Exploring the course-led development of a learning network as a community of practice around a shared interest of rainwater harvesting and conservation agricultural practices: A case study in the Amathole District in the Eastern Cape, South Africa

A full thesis submitted in fulfilment of the requirements for the Degree of

Masters of Education (Environmental Education)

at Rhodes University

Kim Nichole Weaver

G14C6333

December 2015

Supervisors:

Professor Rob O'Donoghue

Professor Heila Lotz-Sisitka

ABSTRACT

South Africa has water and food security challenges, especially the Eastern Cape Province where there is a high level of poverty. These challenges place heavy pressure on the agricultural sector as it is the main user of the allocated water in the country. Rainwater harvesting and conservation (RWH&C) practices are explored as a response to these challenges, however information on these practices is not readily available to rural farmers. Agricultural extension has been moving from a top down approach towards a more participatory, collaborative process where what farmers need and want is considered. These participatory approaches need to be explored to enable change in farmer's practice.

This research forms part of a Water Resource Commission (WRC) project, *Amanzi for Food*. (Project K5/2277). The project has the explicit intention of supporting the use of two sets of WRC materials on RWH&C and expanding the learning of these practices through a course-led process within a learning network structure centred around an agricultural college. The network was established with a participatory, applied training of trainer's course that supports and expands knowledge of RWH&C practices amongst network members from different groups within the sector; farmers, trainers, researchers and educators.

My main research question was to investigate the process of cultivating a learning network amongst different agricultural actors through a course-led initiative to strengthen the engagement with RWH&C practices. To address this research I used focus group discussions, course observations, participant interviews, participant questionnaires and participant assignment progress to generate data. These data were analysed using Wenger's theory of communities of practice to gauge levels of engagement, participation and learning.

Main findings of the study are that the course-led activation of the learning network supported the community of practice members to share their personal experience and achieve social competence in the learning of RWH&C agricultural practices in their context.

ACKNOWLEDGEMENTS

I would like to thank the WRC for funding this project and providing the team with the support for carrying out our fieldwork and sustaining the interactions with the participants. The funding enabled me to fully engage with this research process and help facilitate the *Amanzi for Food* training of trainer's (ToT) course. Subsequent to the year of funding from the WRC, I was supported by CathSETA for my second year which is greatly appreciated.

To my *Amanzi for Food* field family, Tichaona Pesanayi, Lawrence Sisitka, Chisala Lupele and Chris Mabeza – a huge thank you for the ongoing support and passion that you all show towards sustainable agriculture and improving social learning processes for farmers. I look forward to many more learning adventures with you all. A special thank you to Ticha, I could not have asked for a better mentor than you!

Every single memory from the Amathole region will be cherished because of the people that I was fortunate enough to meet during my research journey. I thank you for giving us the time and energy and for sharing your experiences with us, we learnt so much from you all.

Thank you to my supervisor, Prof. Rob O'Donoghue for meeting with me in 2013, seeing potential in me and taking me on as a student at the centre. I appreciated your open door policy where I felt welcome to meet with you and chat about my research at any time. Thank you for your careful reading near the end of the journey – it helped bring this work together. A special thank you to Carmen too, for inviting Matt and I into your home and for the delicious meals.

I am also grateful to Prof. Heila Lotz-Sisitka, my co-supervisor, for guiding the WRC *Amanzi for Food* team in our field decisions – with your guidance we were confident in our progress. Your direction during my research journey helped tremendously. Your careful reading of my work was invaluable to my final thesis.

I was very lucky to be part of the community at the Environmental Learning Research Centre – during this journey the people there were phenomenal with their ongoing support. Thank you to every single one of you for the comradery. Thank you to Dr. Lausanne Olvitt, Dr. Ingrid Schudel for the master's sessions that I joined – I gained so much. Sashay Bates and Samantha Abdul, you both joined me in having our weddings in 2014 – it was fun to chat 'wedding'. Thanks Sash, Sam and Veronique for your organisation skills and helping the

Amanzi for Food team with our logistical plans. Thanks also to the student community and friends who provided me with research ideas and many wonderful lunch break discussions – Nina, Caroline , Sirrka, Priya, Caleb, Experencia, Zintle, Lebona, Treve and Victoria. I would also like to thank all of my friends far and wide, especially those in Grahamstown for the fun times that took my mind off of my research. You know who you are! Dylan Weyer, thank you for the last minute help with the map.

Thanks to my parents, Pamela and Bruce Carlyon – you were both so supportive of our decision to go back to University and take on the challenge of furthering our studies. You are both always positive and your help with the wedding made it possible for me to work hard and put my head down with my research. My sister, Carey-Anne, you are always the person I want to talk to when I feel down and you have provided support and love for both wedding and research woes. Thank you to Meryl and Alex Weaver, my in-laws, for your love for the Eastern Cape and Grahamstown – we would not have had the confidence to move here and take on our Master's without your support. To Jenna and Ryan Weaver, thank you for all the messages and photos of Chloe and Alex which would brighten even the glummest days. To all my family, without your confidence and belief in me, I would have never thought myself capable of taking on this mammoth task in the same year of planning our wedding, thank you.

