual commitments between CSA and local land users. The framework revolves around rangeland restoration, compliance monitoring, and providing incentives for adherence (Megan, pers. comm.). This is based on one of the key lessons from the commons theory, which states that communities are motivated to adopt conservation practices only if they are likely to benefit from their stewardship and restraint (Ostrom 2015; Charles 2021). CAs are designed to adopt principles that contribute to rangeland restoration (Henry, pers. comm.; Nancy, pers. comm.). It emphasizes specific actions to be followed by the community to restore rangelands and prevent further degradation, and in return CSA provides a benefit package to the community to cover opportunity costs (Laura, pers. comm.). The agreements include monitoring and compliance frameworks, with sanctions for non-compliance by either party to ensure that both CSA and the community adhere to the agreed actions (Laura, pers. comm.). The CAs are tailored to different contexts to maximize impact (David, pers. comm.), showing flexibility in implementation.

The framework includes regular discussions and workshops to ensure all parties understand and agree on the actions and benefits of the CAs. (Laura, pers. comm.). The agreements are signed with groups rather than individuals, particularly farmers cooperatives, fostering collective responsibility and shared goals within the community (Nancy, pers. comm.). The negotiation process involves training and discussions to customize the agreement based on what the community can realistically achieve, and the support they need from CSA to do so (Laura, pers. comm.). This ensures that the agreements are realistic and tailored to the community's needs and capabilities. Community leaders, *Indunas* and their councils are also engaged under the framework, ensuring community-wide participation and support (Laura, pers. comm.; Mark, pers. comm.). Despite challenges like rapid development and land use conflicts, the inclusive and flexible nature of these agreements helps align conservation efforts with community priorities, ultimately contributing to both environmental sustainability and improved livelihoods (Henry, pers. comm.; Nancy, pers. comm.).

The CA framework has four main components – conservation actions, benefits packages, compliance monitoring and penalties.

Conservation actions

The CAs under the H4H programme specify targeted actions to improve rangeland health and livestock management. The community members themselves play a role in identifying the conservation actions they can undertake (Alice, per. comm.). Laura (pers. comm), whose work revolves around stewardship of communities and particularly CAs, explained in detail the different conservation actions outlined within the H4H programme.

One of the first actions is organizing the community within governance structures. This may include forming or strengthening local groups to oversee the implementation of conservation practices (Laura, pers. comm.). This is one of the prerequisites to sign the CAs with the communities, as the agreements are signed with groups and not individual farmers (Nancy, pers. comm.). The primary conservation action focuses on changing the behaviour of grazing among the community members. This action aims to promote sustainable grazing practices that are critical for rangeland restoration (Laura, pers. comm.). Actions also target other degradation issues in the rangeland, aiming to mitigate and reverse the damage to ensure the long-term health of the land (Laura, pers. comm.). A critical action in some areas focuses on the health of the livestock, specifically disease control measures. This is particularly significant in FMD regions (Laura, pers. comm.). Typically, the agreements include a maximum of five to six conservation actions, tailored to the specific needs of the rangeland.

Each proposed action is paired with a corresponding benefit, ensuring that the community sees tangible rewards for their efforts in implementing the conservation measures (Laura, pers. comm.). The participatory approach, where communities identify feasible actions, ensures greater commitment and practical implementation of the conservation measures.

Benefits package

The benefit packages are multifaceted, addressing both the needs of the farmers and the wider community. One of the primary incentives is improved access to markets for farmers who are compliant with the CAs (Isabel, pers. comm.; Nancy, pers. comm.; Laura, pers. comm.; David, pers. comm.). Another important benefit is that CSA provides fodder bales during dry seasons or droughts at discounted prices for the farmers who are party to the CAs (Nancy, pers. comm.; Tom, pers. comm.; Rick, per. comm.; Eric, pers. comm.). In some instances, CSA has also stepped in and provided veterinary medicines and vaccines that are too expensive for farmers to buy on their own (Nancy, pers. comm.). As part of the agreements, CSA helps with tagging and branding livestock, which facilitates better management and tracking of the animals

(Nancy, pers. comm.; Eric, pers. comm.). In terms of benefits to the wider community, the focus on creating job opportunities and supporting enterprises and businesses is considered one of the most important outcomes of the CAs (Angie, pers. comm.; Rick, pers. comm.).

The benefit packages are closely tied to the farmers' compliance with the conservation actions outlined in the agreements (Alice, pers. comm.; Angie, pers. comm.). The compliance-based approach ensures that both parties, the community and CSA, are accountable for the promised actions and benefits (Laura, pers. comm.). The last component is the penalties, which are imposed when either party does not comply with the CAs (Laura, pers. comm.). Both compliance monitoring and penalties are agreed upon in at the time of signing the CAs, fostering a transparent, cooperative, and accountable partnership between the organisation and the community.

The CA framework provides mutual understanding of the benefits and responsibilities, and the farmers expressed the importance of such agreements (Rick, pers. comm.; Tom, pers. comm.). However, Paul (pers. comm.) pointed out that the CAs are not a tool that was designed under the H4H model, and argued that if the model is implemented as it was intended to, then the CAs are not necessary to achieve positive outcomes.

> "They are conservation heavy. They are here for the conservation. This is a livelihoods programme, not a conservation programme. That's why they want people to sign conservation agreements." (Paul, pers. comm.)

His argument also brings into question the long-term sustainability of the benefits offered through the CA framework. Apart from market access, all other benefits including subsidies for fodder and job creation are not sustainable in the long-term, particularly in the absence of CSA and the funding they bring in. This raises the question of whether communities will continue these conservation actions in the absence CSA's support. During the interviews, when beneficiaries were questioned if they will continue these good practices in the long run, many participants replied that they hoped they will have support through funding, and in its absence continuing with these practices will be a challenge (Tony, pers. comm.; Eric, pers. comm.; Drake, pers. comm.). This emphasises the need to design frameworks where benefits are sustainable and independent of organisations' existence in the landscape.

4.5.4 Funding mechanisms

Funding was a recurring topic in the interviews, both by farmers and practitioners. This section focuses on the funding mechanisms that CSA taps into for the H4H programme. Practitioners discussed the pros and cons of the different methods, giving insight into what works for cross-sector collaboration and what doesn't.

Donor-based funding

The H4H programme was initiated with donor-based funding, with PPF and CSA tapping into their funding resources and driving much of the initial implementation (Alice, pers. comm.). In fact, donor-based funding still provides substantial support in the H4H implementation in K2C BR (Nancy, pers. comm.). But practitioners flagged the issues and challenges of relying solely on donors. When donations dry up, projects and personnel are left without support, emphasizing the need for more sustainable financial models (Alice, pers. comm.). NGOs and NPOs often depend on donor funding for their existence, creating a dependency cycle, where they must demonstrate ongoing problems that need solving to secure more funding (John, pers. comm.).

The predetermined time frames and goals set by donors dictate the course of the project years in advance (Paul, pers. comm.; John, pers. comm.). Organisations also need to continually apply for new funds and provide clear reports to satisfy donor requirements, adding pressure on communities to meet certain targets and goals (Nancy, pers. comm.). This top-down approach forces communities to conform to external expectations, which makes it harder for projects to be community-led (John, pers. comm.). Alice (pers. comm.) also commented on the competitive nature of donor funding.

> "You know, sometimes when you have lots of NGOs in the same area – and we're actually finding this in the Mara [Kenya] – it's almost like NGOs are competing against each other because generally donor funding is quite competitive. So really there's a small pot, and all these NGOs are competing for the same pot of money, who actually have the same vision and want to create the same positive impact." (Alice, pers. comm.)

Paul (pers. comm.) pointed out that despite decades of foreign aid and donations, many sites show no significant long-term improvement, highlighting the unsustainability of continuous aid. He advocated for investor funding over donor money, where programmes are more like business ventures, and the community is accountable for repaying the investment. He argues that with the community taking on this responsibility, the programme truly becomes

community led. Addressing these challenges requires a shift towards more flexible funding models, such as blended finance, which can reduce dependency on donor money.

Blended finance approach

> "Generally, we take a blended finance approach. So a lot of our sites are initially donor funded and that's the same with K2C. But we are trying to transition them more to a blended finance, to a more sustainable financial approach." (Alice, pers. comm.)