Last but definitely not the least, I would like to thank my rock, my best friend and husband, Matthew Weaver – you have been my biggest supporter through this process. I started my research journey as a Carlyon and now am finishing as a Weaver – I couldn't be prouder to have your name. I am the luckiest girl in the world to have your love and support, if these two years are anything to go by, our friendship and marriage will grow exponentially – I cannot wait to see what our future holds! I love you!

"A person is born into the world not as a pristine and isolated individual, but as a nexus in a social network."

Norbert Elias

(cited in Smith, 2001, p. 10)

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

ACRONYMS

AHS	Agricultural High School
CoP	Community of Practice
ESD	Education for Sustainable Development
NGO	Non-governmental organisation
RWH	Rainwater Harvesting
RWH&C	Rainwater Harvesting and Conservation
ToT	Training of Trainers
WRC	Water Research Commission

CHAPTER ONE

Introduction and Background

1.1. Introduction

This chapter provides the background to the research as well as the research purpose and research questions. This study forms part of the wider *Amanzi for Food* research programme on knowledge dissemination in the agricultural sector. The research explores the activation of a learning network to investigate the best possible ways in which materials might be made more accessible and utilised in an agricultural landscape of practice. The main focus of learning is around rainwater harvesting and conservation (RWH&C) practices as a response to the increasing pressure on climate variability.

1.2. The Broader Context of the Study: The Water Research Commission and *Amanzi for Food*

South Africa faces increasing water and food security challenges (Altman, Hart & Jacobs, 2009; Muller et al., 2009). A key concern in this context is that farmers are cognisant of the current situation. Key to the need to respond to water scarcity, is the ability of farmers to incorporate rainwater harvesting and conservation practices into their everyday practice. In this research, I acknowledge the need highlighted by numerous researchers to understand the processes of knowledge flow and uptake of knowledge of RWH&C practices amongst trainers and farmers (Denison & Wotshela, 2009; Phiri, 2011; Burt & Berold, 2012; Lotz-Sisitka, O'Donoghue, Phillips, Pesanayi, & Sisitka, 2013[1]). This study is funded and motivated by the Water Research Commission (WRC). The WRC's mission is "to be a global water knowledge node and South Africa's premier water knowledge hub…" (Water Research Commission, 2015). The WRC has contributed substantially to the body of knowledge in South Africa relating to water management and knowledge, and has a dedicated research programme focusing on the agricultural context. In this context, new research interests and

[1] The Water Research Commission projects are identified by a project number, I will use these to locate the research with the WRC studies.

problems constantly emerge, including the need to enhance knowledge flow of RWH&C in the agricultural sector, and specifically amongst smallholder farmers and household food producers.

In 2013 the WRC appointed the Environmental Learning Research Centre at Rhodes University to undertake a research programme focussing on the development of "an action oriented strategy for knowledge dissemination and training for skills development of water use in homestead gardening and rainwater harvesting for cropland food production for small holder farmers and food growers in South Africa" (Lotz-Sisitka et al., 2013, p. 1) (WRC Project K5/2277). The Environmental Learning Research Centre is concerned with environmental education and education for sustainable development (ESD)[2] in formal and informal education systems. A common direction in ESD is to strive for transformative change in a social context through learning and practising more sustainable practices (Bangay & Blum, 2010), such as RWH&C.

This study falls within the WRC/Rhodes University Environmental Learning Research Centre research programme entitled *Amanzi for Food* or Project K5/2277 (Lotz-Sisitka et al., 2013). The purpose of the research programme as mentioned above is to develop an action-orientated strategy for knowledge dissemination that aims to encourage efficient and effective water use for food production through engaging growers via dissemination of knowledge and the provision of training opportunities (ibid.). A key focus of this programme is to support the mediation and use of a core set of learning materials that have been produced by the WRC for smallholder farmers to harvest and use water for food production, and to enhance household food security. This project is a follow-on from other research that the WRC has supported on rainwater harvesting and social learning (Denison & Wotshela, 2009; Phiri, 2011) and community-engaged training and knowledge dissemination and mediation (Botha & de Lange, 2006; Burt & Berold, 2012; Rivers, 2014). It seeks to address the problems of knowledge dissemination into communities of agricultural trainers and farmers. As indicated in the proposal and orienting documents of the *Amanzi for Food*

[2] The concept of ESD is explored in section 2.6.1.

research programme, flow of knowledge from scientists to practitioners is a key issue facing not only the WRC, but many other scientific knowledge producers in the environmental sector (Lotz-Sisitka et al., 2013).