CSA is working towards incorporating a blended finance approach, where the programme gradually shifts to other funding mechanisms (Alice, pers. comm.). In the K2C BR, CSA has implemented carbon financing, which not only covers implementation costs, but also allows for any additional revenue to directly funnel into the community and the farmers through carbon credits (Alice, pers. comm; Laura, pers. comm.; Nancy, pers. comm.).

But this comes with its own challenges. Engaging communities in such long-term carbon projects is complex. It is important to ensure transparency and clear beneficiary relationships. Currently, CSA is leading the project, but plans to transition into a community-led project in the coming years (Laura, pers. comm.). Legal entities must also be established to ensure that carbon benefits are fairly distributed within the community (Alice, pers. comm.). However, discussions with the farmers reveal that there is a gap in understanding the specifics of the carbon project (Tony, pers. comm; Rick, pers. comm.). These factors indicate that the community is not yet equipped to manage and deliver on such long-term projects.

Alternatively, there are also other green financing options that are not necessarily as long term as the carbon project. One option is corporate financing, where companies provide funding for resources that are farmed sustainably (Alice, pers. comm.). Wildlife bonds, such as rhino bonds and lion bonds are also a being considered as alternatives within the blended finance framework (Alice, pers. comm.). These mechanisms allow for flexibility and reduces pressure on the communities to meet specific targets and goals.

4.6 Enablers and barriers of cross-sector collaborations

There were many factors that were discussed as enablers or barriers for successful collaboration, with practitioners focussing on individual experiences based on their organisational roles. The factors discussed below were mentioned by at least three participants as crucial for collaboration.

4.6.1 Cultivating a collaborative culture

Fostering a collaborative culture among organisations working in a particular landscape is crucial for effective implementation and enhances the efficiency of the programmes. This is the basis of adaptive co-management through which community resilience is built by different organisations collaborating together for resource management (Olsson, Folke, and Hahn 2004; Armitage, Berkes, and Doubleday 2010). Nancy (pers. comm.) emphasised that it is counterproductive for organisations to perform similar tasks with similar goals, but independently. A unified programme approach like H4H allows multiple organisations to come together to design, plan and implement the programme collectively (Nancy, pers. comm.).

> "It's different organisations, but we are almost like cousins, because we are not working against each other. We are working with… we want to have positive impacts together, in different areas." (Nancy, per. comm.)

A collaborative mindset is also imbibed in the K2C BR as it has proven to be the most effective (Megan, pers. comm.).

> "That is just part of the biosphere culture, that you bring people together that can collaboratively implement projects. And, you know, that's the best way to do it for us. One, not one on their own, could have achieved the results that we have." (Megan, pers. comm.)

Alice (pers. comm.) pointed out that this 'culture' can also be promoted by institutional funders or donors by funding collaborative initiatives which encourage organisations to work together rather than in isolation. Having a collaborative culture also allows for programmes to be scaled, as has been the case with the H4H programme which is now being implemented to other countries in the region like Zimbabwe, Mozambique, Botswana etc. (Nancy, pers. comm.; Alice, pers. comm.)

But on the flipside, collaboration for the sake of collaboration can lead to frustration and inefficiency (John, pers. comm.). Effective collaboration should be driven by genuine willingness and strategic alignment rather than mere obligation (John, pers. comm.). It is crucial for organisations to have a holistic perspective and support each other within the system to solve issues and reach the programme's goals (David, pers. comm.).

4.6.2 Funding

Funding was cited as one of the most crucial factors for collaborative programmes.

> "Funding, funding. Funding is the biggest problem because you know you need money to get things done. You need money to travel, to have engagements, to have your meetings or workshops, to buy equipment, to pay labour. So funding is the biggest one… because it influences everything." (Nancy, pers. comm.)

Resources are required to cover initial investments and costs, and continuous support is required to expand and maintain the programmes (John, pers. comm; Megan, pers. comm.). Having high net worth individuals and foundations like PPF plays a critical role in securing initial and subsequent funding (Alice, pers. comm.). Insufficient funds also restrict the ability to scale programmes to new areas, as seen in the K2C BR where scalability of the H4H programme is often hindered by budget constraints (Mark, pers. comm.; Mathew, pers. comm.). Long-term viability of programmes depends on sustainable funding mechanisms to maintain project activities and achieve desired outcomes (Alice, pers. comm.; Megan, pers. comm.). Paul (pers. comm.) suggested that encouraging communities to participate in fundraising can ensure that they have a stake in the project implementation, and enhance their commitment for the programme.

4.6.3 Communication

Communication was a recurring factor, with almost all practitioners mentioning it as key to successful collaboration. AL-Tabbaa, Leach, and March (2014) emphasized the importance of creating strong communication channels particularly in the formulation and implementation of interventions. Open communication helps build trust and ensures that all stakeholders understand the programmes and work towards shared goals (Alice, pers. comm.). It also prevents duplication of efforts, and helps organisations be aware of each other's activities and similar projects being conducted in the communities (Nancy, pers. comm.)

But communication isn't limited to practitioners and organisations alone. Engaging with all levels of the community, including farmers and wider community members, is essential to build and maintain relationships (Laura, pers. comm.). It is crucial to have regular communication with the farmers to ensure that timely information is delivered between them and organisations (Caleb, pers. comm.). Miscommunication often leads to conflicts, particularly over land use (Mark, pers. comm.). Regular communication with TAs and other local leaders is necessary to ensure smooth operations (Mark, pers. comm.; Isaac, pers. comm.). Communication with the

Indunas go both ways, with organisations keeping them in the loop about work being done, and *Indunas* informing organisations about new developments that may impact the programme (Laura, pers. comm.; Mark, pers. comm.; Isaac, pers. comm.).

Thus, effective communication and maintaining healthy relationships is crucial to prevent misunderstandings that could adversely impact the programme (Mathew, pers. comm.). Consistent and clear communication ensures that all parties are aligned and working towards mutually beneficial goals (David, pers. comm.). This requires significant time and effort from all stakeholders (Isabel, pers. comm.).

4.6.4 Trust

Organisations, just like people, are influenced by personalities (Megan, pers. comm.; Isabel, pers. comm.; Henry, pers. comm.). The success of collaborations often depends on the ability of individuals to navigate and manage interpersonal relationships (Megan, pers. comm.; Isabel, pers. comm.). This requires building and maintaining trust. As in the case of communication, trust must be fostered on multiple levels. Trust between different organisations, as well as within the community is vital for effective implementation of programmes (Alice, pers. comm.; Megan, pers. comm.). Trust is built on respect, understanding and tolerance (Mathew, pers. comm.). It is also crucial to reduce competition between organisations, particularly NGOs and NPOs (Alice, pers. comm.). Recognizing that partners are not working against each other fosters a collaborative environment (Nancy, pers. comm.). Additionally, trust is fostered with the communities and TAs by fulfilling promises that were made, which is crucial to have long-term support for the organisation and the programme (Mathew, pers. comm.). Building trust where it doesn't exist can be time-consuming. So finding partners who have over the years established trust with the communities and have a proven track record of skills and capabilities is crucial for smoother implementation (Alice, pers. comm.).

4.6.5 Limited resources

Practitioners highlighted challenges of limited resources, particularly budgets, infrastructure, and logistical constraints. Resources are especially a challenge when working with governments, who have limited budgets (Mathew, pers. comm.). Limited budgets restrict the ability to carry out day-to-day activities like travel, holding meetings and maintaining active communications (Mathew, pers. comm.). Government support such as funding for fencing and medications and vaccines for cattle have strict limitations, and are highly dependent on the fiscal year (Laura, pers. comm.; Nancy, pers. comm.). These limitations are a recurring

challenge and affect activities like rational grazing and dipping (Samuel, pers. comm.; Caleb, pers. comm.). The broader infrastructure and facilities like poor road conditions, unreliable network connectivity, electricity issues (exacerbated by load shedding) also pose significant challenges and hinder the activities (Mathew, pers. comm.).

4.6.6 Time management

Practitioners highlighted time management as a significant challenge in cross-sector collaborations. These challenges are rooted in time frames imposed by donors, differences in organisational priorities, and logistical constraints such as staffing and planning. Donor-imposed time frames and targets create pressure, leading to insufficient time for community engagement, which can strain relationships with the TA and the community (Mark, pers. comm.). Often the fast-paced nature of these programmes leaves little time for understanding partners and having open discussions, which is crucial for effective collaboration (Alice, pers. comm.). Different organisations have varying paces of carrying out work based on priorities. Businesses tend to focus more on time due to financial pressures, while NPOs may have more flexibility and leeway (David, pers. comm.). This disparity can affect collaboration, and it is crucial to find middle ground (David, pers. comm.). Staff shortages also lead to time constraints, and require better planning and time management (Henry, pers. comm.). Being short-staffed poses challenges for representatives to actively participate in stakeholder meetings and engage with communities (Mathew, pers. comm.; Mark, pers. comm.).

4.6.7 Limitations of stakeholder congested landscapes

The K2C BR poses a unique challenge for the implementation of collaborative programmes between various organisations. John (pers. comm.) noted the presence of a vast number of stakeholders in the landscape, including universities, training entities, biosphere reserves, private reserves, and numerous NGOs. Isabel (pers. comm.) echoed this by stating that the proximity to KNP attracts a plethora of organisations, making K2C BR a hub for various initiatives.

This high density makes it challenging to achieve progress as there are many interests and programmes to consider while planning and designing any intervention.

> "It has been one of the most complicated landscapes for me, and I've been working in, you know, eight countries. That area is particularly… there are amazing advantages to that. You know, in terms of resources and capacity and input. It's rich! But it also

comes in a one way with a price, you know. It makes progress often slow and much more complex in my view, than in any other landscapes." (John, pers. comm.)

The richness in resources and capacity does not necessarily translate to efficiency due to the need to consider numerous realities and existing engagements (John, pers. comm.). Organisations must navigate and align their work with numerous existing programmes, which necessitates a "dance" of coordination that requires more effort and slows down collaboration and progress (John, pers. comm.). As discussed earlier, too many stakeholders could also lead to competition between the organisations, which is counterproductive for the holistic development of the communities (Alice, pers. comm.)

4.7 Leverage points for transformational change

The research findings point towards certain 'leverage points' that can be harnessed for transformational change of the communal farming systems. The identified leverage points are categorised into four broad system categories of "parameters", "feedbacks", "design" and "intent" based on Abson et al.'s (2017) framework (Figure 11). The leverage points are listed in the order of their effectiveness, starting from "shallow" interventions to "deep" interventions, as was the case with Meadows's framework (1999).

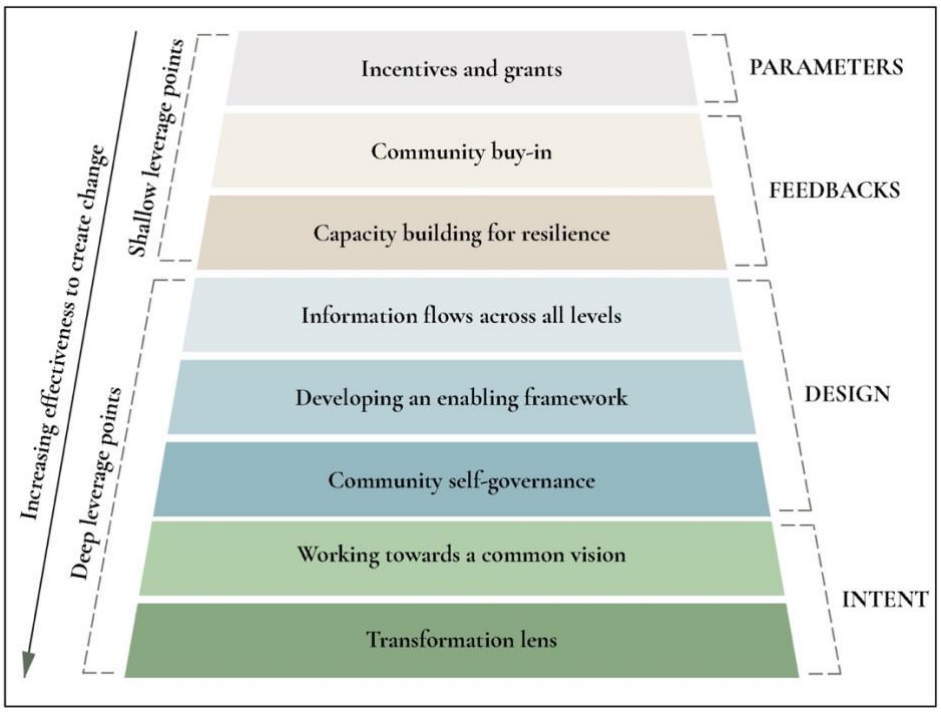

Figure 11: Identified leverage points categorised under 'system characteristics' based on Abson et. al.'s (2017) framework. Figure created by author. Adapted from Abson. et. al. (2017) and Meadows (1999).

The leverage points discussed below in more detail help us understand which interventions have the most impact, and what aspects practitioners should focus their energy on. The end goal of programmes like H4H is to build resilience within communities, and to uplift the farmers to run the programmes on their own. Understanding these leverage points is also particularly important to identify solutions that are suited for dynamic interfaces such as the African landscapes.

4.7.1 Incentives and grants

The interviewees, both practitioners and beneficiaries, extensively discussed incentives that the community receives from CSA. CAs are designed to ensure that communities benefit directly from their efforts to protect the environment (Samuel, pers. comm.). The agreements make it clear that specific actions lead to specific rewards (Laura, pers. comm.). The range of incentives that are provided are resources that the government is not able to provide (Mathew, pers. comm.). Those who adhere to the guidelines receive tangible benefits, while those who do not participate miss out, thereby demonstrating the advantages of compliance (Isabel, pers. comm.; Alice, pers. comm.). This system is designed to encourage farmers to adopt and maintain conservation behaviours (Alice, pers. comm.). Additionally, Isabel (pers. comm.) pointed out that initial incentives are crucial to kickstart behaviour change, and farmers need to see immediate benefits to motivate them to adopt new practices.

Although CAs aim to make conservation viable for farmers, ensuring that they see direct benefits, economically and socially, incentives such as subsidies for bales of hay and provision of fences are mechanistic characteristics that are shallow interventions (Abson et al. 2017; Meadows 1999). Parameters are short-term benefits (Meadows 1999), particularly for the farmers who receive them. But in the long-run they rarely change behaviours (Meadows 1999), contrary to what the CAs are intended to do. Moreover, these parameters are highly dependent on external funding or support, and when the funding dries up, the intended practices would stop as well. This was evident in the responses of the farmers when questioned about how they envisioned the sustainability of the new techniques in the long-term. Most of the participants responded that they hoped to always have the economic support that they currently receive, and would likely continue with sustainable practices only if they receive funding to do so (Drake, pers. comm.; Tom, pers. comm.; Eric, pers. comm.; Angie, pers. comm.).

Similarly, social grants provided by the governments act as buffers, and have the least potential on long-term change. This was echoed by David (pers. comm.) and Paul (pers. comm.), who

argued that they have observed systems change a lot quicker where there are no grants nor subsidies that communities can fall back on.

> "In other African countries things happen a lot faster than what it does in South Africa because there is no Plan B. So anything that you go to them with, and they see that it can work, they take it up usually much quicker, the response is much better. They are a lot more enthusiastic about it because they don't have the plan B to fall back on." (David, pers. comm.)

4.7.2 Community buy-in

For programmes like H4H to be successful, community engagement and buy-in must be prioritised (Paul, pers. comm.). This involves recognizing that not everyone will be immediately interested or involved (Nancy, pers. comm.; Samuel, pers. comm.). The H4H programme focuses on livestock farmers, but not everyone in the community is a farmer or interested in rangelands, and even among farmers, interest in the programme may vary (Nancy, pers. comm.). Successful community buy-in ensures that community members (at least a majority) understand and support the initiatives from the beginning (Paul, pers. comm.; Alice, pers. comm.). This acts as a negative feedback control in the event of resistance from other land users.

Keeping in mind the priorities of the community and designing interventions around that is also crucial (Isabel, pers. comm.; Nancy, pers. comm, Laura, pers. comm.). This requires active collaboration between project partners and beneficiaries to ensure the programme remains relevant and acceptable (Megan, pers. comm.; Mathew, pers. comm.; Alice, pers. comm.). This approach fosters a sense of ownership and responsibility among community members, that strengthens community buy-in as a negative feedback control.