Looking back at some of the research the WRC has been involved in, one can identify the need for a project like *Amanzi for Food*. Research by Botha and de Lange (2006), WRC project K5/1357, identified the different agricultural training needs of rural farmers in the Limpopo province. Water harvesting, soil preparation, seed selection, fertilisation and weed control were among the needs that emerged from engaging with these rural farmers in training initiatives (ibid.). Training materials and packages were put together to prepare the trainers and facilitators for their tasks of delivering information to farmers. The engagement was positive and productive, as Botha (2009), WRC project KV 221, reported that the Farmer Training units of the agricultural colleges normally receive very little support from the outside. Learning material packages were presented or disseminated among the agricultural colleges and other end users and it was suggested that the colleges would have liked the materials to be available in electronic documents along with an information sharing system (e-forum) between WRC and the agricultural colleges (ibid.). Botha's study showed how important it is for materials to be disseminated in a professional and positive manner. Her work also showed that through interaction, engagement and participation, the projects objectives of developing and disseminating useful knowledge and teaching materials can be met (ibid.).

Denison and Wotshela (2009), WRC project K5/1777//4, explored different indigenous water harvesting and conservation practices. Their research found that there are only a few existing indigenous water harvesting practices in South Africa that have been used over the years, but that such use was marginal at best. They recommended that the WRC explore other dissemination channels so that their research into these water conservation practices could have a higher impact on a larger population of researchers, practitioners and food producers (ibid.). They reasoned that if these indigenous water conservation farming practices could be implemented and understood by more rural farmers, there would also be more food being produced at a local level (ibid.).

Phiri's (2011) Master's research at Rhode University, although not specifically a WRC project, did align with the WRC research. He researched community learning in an area in the Eastern Cape focussing on integrated water resource management practices. His research showed that participation is an important dimension of learning. He recommended that community members should be encouraged to work in communities of practice, and he noted the existing significance of such networks for creating a platform for interactions and social learning to occur (Phiri, 2011). He recommended further exploration of the contextual factors that influence participation and learning opportunities (ibid.).

Taking this work further, Burt and Berold (2012), WRC project K8/813, focused on water knowledge flows to communities. Their research emphasised that knowledge has to be effectively presented and mediated for it to be used by trainers working with community food growers. Their research highlights the importance of a mediator and the skills that the mediator needs to be able to provide relevant information and to mediate learning and action in a social learning process (Burt & Berold, 2012). Recommendations on water knowledge flow put forward by Burt and Berold (2012, pp. 24-27) included:

- Mediate the process of developing resources with practitioners,
- Produce accessible video material as a mediation tool,
- Use social media networks to communicate 'Did you know?' information bites,
- Create a 'Please call me' facility linked to a water information organisation, and
- Research how water knowledge is currently being used and could be further used in South Africa.

Expanding this work, Burt, Lotz-Sisitka, Rivers, Berold, Ntshudu, Wigley, Stanford, Jenkin, Buzani and Kruger (2014), in WRC project K5/2074, focused on mediation of water knowledge. They identified the skills that are needed to mediate water management and practice learning in a community in the Eastern Cape (ibid.). Their research explored how RWH&C practices were being learnt in community social learning contexts. Their research showed that knowledge mediation needs to include a range of contextual factors and that

the learning processes need to contribute to meaning-making in relation to practice. Institutional and governmental support needs to be given to agricultural trainers as they have the heavy task of mediating knowledge and contributing to changes in practice (ibid.). Rivers (2014), who was part of the Burt et al. (2014) research programme, added that "… learning emerges in relation to context via interactions between implicit and explicit mediation processes …" (p.451); her depth in the understanding of mediation through her PhD studies also contributes to the WRC's body of research.

1.2.1. The Water Research Commission Amanzi for Food programme

The *Amanzi for Food* programme (K5/2277) was designed to build on and address the recommendations made by the above researchers. It focuses on agricultural colleges and knowledge dissemination to farmers and the other key participants such as extension officers and trainers. The mediation of learning, in WRC project K5/2277 (Lotz-Sisitka et al., 2013), focused on the mediation of specific WRC materials through a course-led initiative which brought agricultural actors together to form a learning network. There were two specific sets of WRC materials (see figure 1.1) that contain information on RWH&C practices:

- *Water Harvesting and Conservation* by Denison, Smutters, Kruger, Ndingi, and Botha (2011) from WRC Project No: K5/177; and

- *Agricultural Water Use in Homestead Gardening Systems* by Stimie, Kruger, de Lange, and Crosby (2010), from WRC Project No: K5/1575/4.