And yet, there is often slow adaptation to new programmes. Some farmers may not join cooperatives or participate in conservation agreements immediately, but gradual adaptation occurs as benefits become evident (Samuel, pers. comm.; Mark, pers. comm.). It also helps to identify the key actors within the community who understand the benefits of the programme, actively support it, and have the drive to influence the rest of the community (Henry, pers. comm.; Nancy, pers. comm.).

> "I think you need to identify individuals in a community that you can work with. You know, that can understand where you're coming from, what is your envisioned outcome. And then that person probably need to have some clout or some family that's

important in the community. I mean, if you're going to have somebody that nobody in the village respects or his family respects, they're not going to listen to him either." (Isabel, pers. comm.)

4.7.3 Capacity building for resilience

Rangeland degradation and all associated impacts form a positive feedback loop which is self-reinforcing. Overgrazing leads to soil erosion and in turn a decline in grass growth, which leads to more overgrazing and more soil erosion. Capacity building equips farmers and communities with knowledge and techniques regarding adaptation strategies (Charles 2021; McGahey et al. 2014). By empowering communities with these skills, the positive feedback loop of current practices can be slowed down. Providing training and equipment is seen as a means to give people hope and empower them to take responsibility for their own resilience and environmental management which is crucial for long-term sustainability (Paul, pers. comm.).

> "So they we often say, one of the principles of Herding 4 Health is the fact that a herder can work only for a farmer. There's no other… a herder cannot work for anybody else than a farmer. And if you're a farmer, the land, your animals, and all of those belongs to you. That's what you have custody over. That's your responsibility. Your accountable. You're alone accountable for it. It cannot be delegated. So ultimately, communities are taking full responsibility, and they are being held accountable by themselves and their governance structures." (John, pers. comm.)

The H4H programme emphasises the importance of training community members to ensure they can continue the conservation work independently even if the programme ends (Paul, pers. comm.; Nancy, pers. comm.). This is echoed by the farmers as well, who emphasized knowledge sharing.

> "They [CSA] must not leave us without knowledge. They must teach us so that one day if they decide to go, we will be left with some experience, so we can solve our own problems." (Drake, pers. comm.)

The trainings include teaching rangeland management skills, ecological literacy, raising funds and solving problems independently (Paul, pers. comm.; Nancy, pers. comm.; Drake, pers. comm.). There is also a focus on training young people and involving women in management activities to retain knowledge within the communities and build long term resilience (Paul, pers. comm.; Laura, pers. comm.; Angie, pers. comm.).

4.7.4 Information flows across all levels

Changes to the information structure of the system is a high leverage point that can lead to significant change in behaviours (Meadows 1999). Within the H4H programme, much of the time and energy is spent on information sharing and communication. Communication was also cited as one of the biggest enablers of collaboration by the practitioners. Information flows happen across multiple levels and between different entities. Some of these information sharing systems function better than others, some are unique to the K2C BR, and some need to be created for better functioning of the system.

Feedback from and within the community is one of the strong systems of information flows under the programme (Tony, pers. comm.; Elvin, pers. comm.; Drake, pers. comm.). This involves regular meetings, feedback sessions, and direct communication channels to resolve issues promptly. Weekly or monthly cooperative meetings are common platforms for discussing issues, sharing information, and planning. (Rick, pers. comm.; Nancy, pers. comm.; Samuel, pers. comm.). Regular feedback sessions and reviews are conducted between CSA and the community to assess the effectiveness of CAs, and adapt based on the feedback received (Laura, pers. comm.). Structured grievance mechanisms are in place, including grievance forms which the community can use to raise issues (Mark, pers. comm.) Additionally, CSA is working on creating grievance committees within the communities for them address any conflicts or problems amongst themselves (Laura, pers. comm.). There are also 'supervisors' who are community members employed by CSA, who play an important role as messengers between the community and the organisation (Isaac, pers. comm.; Isabel, pers. comm.; Angie, pers. comm.; Caleb, pers. comm.).

An interesting information flow that was created through the programme was the peer-to-peer learning exchange between different villages. This allows new or prospective communities and farmers to visit those already engaged in the programmes to see first-hand the benefits and practices involved, which builds credibility (Laura, pers. comm.; Nancy, pers. comm.; Samuel, pers. comm.; Mark, pers. comm.). Farmers are more likely to adopt new practices when they observe the positive outcomes in neighbouring communities (Laura, pers. comm.; Nancy, pers. comm.; Mark, pers. comm.). Community leaders, particularly cooperative chairpersons, play a crucial role in these exchanges acting as ambassadors, sharing their experiences, and encouraging others to participate (Mark, pers. com.; Tom, pers. comm.). Participants of the exchange relay information regarding visible benefits experienced by participating villages to their communities, creating a ripple effect of interest (Nancy, pers. comm.; Mark, pers. comm.).

Regular meetings and workshops, both formal and informal, between different organisations are critical for aligning efforts and sharing knowledge (Henry, pers. comm.; Mark, pers. comm.). Community Liaison Officers of different organisations and administrative bodies like municipalities play a crucial role in facilitating communication and help avoid duplication of work by ensuring that the projects of different organisations complement each other (Mark, pers. comm.). Steering committee meetings, which are meetings organised at a regional level, allow organisations to learn from one another across different landscapes and countries (Henry, pers. comm.). Academic institutions contribute to information flows through symposiums and presentations that helps integrate scientific research and training, and promote knowledge exchange (Isabel, pers. comm.). Informal gatherings, such as science clubs, foster a collaborative culture where researchers, NGOs, and funders can share their work in a more relaxed, social setting, further enhancing a collaborative environment (Isabel, pers. comm.)

The one area where information flows are crucial but fall short on is feeding information back into the communities. Particularly in the K2C BR, there are numerous organisations working on various projects, and the communities don't always have the larger picture of the cumulative impacts. An interesting suggestion by Mark (pers. comm.) was to start a "roadshow", where representatives of all organisations go into each village they work with together and discuss the work being carried out, its progress, and clarify any concerns raised by the community. Much of the information exchange currently happens at a higher level, and the people on the ground are often left out of this loop (Mark, pers. comm.; Mathew, pers. comm.). These roadshows will help bring all practitioners and beneficiaries together, creating awareness regarding the work being done by various organisations within the community (Mark, pers. comm.). This multifaceted approach to information flows, creates a robust framework and is a deep leverage point that can be harnessed further.

4.7.5 Developing an enabling framework

The rules define the boundaries, scope, and the freedom within the system (Meadows 1999). Restructuring rules of a system can change behaviour under them (Meadows 1999). Through the H4H programme, an enabling framework for livestock farming is developed that encourages behaviour changes similar to restructuring rules. This is done through building an enterprise framework and market system, thereby creating a healthy rangeland economy. An effective market system is crucial to enable farmers to become self-sufficient and resilient by running livestock farming as a business (David. Pers. comm.). But unfortunately, the

communal farming systems are not set up to draw investments but to survive (John, pers. comm.).

> "So the biggest reason why enterprise is not involved in our communal farming systems, one of the biggest reasons, is because, it's risk prone. You know, there's no system. It seems unorganised. There's little control over livestock. It seems degraded. There's no records. There's no evidence of things from a farming systems perspective. And land ownership is not clear. So how do you go and set up an enterprise? Nobody is interested. And there's a notion of, there's not finances in the system. Because it most likely won't be rewarded financially." (John, pers. comm.)

The H4H model tackles these issues and creates an "investment platform" that attracts more players to get involved (John, pers. comm.). By bringing in enterprises like MNA into the landscape, the goal is to create a healthy competition that encourages more "selling agents" from within the community (Paul, pers. comm.). The market system must be developed from a commerce perspective that focuses on the economic outcomes of the community as a whole (Paul, pers. comm.). It is also crucial to involve other players who will help prop up this system to then help build an industry around the sale of cattle (John, pers. comm.). For example, in the K2C BR, organisations like SANParks and the Mpumalanga Tourism and Parks Agency (MTPA) could be roped in to encourage the sale of meat sourced through MNA from the neighbouring villages inside the national park and the game reserves (Paul, pers. comm.). This approach of bringing in different actors and building an industry helps develop the "rangeland economy" (Paul, pers. comm.; Alice, pers. comm.; John, pers. comm.)