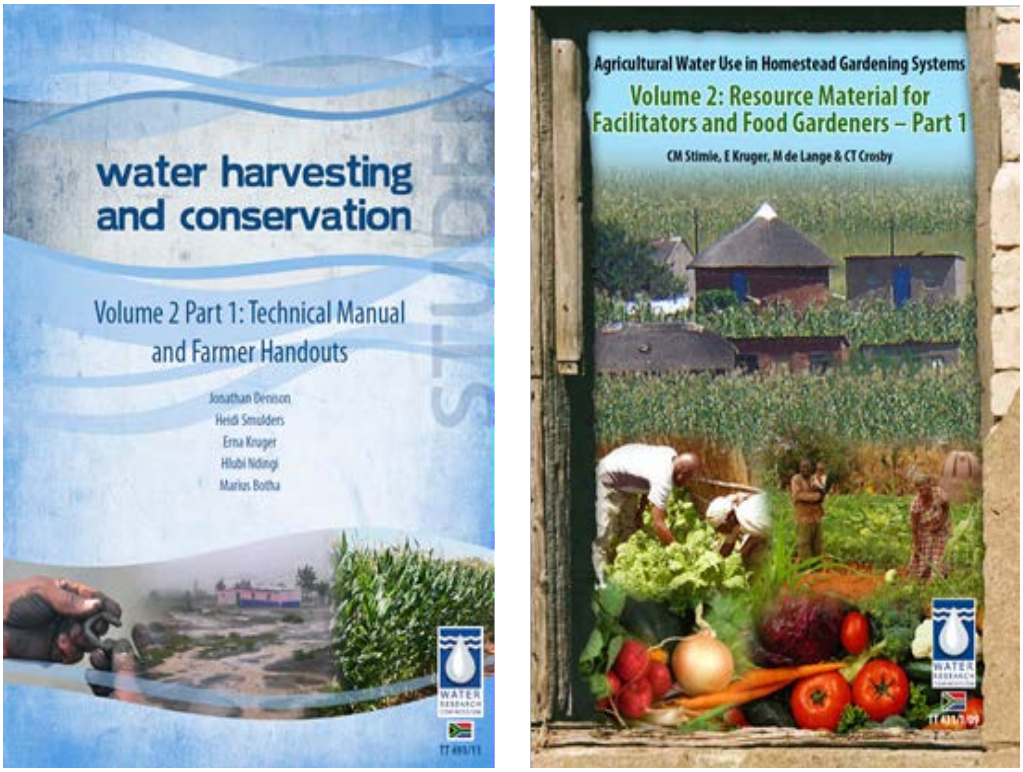


Figure 1.1: The WRC materials received by all course participants (see www.amanziforfood.co.za for full versions of the materials)

The course participants received various handouts and additional course materials along with the WRC resources (see section 4.7.3.1). One document worth introducing here is the navigation tool (see Appendix 1) which aids access into the WRC resources mentioned above. This tool can be used to locate the relevant practice based information that a participant may need. It mediates access to the materials through a focus on a range of RWH&C practices which can support small holder farmers to increase food production.

This course was designed to constitute and cultivate a learning community through which the materials would be worked with in potentially productive, applied ways (Lotz-Sisitka, O'Donoghue, Phillips, Pesanayi, & Sisitka, 2014a). In this project, course participants worked together on the course sharing ideas and experiences towards the applied use of the RWH&C materials in their agricultural activities, a process that I document across this thesis. The course participants from different backgrounds were intended to form a learning

network centred around Fort Cox College of Agriculture and Forestry (Lotz-Sisitka et al., 2014a).

With RWH&C learning materials and practices being central to the formation of the proposed learning network (Lotz-Sisitka et al., 2014a), the *Amanzi for Food* team introduced and facilitated a Rhodes University accredited Training of Trainers (ToT) course. The course was to support network members to deepen their knowledge and experience of RWH&C practices in local food production systems. This course was developed as a mediating process to support the use of the WRC materials on RWH&C practices into the diverse agricultural activities and practices of the various course participants. The course orientation document was created for people to gain a deeper understanding of what it set out to do (Appendix 2). The phases the course followed the form of five module sessions and are introduced in the figure 1.2 below. In phase one, course participants were introduced to the importance of carrying out a contextual profile and investigating if any RWH&C practices are being utilised in their area. Phase two looked at identifying and selecting RWH&C practices to include in their work, while phase three looked at utilising these selected practices in the implementation of demonstration sites. In phase four, course participants were facilitated to plan and implement curriculum activities and teaching practices. Phase five in the course entailed course participants to reflect over the course process in reviewing and evaluating curriculum innovation and teaching or training practices.