However, practitioners highlighted the importance of having enabling, flexible policies that can be adapted to meet the needs of the community and support programmes like H4H (John, pers. comm.; Paul, pers. comm.). Currently, due to disabling policies, there aren't many entrepreneurs from within the community, and this system needs to be built (John, pers. comm.; Paul, pers. comm.). Paul (pers. comm.) argued that effective policies should be enabling rather than disabling. Enabling policies are flexible, can be reviewed frequently, and support positive actions (Paul, pers. comm.). Disabling policies, often rigid laws like the FMD restrictions, can hinder progress and make it difficult for good programmes to have positive outcomes (Paul, pers. comm.; Laura, pers. comm.). Paul (pers. comm.) also commented that there's often reluctance or a slow pace in policy changes, making it a weak link in the system.

4.7.6 Community self-governance

Creating new structures and systems is one of the strongest ways to build resilience (Meadows 1999). Self-organisation leads to changes in the system that is lower on the list of leverage points (Meadows 1999). Collective action is crucial to reinforce sustainable linkages between communities and the environment, and successfully manage common resources (Ostrom 2015). Community self-governance is one of the key initial actions that is focussed on by the H4H programme. Self-organisation occurs through the farmers cooperatives, which establish governance structures within the community to manage livestock farming systems, but also has a ripple effect on the wider community.

Farmers and practitioners discussed how effective governance structures were essential for the implementation of CAs (Laura, pers. comm.; Nancy, pers. comm.; Tom, pers. comm.). Some villages had informal groups such as dip tank committees, but practitioners noted that formalized and capacitated governance structures are crucial to take on larger responsibilities (Laura, pers. comm.; John, pers. comm.). Farmers cooperatives play the role of governing structures, and are crucial for leading and managing local projects, and also self-regulate and ensure compliance among community members (John, pers. comm.; Alice, pers. comm.; Isabel, pers. comm.). Communities that manage to set up good governance are often more proactive in taking on and implementing projects (David, pers. comm.).

These farmers cooperatives or governance structures can be set up only if the projects are "community led" (John, pers. comm.). The communities have to be equal partners in decision making, and setting goals and targets (Samuel, pers. comm.; Laura, pers. comm.; Mathew, pers. comm.). This involves enabling communities through training, and providing the necessary tools and knowledge for them to make decisions (John, pers. comm.; Paul, pers. comm.).

> "This is a community led programme, like a community led initiative. And if the farmers don't want to do it or don't want to implement, then it's not going to work. And it really needs to be farmer driven for sustainability. So you know we work through local governance bodies, whether that's a grazing area association or a farmer's cooperatives. And they themselves, you know, identify what are the conservation actions that they can do. They decide what the grazing plan is going to be, you know, with support from our eco trainers and CSA. But it's really, they need to make the big decisions, they need to get the rest of the community on board. Yeah, it's really the only way it's going to work is if it's community driven." (Alice, pers. comm.)

4.7.7 Working towards a common vision

System goals is one of the most crucial aspects for transformation, as they have the ability to change the direction that the system is moving towards (Meadows 1999). Having a common goal that all organisations work towards is crucial (Schultz, West, and Florêncio 2020). These system goals are not always explicit and deductible (Meadows 1999). The interviews revealed that institutional mandates heavily influenced the goals that organisations worked towards. The goals of the H4H programme in the K2C BR fed into the larger mandate of CI for Africa (Alice, pers. comm.). Institutional mandates add nuances to how the H4H model is taken up and implemented in different regions (John, pers. comm.). This was also echoed by David (pers. comm.)

> "There's a lot of small things that can affect the project, just the things from where you're coming from, where you want to get to, what you want to conserve, what you want to build capacity for." (David, pers. comm.)

The interviews with the practitioners revealed that the main goal of the H4H programme in the K2C BR is conservation, particularly rangeland restoration and reducing human-wildlife conflict (Alice, pers. comm.; Henry, pers. comm.; Nancy, pers. comm.; Laura, pers. comm.) Uplifting livelihoods of the communities is a means of reaching this goal. But there are also multiple efforts directed towards other aspects that don't directly fit into the H4H model, like green jobs creation, small enterprise development and creating broader opportunities for the communities. This can be counterproductive to the main mandate of the programme, and also leads to efforts that are misaligned with the system goals.

> "So some organisations would do a lot more, so they get more involved in some things that are not necessarily directly related to cattle and rangelands. They would do other projects as well… But you often get distracted from your main task when you diversify too much." (David, pers. comm.)

These diversified efforts and initiatives are a result of the goals of the organisation and the H4H model being different. While CSA's main goal is conservation, the H4H model has a clearly defined goal of improving livelihoods and building resilience of the communal farming systems. Identifying the common systems goal and common challenge that all organisations should work towards is very crucial (John, pers. comm., Alice, pers. comm.). This leads to an understanding of where all organisations fit in and how they can best collaborate to create the most effective change (John, pers. comm.).

4.7.8 Transformation lens

System goals are a result of world views, and the lens through which transformation is viewed (Abson et al. 2017). Changing world views or 'paradigms' have the ability to change all other leverage points, but paradigms are also the hardest to change in a system (Meadows 1999). Change in individuals can happen quickly, but changing a society takes a lot longer (Meadows 1999). Such change in paradigms requires looking at the system as a whole (Meadows 1999). This was echoed by some practitioners who pointed out the pitfalls of project driven initiatives. These initiatives are short-term, usually donor funded, and with an expectation of implementing projects for a few years and leaving (John, pers. comm.; Paul, pers. comm.). They argued that such approaches leave the communities worse off than where they started (John, pers. comm.; Paul, pers. comm.).

Despite living in a transformational setting, changes and adoption of new practices do not happen quickly enough (Megan, pers. comm.; Laura, pers. comm.). The timeframe for communities to start running programmes independently can vary widely. Some communities may become self-sufficient within five to six years, while others might take ten to fifteen years to reach the same level of independence (David, pers. comm.). Paradigms are changed by working with active change agents and the open-minded people in the middle ground, rather than focussing time on reactionaries (Meadows 1999). This often requires leveraging the influence of farmers already under CAs to persuade others, particularly the wider community.

But most importantly, the lens through which interventions are proposed play an important role in shaping the direction of the project. Most interventions that are implemented in the K2C BR are conservation heavy, given that the communities are at the human-wildlife interface along the borders of PAs.

> "So SANParks invited farmers and NGOs and we were all under one roof and were just talking about the issues that are happening in the reserves with rhino poaching and stuff. One farmer stood up and said, "you know what, we have heard you guys talking about your rhinos and your elephants and, you know, all these animals that you're protecting. But no one is looking after us. And we are livestock farmers, and our animals are dying, and no one cares. We all care about that. And by the way, we know who is doing all the poaching, but we won't tell you, because these people are putting bread on out table. We're eating, we are surviving because of them." So then it clicked

that, oh, we need to actually go into the communities if we want to stop the crime in the protected areas." (Nancy, pers. comm.)

"So conservation, let's just start there. We need to be very clear. This is a developing country - developing world, continent, whatever. For first world folks to come here with a bleeding heart about conservation and trying to save an elephant or a rhino - it is a problem." (Paul, pers. comm.)

The two statements above indicate the pitfalls of having a conservation lens, or building interventions based on a particular paradigm. The focus automatically becomes the environment and not the people. Paul (pers. comm.) argued that the environment will never be a concern for people who are living on economic fringes. He further noted that the H4H model was designed to be a livelihoods programme, and because of having a holistic approach also had conservation outcomes. Having a systems approach that considers all aspects of the society leads to creating an enabling framework through which change can happen more effectively (John, pers. comm.). So the H4H interventions are designed to be not just about training and capacity building, but also building the enterprise framework, and looking at the rangeland economy as a whole (Alice, pers. comm.; David, pers. comm.).

A key aspect of community interventions is to recognise and acknowledge the connection between the well-being of the communities and ecosystem health (Charles 2021). This mandates the need to focus on community livelihoods, while ensuring the sustainable use of resources (Wright et al. 2016; Charles 2021).

4.8 Key levers for rangeland systems transformation

Understanding the leverage points helps identify 'levers' in the system that have the potential for deep and transformational change. Two aspects stood out during the discussions with practitioners that indicated their potential to be rangeland system levers – herders and facilitators.

4.8.1 Herders as levers of rangeland transformation

"Herders with the right understanding and good skills can actually be such a great influencer or agent of change in communities. It's the people that's right at the interface. They're your first line of defence with risk mitigation – whether it's human wildlife conflict, whether it's disease, whether it's degradation in rangelands – all of

those issues are actually what they work with on a day-to-day basis." (John, pers. comm.)

The above statement emphasizes the importance of herding in the communal farming systems, particularly in deep rural areas. The traditional practices of communal farming with effective herding are arguably the most ideal for the context of where they exist (John, pers. comm.). The practice of herding has unfortunately digressed in the last four to five decades, particularly in South Africa (John, pers. comm.) The goal of the H4H model is to revive the practice of herding through training, so they can identify typical challenges faced at the interface and resolve them (John, pers. comm.).

The training is carefully designed to ensure that the herders are equipped with "ecological literacy", where they are able to identify unhealthy ecological processes and take action that would mitigate these challenges (Paul, pers. comm.). These core skillsets are imparted by creating a notion of professional herders, and developing a career path that would change the current plight of herders (John, pers. comm.; Paul, pers. comm.). There are different levels of training with the first level teaching the basics of herding and rangeland management in five days, the second level is 3 weeks long and capacitates a few herders in each village with more knowledge on animal husbandry, and he third level is two months long that trains some herders to become trainers themselves (Paul, pers. comm.). This structured approach allows the knowledge to be imparted more widely and effectively (Paul, pers. comm.).

Strategic herding has shown incredible improvements in the conditions of communal farming systems, particularly in sites where it has been implemented well (Paul, pers. comm.). The occurrence of disease has significantly reduced, there is almost no loss of livestock to predators, the rangelands are a lot healthier with grazing plans that move cattle across the rangelands on a daily basis (Paul, pers. comm.).

> "Nobody else does more for the environment than this guy [herder]. No one. No one. After five days of training. He looks at these things. Because now he's responsible for the resilience of his community." (Paul, pers. comm.)

4.8.2 Facilitators as levers of cross-sector collaborations

Successful collaboration requires building unity among stakeholders and maintaining sustained efforts through facilitation so that all stakeholders see the benefits and are motivated to continue their engagement (John, pers. comm.). Effective leadership and facilitation are

essential to drive projects forward and for uniting diverse personalities (Henry, pers. comm.; John, pers. comm.). But collaboration can be challenging due to various complexities. Different stakeholders often use different language or jargon to communicate similar things, that can lead to misunderstandings or hinder collaboration (John, pers. comm.). Cultural differences between different organisations and sectors may hinder trust and cooperation (Alice, pers. comm.) When engaging with the communities, scientific language has to be "watered down" to make it accessible and relatable for the community by framing the discussion in terms of observable local issues (Laura, pers. comm.). Cultural norms can often prevent direct feedback, as community members might avoid openly discussing problems (Megan, pers. comm.). Hence, effective facilitation is required to translate these different languages and cultures into a common, understandable dialogue (John, pers. comm.; Henry, pers. comm.).

John (pers. comm.) extensively discussed the need for facilitators to enhance collaboration. Having facilitators builds unity in the landscape by bringing together actors and organisations across different sectors.

> "Because many realise [collaboration] is needed. Very few know how to get there. What do you physically need to do in order to achieve that outcome? And that's what we [facilitators] do. That's what we specialise in. To actually start walking that walk, and that journey towards that point where at a landscape level people start working together to achieve the outcomes needed." (John, pers. comm.)

Facilitators help rally organisations towards system goals to solve common challenges, which transcends the individual organisational mandates. The role of facilitators is to also set up frameworks and platforms that enable such collaborative action by providing a sustainable level of support. The goal is to set up these frameworks to a certain level of autonomy and until a "sustainability mechanism" kicks in, and the system starts maintaining on its own (John, pers. comm.; Paul, pers. comm.). These organisations act as "bridging organisations" as defined by Folke et al. (2005) and outlined in the literature review. They help ease the costs of collaboration and conflict resolution while working towards common goals.

Herders, organisations and facilitators have key roles in influencing the different system characteristics as illustrated in Figure 12.

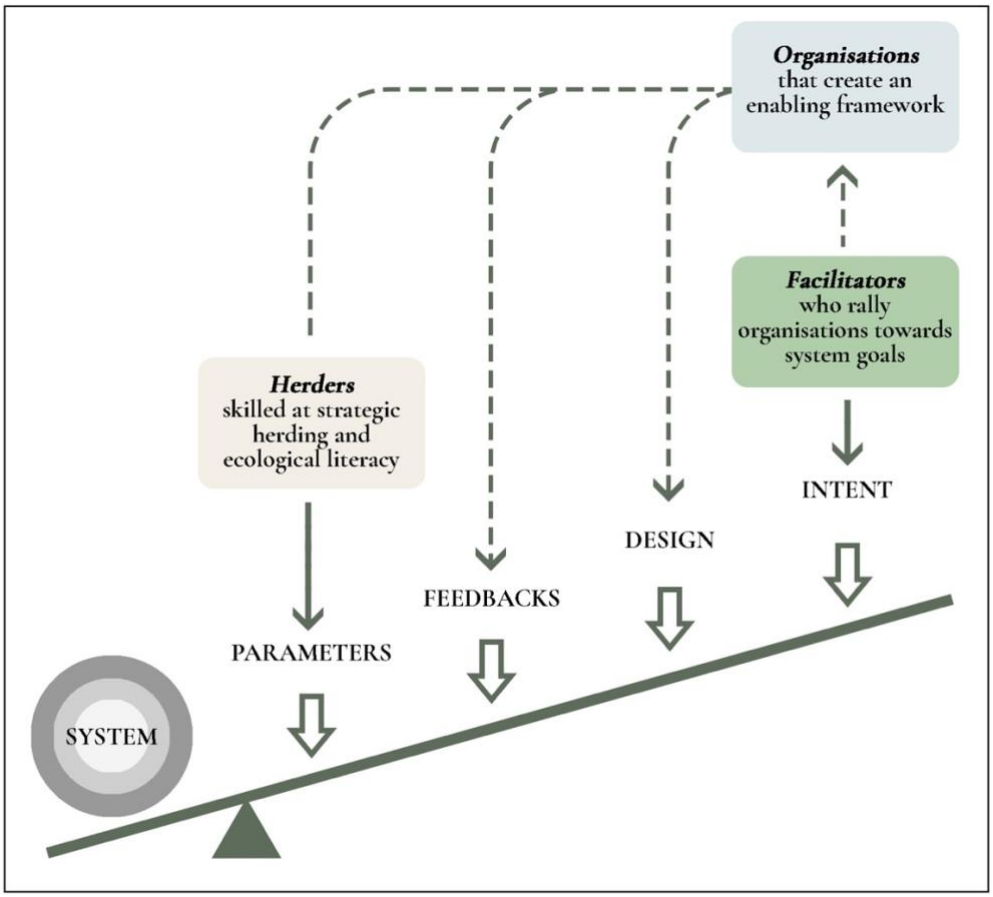

Figure 12: Image indicating how herders, organisations and facilitators influence leverage points and system characteristics. Figure created by author. Adapted from Meadows (1999), Abson et al. (2017) and Bryant and Thomson (2021).

Herders have deep impacts on system parameters like rangeland conditions and livestock health and are at the frontline of management of physical characteristics of the environment. Organisations are the partners that work together to create the enabling framework to implement the programme at the community level, influence policy and governance at the landscape level, raise the initial funding and investments, and create industry and enterprise. Facilitators are the key entities that bring the various partners together and steer them towards system goals. The interaction between these entities follow the framework of adaptive governance built around collaboration, learning and bridging organisations (Karpouzoglou, Dewulf, and Clark 2016; Schultz, West, and Florêncio 2020).

5 Conclusion

The primary objective of this research was to understand how cross-sector collaborations could be harnessed to build resilient communities, through the case study of the H4H programme in the K2C BR. Qualitative research was carried out through semi-structured interviews of practitioners and beneficiaries of the programme. The results and discussions delved into three main aspects of the study – the effectiveness of the H4H programme, the implementation of cross-sector collaborations, and how these collaborations can be enhanced.