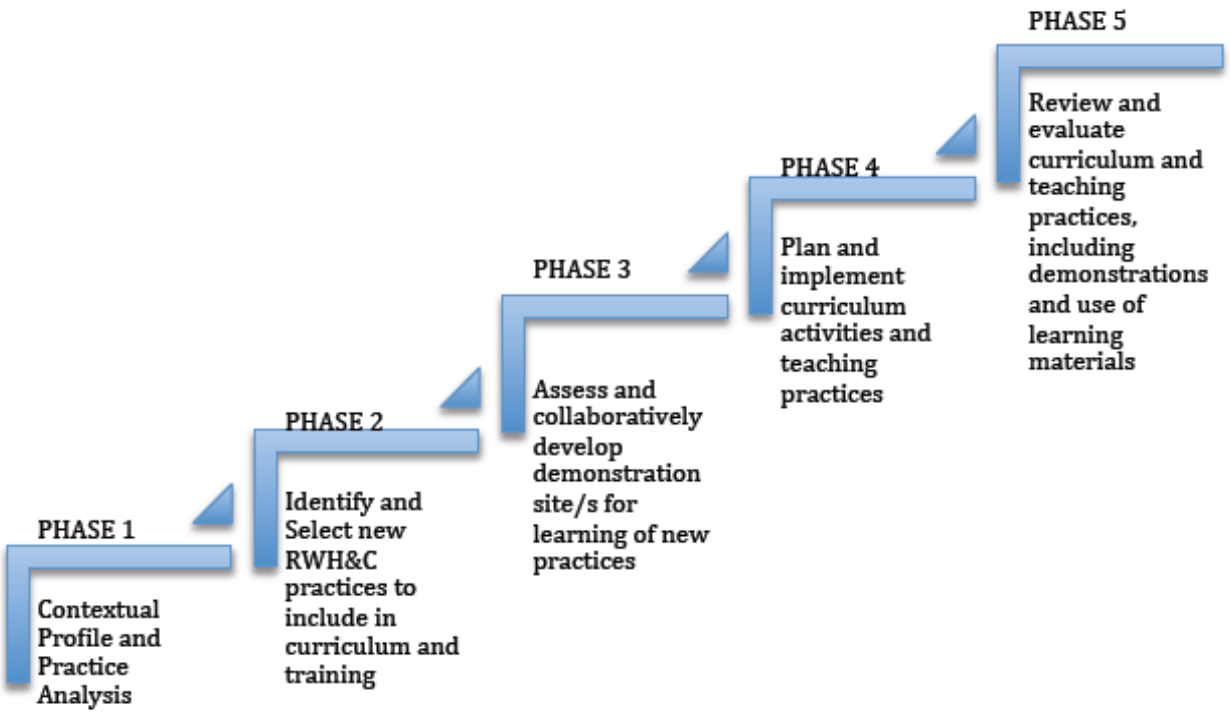


Figure 1.2: Phases of the Training of Trainers course

Participants engaged with RWH&C practices throughout the course process. In phase three of the process, participants collaborated to plan and implement demonstration sites as change projects; these proved to be important interaction spaces for participants involved.

The ToT course is facilitated by a team of researchers led by Professor Heila Lotz-Sisitka and Professor Rob O'Donoghue at the Environmental Learning Research Centre at Rhodes University with Jonathan Denison from Umhlaba and Katrina Phillips, an international media advisor from Zimbabwe. Lawrence Sisitka leads the local *Amanzi for Food* field team while the other members are Tichaona Pesanayi, Chris Mabeza, Chisala Lupele and myself. Recently we have been joined by Wilma van Staden, who is establishing a second learning network in the North West Province. We are a group of researchers, all with various levels of experience who facilitated the ToT course each with a diverse research focus in the programme. My research project within this programme is explored below in section 1.2.2.

Various media tools which are discussed in detail in section 5.4.1 were used to expand the learning network. These included a WhatsApp group for the learning network to communicate, a Facebook page for updates and news to be shared, an *Amanzi for Food* website and blog, and finally radio broadcasts to share experiences from the learning network into the wider community.

1.2.2. My Research in Amanzi for Food

This study (which forms part of the wider *Amanzi for Food*, WRC project K5/2277 research programme) maps out the agricultural sector network that is evident in the Amathole District and identifies who the key players are in the sector. A loosely fragmented network which was evident through initial engagement with network members was strengthened through the *Amanzi for Food* course-led initiative to mediate the use of the WRC materials (see chapters four and five). To establish this finding, I investigated the process of constituting the group as a CoP within the course-led initiative, and how they reached out in using the materials in wider learning activities in colleges, extension services and into and with local communities.

My work explores ways in which network members shared and sourced information in their context to use in their teaching, training or directly in producing food (see section 4.3). The various platforms, channels and processes of communication used by network members were looked at for the patterns of social learning interactions to identify effective knowledge dissemination avenues (section 4.3). Platforms of communication are understood here as the various spaces and ways that people get together to share information such as forums or co-operatives. Channels of communication in this research refer to the different materials and media used to share information in the agricultural sector. Processes of communication are understood in this research as the activities that people are involved in as they share information relevant to their practice.

This study was developed to document and probe how participants interacted and came to use the materials in the diverse contexts of their work during the ToT course engagements. The course supported the participants to constitute themselves as the Imvothu Bubomi learning network. This group was formed as part of the course-led initiative in *the Amanzi for Food* programme. The threads bringing agricultural institutions together were evident from the beginning of the collaborative research journey with the WRC materials and into wider work (see section 4.2). Through the contextual work, the *Amanzi for Food* field team[3] facilitated the strengthening and joining of connective threads into a learning network that came to function as a community of practice around a shared interest around water harvesting for food production. All members of the network joined the group to learn more about RWH&C practices whether to use this in their teaching, training and demonstration practices, or to use these practices in their day to day farming.

1.3. Purpose of the Study

The main purpose of this research was to gain an understanding of how a course-led initiative facilitates the cultivation of a community of practice (CoP) to enable access to information on RWH&C practices. Additionally, the purpose of this research was to encourage social learning and knowledge sharing within the agriculture sector. More agricultural institutions and users need to learn about ways in which climate variability, water and food security can be faced with alternative agricultural methods (Lotz-Sisitka et al., 2013).

With this as purpose and context, the study set out to link actors in the agricultural sector in the Amathole District with a focus on the Nkonkobe local municipality and to actualise and study the expanding learning network. The emerging roles of the different network member organisations, institutes and individuals were explored as the network was constituted and expanded through learning interactions. Through the investigation, the emerging partners

[3] The *Amanzi for Food* field team consisted of six researchers, my role was as a course facilitator as well as researching the course-led activation of a learning networked community.

and the preferred communication processes used by the network members have been identified by enquiring what materials, media and activities were used in order for the members to acquire knowledge. This included an enquiry into the materials, media and activities used in order for the members to access new information and knowledge. The interactions that were mapped and the insights derived were used to understand the information/ knowledge flow and the communication channels and processes that were used in this expansive learning process.

Identifying the learning network as a community of practice (CoP) with a shared purpose opened up a discussion about the learning that was happening amongst a group such as this (Wenger, 1998a). The value that was created and found through the interactions between different network members is analysed in the study, to gauge and understand the learning that is enabled by networking (Wenger, Trayner, & de Laat, 2011).

1.3.1. Research Questions

The research questions below guided my research design decisions and shaped my analysis along the way. The main question and three sub-questions are listed below:

- Can cultivating a learning network amongst different actors[4] in the agricultural sector strengthen engagement with RWH&C practices, and if so how?
    - To map the learning network links and social learning processes that were evident amongst agricultural institutions and individuals.
    - Can, and if so, how can a participatory course-led activation of a learning network cultivate a community of practice that fosters learning, or not?
    - What value creation elements are evident in a course-led approach to activate the formation of a learning network focussing on RWH&C practices?

[4] Different actors in the learning network included rural farmers, extension advisors and other trainers from economic and rural development agencies, agricultural researchers and agricultural educators.

1.4. My Interest in the Study

My background and interest is in conservation and sustainable resource management. In order to improve the livelihoods and sustainable living practices of fellow South Africans, there needs to be more attention given to small-scale and rural agricultural activities with conservation agriculture in mind. South Africa has so much potential in the agricultural sector, and water is the primary natural resource that limits growth in the sector (Viala, 2008). Water needs to be conserved and managed carefully and sustainably to ensure that agricultural activities increase (ibid.). The people in our beautiful country are very important and I believe that our country has so much to offer, starting with the people. Hence, my interest in the *Amanzi for Food* programme and working with community members to strengthen their relationships and share information on sustainable farming practices (RWH&C) so as to help alleviate poverty and food insecurity, while conserving and utilising scarce water resources.

1.5. The Amathole District and the Nkonkobe and Amahlathi Local Municipalities: The Context of the Study

Buffalo City metropolitan municipality is where the Amathole District is situated within the Eastern Cape (figure 1.3). The Municipal Structures Act (Republic of South Africa, 1998) defines local government in South Africa as comprising three types of municipalities – metropolitan, district and local municipalities. Metropolitan municipalities govern large areas based around the major South African cities (e.g. East London, Port Elizabeth, Cape Town, Johannesburg, etc.) (ibid.). The rest of South Africa is divided into district municipalities, each of which comprises several local municipalities (ibid.). The Amathole District is home to Nkonkobe and Amahlathi local municipalities where this research took place. Significant towns and areas within these local municipal areas can be found in figure 1.3 below. The Alice-Middledrift area which falls within Nkonkobe municipal area is where most of the *Amanzi for Food* activities took place, although nearby Keiskammahoek farmers joined in too. Stutterheim, approximately 100 kilometres from the Alice area, hosts the local

agricultural research institute of the province. Both, Keiskammahoek and Stutterheim fall within the Amahlathi local municipal area as indicated below.