The findings revealed that the H4H programme has had wide reaching impacts on the livestock farmers, the community, and the environment. Implementation of holistic rangeland management through planned grazing and mitigation techniques are actively practiced. The programme directly benefits farmers through market access, capacity building, and additional support to maintain and manage their livestock. It has led to the establishment of local governance structures to manage communal open access resources. There have also been notable impacts on the wider community, particularly with job creation. Although this programme has positively impacted the communities, the sustainability of these benefits in the absence of external support and funding of the organisations is a concern.

The H4H programme provided a rich canvas to understand and explore cross-sector collaborations as it brought together various organisations across multiple sectors under one umbrella. The findings emphasised the need for multisectoral approaches that leverage the strengths of different organisations to create a broader impact. While academia conceptualised the model and continues to bring in research expertise, they do not have the capacity for implementation of the programme within communities. NPOs on the other hand have feet on the ground and have fostered trust within communities over the years to be able to successfully drive implementation. They also have the capacity to bring in funding that supports initial phases of implementation. Enterprise partners manage the economic aspects by leveraging their expertise to create enterprise frameworks and contribute to building the rangeland economy. Governing bodies help with policy interventions (although their role was limited to providing infrastructure and facilities in the K2C BR) and TAs contribute with legitimising the programme within the communities. Not surprisingly, all practitioners recognised the importance of farmers as crucial 'partners' as they are the key agents of change within this programme.

The findings also revealed important tools including skills audits, mapping of programmes in the landscape, conservation agreements, and funding mechanisms that play a key role in implementation. Although the CAs provide a good framework that defines roles and responsibilities of different actors, the benefits provided under the CAs adopted in the K2C BR are not sustainable due to their inherent dependence on CSA and external funding and/or support. This also does not ensure sustainability of the rangeland management practices in the absence of CSA. Donor-based funding poses a similar problem. Although blended finance models are pitched as an alternative, in reality it does not seem viable unless communities and the farmers cooperatives are equipped with the skill and knowledge to manage these new forms of financing on their own. These results underscore the need to build long-term resilience of the communities, where the benefits of carrying out conservation actions reap consistent long-term benefits.

The next segment presented the enablers and barriers of cross-sector collaborations. These include tangible factors like funding and resources, as well as communication, trust, and time management. There were two important takeaways in this section. Cultivating a collaborative mindset was crucial to ensure that organisations organically came together to efficiently manage resources. And stakeholder congested landscapes, despite being rich in capacity and resources, pose significant challenges in implementation. K2C BR is one such landscape where progress is slow and complex.

Finally, the last section delved into the various leverage points that were identified for systems transformation. These leverage points were analysed through Meadows's (1999) leverage points framework and Abson et. al.'s (2017) system characteristics framework to understand which interventions were shallow and deep, and what aspects need to be focussed on for maximum impact. The findings showed that incentives and grants, factors that the CAs heavily relied on, had the least leverage for behaviour change. Community buy-in and capacity building were crucial, but still had limited leverage for systems change. Strengthening information channels and creating new ones across different levels and sectors can have significant impact on outcomes. A more effective factor is to develop an enabling framework, like the one the H4H model proposes, that ensures that the system can be sustainable with limited external support. Community self-governance structures has more leverage, as this leads to self-organisational changes that is one of the strongest ways to build resilience. The deepest leverage points however are working towards a common goal and having a holistic approach to transformation. Interestingly, these leverage points require the least amount of resources

and can be achieved by a shift in perspective and understanding of the system. Cross-sector collaborations need to consider the complexities that systems present as a whole while designing interventions. Hence, it is important to equally prioritise livelihoods and sustainable management in interventions that target the communal rangeland systems.

Based on these leverage points, two key levers were identified to enhance cross-sector collaborations in rangeland management. These are herders and facilitators. Herders equipped with knowledge regarding strategic herding and ecological literacy are levers impacting the parameters of the system including rangeland stocks and buffers. Facilitators ensure that organisations work towards the common systems goal. Together with the organisations that form the enabling framework, herders and facilitators unlock transformation of rangeland systems.

5.1 Recommendations

The biggest takeaway from this research is to direct funding towards factors that have deep leverage, particularly to create strong information channels and to set up an enabling framework. These are most efficient in building community resilience, that can be sustained with limited external support.

In South Africa, and specifically the K2C BR, policies have been redundant for decades, and have failed to adapt to the changing needs of the communities. Some policies like the FMD restrictions are particularly crippling for communities. Polices that enable interventions which uplift communities socially, economically, and environmentally need to be supported and enhanced. Some changes could include reframing the policies to ensure there is a strong market for meat sales from communal farmers within the zone.

Having a bird's eye view on the programmes being implemented within the region is crucial to understand how the cumulative impacts of these interventions can be enhanced. It is crucial to model and analyse systems as a whole. This could pose a significant challenge given the incredible number of programmes and interventions being implemented in the K2C BR, but it is crucial to avoid redundancy of progress in communities.

5.2 Avenues for further research

Through the process of this thesis many potential avenues for further research were identified. These recommendations or suggestions are based on the research findings or questions that arose during the process of this research.

1. This research identified leverage points and categorised them based on their increasing effectiveness. It is important to understand how they interact in relation to one another, how they influence each other, and to what extent. This could reveal new system levers that have significant impact.
2. Although there are many studies that indicate the importance of community adoption in interventions, deeper understanding of factors that aid in community buy-in, community engagement, and community self-governance is needed, particularly in the South African context.
3. Comparison of different sites of implementation of the H4H model is lacking. The lessons from different sites would help to understand the successes, failures, and how various factors influence outcomes. These lessons could potentially be extrapolated to enhance effectiveness of community-based interventions.
4. There are numerous debates about the efficacy of the practice of holistic management. However, there is consensus that more research is required to gather empirical and ecological data from sites of implementation. This is an area where the different implementation sites of the H4H model can contribute with.
5. Another important aspect that requires more research is how the carbon project could affect or impact long-term resilience of the communities in the K2C BR. Since the project is already underway, it is also important to find viable pathways to reduce the dependence of communities on NPOs over the coming years.

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Unpublished interviews

Alice (Regional Manager, African Rangelands Program, Conservation International), interview with Medhini Igoor Vijayakumar/author, 28 March 2024.

Angie (Eco-trainer/Supervisor, Welverdiend-B), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Caleb (Eco-trainer/Supervisor, Welverdiend-A), interview with Medhini Igoor Vijayakumar/author, 19 March 2024.

Cam (General Worker, Yes 4 Youth program), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

David (Production Manager, Meat Naturally Africa), interview with Medhini Igoor Vijayakumar/author, 27 February 2024.

Drake (Livestock farmer, Welverdiend-B), interview with Medhini Igoor Vijayakumar/author, 19 March 2024

Elvin (Livestock farmer, Welverdiend-A), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Eric (Livestock farmer, Welverdiend-B interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Henry (Restoration Manager, Conservation South Africa), interview with Medhini Igoor Vijayakumar/author, 02 April 2024.

Isaac (*Induna*, Mnisi Tribal Authority), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Isabel (Veterinarian, University of Pretoria), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

John (Creator of Herding 4 Health Model, (ex) University of Pretoria), interview with Medhini Igoor Vijayakumar/author, 22 March 2024.

Laura (Stewardship Coordinator, Conservation South Africa), interview with Medhini Igoor Vijayakumar/author, 07 March 2024.

Mark (Community Liasson Officer, Conservation South Africa), interview with Medhini Igoor Vijayakumar/author, 08 April 2024.

Mathew (Livestock coordinator, Department of Agriculture), interview with Medhini Igoor Vijayakumar/author, 09 April 2024.

Megan (Chief Operating Officer, K2C Kruger to Canyons - NPC), interview with Medhini Igoor Vijayakumar/author, 04 March 2024.

Nancy (Incentives Manager, Conservation South Africa), interview with Medhini Igoor Vijayakumar/author, 05 March 2024.

Paul (Lecturer/Eco-trainer Programme Lead, Southern African Wildlife College), interview with Medhini Igoor Vijayakumar/author, 14 March 2024.

Rick (Livestock farmer, Welverdiend-A), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Samuel (Monitoring & Evaluation Manager, Conservation South Africa), interview with Medhini Igoor Vijayakumar/author, 28 March 2024.