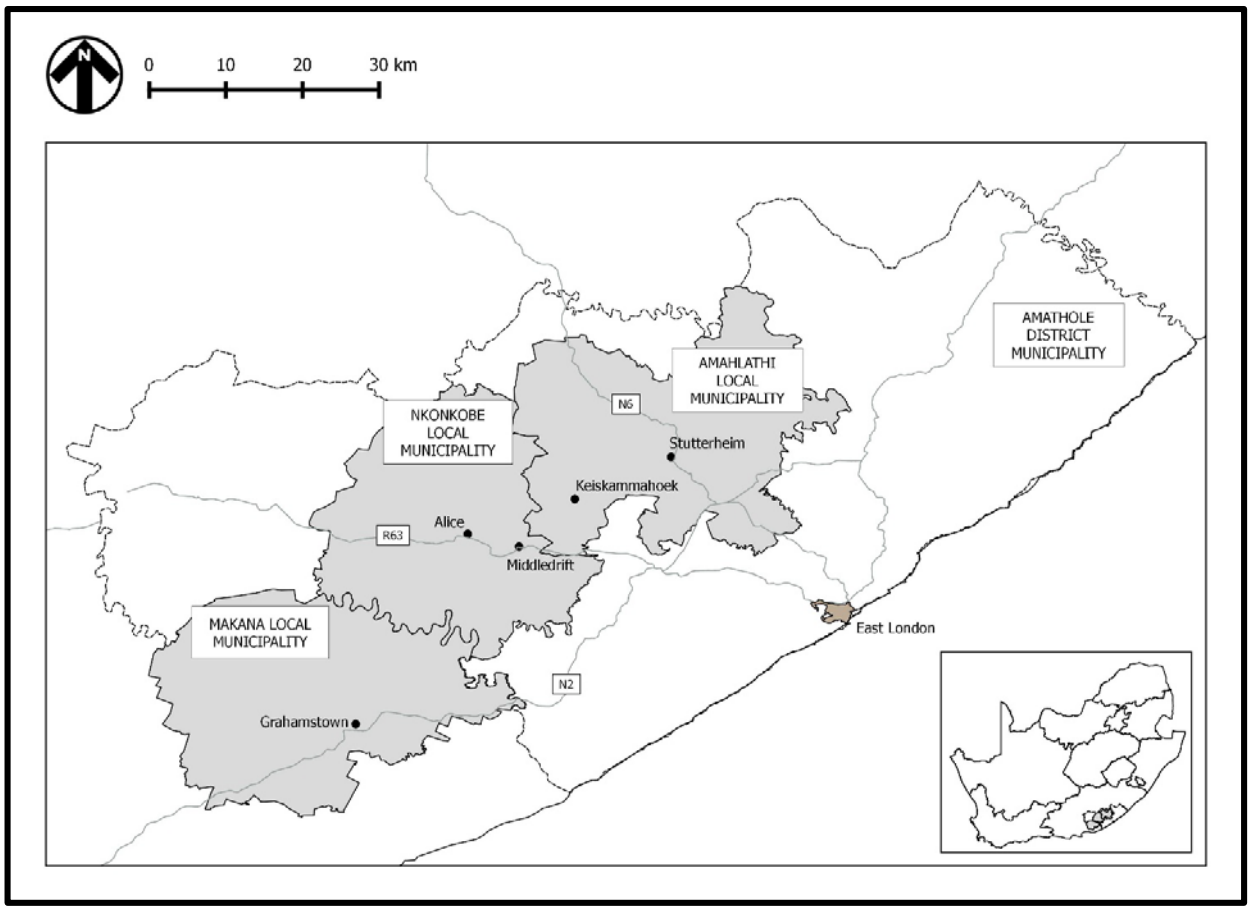


Figure 1.3: Map of the Amathole District municipality with focus around Nkonkobe and Amahlathi local municipal areas where the study sites are, Makana Local Municipality is also shown here to show where Grahamstown is situated in relation to the study site

The Eastern Cape is a semi-arid region, water is not in abundance. Poverty is rife in this province and many people are not earning enough to feed their families. Agriculture has played an important part in livelihood sustenance in rural homesteads, although agricultural activity has declined over the last few years (Westaway, 2012). The participants in this study all from the two municipal areas, Nkonkobe and Amahlathi, were from various disciplines within the agricultural sector ranging from farmers, trainers, researchers and formal educators (see section 4.2.2. for a full description of learning network members and their roles). All the participants were involved in the *Amanzi for Food* learning network in some way or another; a few successfully completed the ToT course and received certificates while

others did not and received letters of participation. The participatory ToT course took place between August 2014 and April 2015, with other meetings to initiate this before, in between and after. The formal certification ceremony (see section 3.4.2. where the certificates are explained) was held in October 2015 at the Rhodes University Environmental Learning Research Centre's 25th year celebrations.

1.5.1. The Agricultural Sector in Amathole District Municipality

Greater detail on the contextual landscape is provided in chapter four. This section will only introduce some of the prominent agricultural institutions in the district. The historically important University of Fort Hare[5] has an active Agricultural Department in the Faculty of Science and Agriculture with an active research programme. The University of Fort Hare is situated in Alice (see figure 1.3). Not far from the university, is the Fort Cox College of Agriculture and Forestry[6] which is close to Middledrift. Another important agricultural institute is the Döhne Agricultural Research Institute which is the main research station in the province and is situated a few kilometres outside of Stutterheim (see figure 1.3). These were the main agricultural players that were active in the learning network. Their roles and those of other organisations and structures will be discussed in chapter four (see section 4.2).