Tom (Chairperson, Farmers Cooperative, Welverdiend-A), interview with Medhini Igoor Vijayakumar/author, 19 March 2024.

Tony (Chairperson, Farmers Cooperative, Welverdiend-B), interview with Medhini Igoor Vijayakumar/author, 19 March 2024.

Victor (General Worker, Yes 4 Youth program), interview with Medhini Igoor Vijayakumar/author, 25 March 2024.

Appendix

Appendix 1: Participant Information Sheet

Name of researcher: Medhini Igoor Vijayakumar

Description of Research:
The research explores the impact of cross-sector collaborations on building resilient communities through the lens of communal farmers in rural South Africa, specifically within the Kruger to Canyons Biosphere Region (K2C BR) in South Africa. Strengthening communal farmers in the region is crucial for socio-economic development as well as resilience against growing climate uncertainties. This would involve a complex web of implementing traditional agroecological practices, capacity-building in adaptive strategies, increasing economic opportunities for farmers, and expanding smallholder farming. These solutions are 'cross-sector' in nature and require collaboration between various actors in different sectors. However, there is limited research that assesses the impacts of cross-sector collaborations between NGOs, governmental organisations, and the private sector in the adaptation of rural communities to climate change. The goal is to understand the potential of smallholder farmers to increase the resilience of the rural communities in a changing world, by using established collaborations as case studies. There are three main aims of this thesis: (i) to understand the impacts of cross-sector collaborations on rural communities, (ii) to explore how cross-sector collaborations influence adaptation strategies in rural communities, and (iii) to explore frameworks that could aid and enhance such collaborations.

Dissemination of Results:
The data will be analysed and published as a master's thesis paper, which will be made publicly available through the academic portal and website of the university after the completion of the programme. Once the research is completed, the final thesis paper will be shared with the partner organisations to help strengthen their future endeavours with the help of data and analysis of the research. The paper may also be published (if accepted) in an academic journal.

Voluntary Participation:
The participation will be completely voluntary, avoiding any risks of coercion. Each interviewee will be informed about the purpose of the research, methodology, voluntary participation, their right to privacy, methods of data storage and the potential risks and benefits of the research. Their right to withdraw from participation will be clearly explained as being possible until April 1, 2024 (two weeks before the end of the field research), after which the interview will only be deleted provided it does not jeopardise the research outcome. All the participants of the interviews will be asked to sign the consent form and/or give verbal consent before recorded interviews. For interviews not conducted in English, the consent form will be translated and agreed upon with the guidance of the translator.

Data Privacy and Management:
The data collected is solely for the purpose of this research. To ensure utmost protection of participants, before transcribing the interviews all names and identities will be pseudonymised with codes assigned to each interview. Access to raw data revealing names or identities of participants is limited to the researcher alone. The collected data and analysis will be stored and managed on a password protected hard disk during and after the research. The raw data will be stored up to a period of 5 years, after which it will be discarded.

For further enquiries regarding this research, please contact:
Medhini Igoor Vijayakumar
Department of Environmental Sciences and Policy
Central European University, Austria
Email: [redacted]

Appendix 2: Consent Form

Name of researcher: Medhini Igoor Vijayakumar

Please tick the appropriate options below.

Project Details:

- ☐ I understand the nature and objectives of the research.
- ☐ I am aware of details of the organisations supporting the research.
- ☐ I understand the potential benefits and outcomes of this research.
- ☐ The methodology used to conduct the research was explained to me.
- ☐ I understand that the data collected will only be used for this research project.
- ☐ I understand that the research will be publicly available upon completion.
- ☐ I understand that the completed research paper will be shared with the local partner organisations.

Data Privacy:

- ☐ I understand that my personal identifiable information will not be published in the final research.
- ☐ I understand that my name will be anonymised.
- ☐ I understand that only Medhini Igoor Vijayakumar (researcher) will have access to the raw data.
- ☐ I understand that the raw data will be stored up to a maximum of 5 years.

Participation:

- ☐ I understand that my participation is voluntary.
- ☐ I consent to the interview being audio recorded.
- ☐ I understand that I can withdraw from participation until April 1, 2024, after which the interview will only be deleted provided it does not jeopardise the research outcome.
- ☐ I have had the possibility to ask questions and have received satisfactory answers.

……

Name of Participant Signature Date

……

Name of Researcher Signature Date

For the translator, if the form was translated to the participant to obtain verbal consent:

- ☐ I confirm that the participant was informed about the research accurately and has given verbal consent to all the aspects listed above.

……

Name of Translator Signature Date

Appendix 3: Interview Guide (Practitioners)

INTRODUCTION:

1. Could you give me a brief introduction of the work [your organisation] is involved in?
2. Could you briefly explain your role in [your organisation]?

EFFECTIVENESS:

3. What are the goals of the H4H programme?
    A) Are there any goals specific to K2C BR?
    B) Is there a timeline for these goals within the K2C BR?
    C) Does [your organisation] have any internal goals?
4. How is the impact of H4H measured?
5. In your opinion, is the programme on track to achieving its goals and targets in the K2C landscape?
6. In your opinion, if the H4H programme was not implemented in the K2C landscape, what do you think would be the ground realities in this region?

SOCIO-ECONOMIC OUTCOMES:

7. Were socio-economic outcomes of rural communities considered during the planning of the H4H programme?
    A) *If not,* why not?

If yes:

8. What are the indicators used to measure socio-economic outcomes of programmes on smallholder communities? What are the methods used to collect data for these specific indicators?
9. What socio-economic changes have been observed as a result of this programme?
10. Have there been any unintended socio-economic consequences (good or bad) as a result of this programme?

COMMUNITY DEVELOPMENT:

11. Do you think the H4H programme contributes to the long-term sustainability and resilience of rural communities?
    A) *If not,* what are the main obstacles?
    B) *If yes,* how?
12. What is the level of involvement of the smallholder farmers within the framework of the programme?

13. Are there specific mechanisms within this programme that ensure active and equal participation of all stakeholders?
    A) *If yes,* how?
    B) *If no,* why not?

ROLES OF ORGANISATIONS/SECTORS:

1. Could you give me a general overview of the Herding for Health programme?
2. Why was the programme designed to be a cross-sector collaboration?
3. What is the role of [your organisation] in the framework of this collaboration?
4. In your experience, what kind of support or expertise do the other organisations/sectors provide within this collaboration?

ROLE OF SMALLHOLDER FARMERS:

5. What is the role of smallholder farmers within the H4H programme?
6. Why was livestock farming designed to be at the core of the H4H programme?

KEY ENABLERS & BARRIERS:

7. What are the key factors required for the long-term sustainability of the H4H programme?
8. What are the key factors required for the scalability of the H4H programme?
9. In your experience working with different organisations and sectors, what are the key factors that enable successful collaboration in the context of climate adaptation in rural communities?
10. In your experience, what are the biggest challenges to sustaining cross-sector collaborations?
11. In your opinion, what strategies can be implemented to overcome challenges and enhance collaborations?

CLOSING REMARKS:

Is there anything else you would like to add?

Would you recommend I look into something further?

Appendix 4: Interview Guide (Beneficiaries)

EFFECTIVENESS:

1. What expectations did you have when you signed up to be a part of this programme?
2. Do you think those expectations have been met?
3. Did you have any concerns about being a part of this programme?
4. What changes have you incorporated in your day-to-day activities after joining this programme?
5. Have you noticed any effects or benefits due to these changes?
6. Do you think you will continue using these techniques in the future, even after this programme is over?
    A) *If not,* why not?

SOCIO-ECONOMIC OUTCOMES:

7. Do you think this programme has had any social impact in your community?
8. Do you think this programme has had any economic impact in your community?

SOCIAL EQUITY:

9. Were you involved in the planning or organisation of the programme in your community?
10. Do you have the opportunity to suggest changes or improvements to the current programme?
11. Do you think all members in your village have equal opportunity to be a part of this programme?

ROLE OF ORGANISATIONS:

1. How did you come across the Herding 4 Health programme?
2. What was the process of implementation of the initiative in your community?

KEY ENABLERS AND BARRIERS:

3. What are the challenges in implementing this programme?
4. In your opinion, what strategies can be implemented to overcome these barriers?
5. In your experience, how could this programme be made more impactful?

CLOSING REMARKS:

6. Is there anything else you would like to add?