1.6. Key Concepts in the Study

Rainwater harvesting and conservation (RWH&C) practices are the main focus and content of the course-led initiative that is central to this research. This term is explored further in section 2.3. Viljoen et al. (2012) defined rainwater harvesting as the "purposeful collection of rainwater from various catchments such as roads, hillsides, pastures, and within fields;

[5] The University of Fort Hare is historically important because of the impressive alumni that studied there during the time when black southern Africans had few options; alumni include many African political and cultural leaders (Morrow & Gxabalashe, 2000).
[6] Fort Cox College of Agriculture and Forestry was made the hub of the learning network activities.

and rooftops and the storage of such water in physical structures or within the soil profile" (p. iii).

A *learning network* is a group of people who have come together to learn about certain topics that are of interest to all members; these networked groups are potential platforms for learning to occur (Cousin & Deepwell, 2005). Members of these learning networks bring their own experiences and competences from their diverse backgrounds, creating opportunities for collaborative learning and engaged practice (Wenger et al., 2011). See section 2.7, where this concept is explored in more detail.

This study draws on Wenger's (1998a) theory of learning in a *community of practice* (CoP). He defined a CoP as a social structure in which people who are interested in the same activity interact to strengthen their knowledge and skills on that shared interest. This term is revisited in section 2.8 in more detail. Wenger (1998a) defined learning as doing, belonging, experience and becoming. Learning is situated within the community and develops through participation. Wenger (1998b) described *participation* as the active involvement and experience in social initiatives. Tracking the developing processes of active participation was key to this research as participants involved in the learning network participated in various activities which enabled learning of RWH&C practices.

Another focus of interest in the study was the *value created* through being part of the developing learning network that functioned as a community of practice around a common concern. Drawing on the value creation assessment framework by Wenger et al. (2011), the learning that was enabled by networking was explored and documented. See section 2.10 for a deeper exploration of this concept.

1.7. Overview of the Study

The next chapter, **chapter two** provides a conceptual framework where the key concepts behind this research are discussed in more detail. The discussion of concepts flows into the

theoretical framework for the study and the theories that enabled me to explore developing learning and practice. These frameworks pave the way for the unfolding of the rest of the dissertation.

Chapter three describes the way in which this study was designed to answer the research questions outlined above (see section 1.3). Ways in which the data was generated are discussed along with the different phases of the design. This is followed by the approach which was taken to analyse the data and to ensure the validity and trustworthiness of insights that emerged. At the end of this chapter the ethical concerns are addressed along with the limitations in the study.

Chapter four presents the data generated in the study. An in-depth contextual profile maps the agricultural landscape along with the roles each organisation plays in the sector. Data is presented using different themes that were used to organise the data in a way that the research questions could be addressed. Finally, elements of value are discussed in order to gauge the value that was created through the course-led process that shaped the expanding community of practice and the associated activities in the area.

Chapter five presents the findings in the form of analytical statements that are based on the evidence presented. These are discussed further using theoretical insights. The chapter looks at the formation of the learning network through the course-led activation. This chapter also explores the network functioning as a community of practice. It then looks at the elements of value created through the learning network activities. The expansion and longevity of the CoP sharing information and experiences was then explored in relation to various media tools and platforms that developed as the project unfolded. The chapter additionally provides the conclusion, with a summary and a reflection of the research journey. It shares some recommendations for the agricultural sector to strengthen knowledge dissemination of relevant information. Recommendations for further research are also discussed in this chapter.

1.8. Concluding Summary

This chapter presents the background to and an overview of the research in order to make the intended purpose explicit. The research purpose and questions are put forward along with a brief introduction to the research context, site and key concepts. The chapter sets the scene for the chapters that follow.

CHAPTER TWO

Contextual Background, Conceptual and Theoretical Framework

2.1. Introduction

This chapter provides the contextual background of the case study site, together with the conceptual and theoretical framework of the study. The purpose of this chapter is to provide the reader with an overview of the background context and literature-based research that informed the study. It covers the water and food security challenges in South Africa and in the local context of the Eastern Cape where the case study is situated. Agriculture and rainwater harvesting and conservation (RWH&C) practices are introduced as responses to water security and food production challenges in the region. A decline in homestead agricultural practices as well as a slow uptake in RWH&C practices are discussed in some detail as these challenges were behind the WRC K5/2277 project, and behind the development of a course based introduction of materials to inform better water conservation farming practices. Additionally, the chapter provides an overview of the roles of agricultural colleges and how they currently contribute to the sector in South Africa. Here, I address the issue of knowledge dissemination and flow into rural and urban agricultural communities and explore communication channels as social learning processes that are already being used in this context.

This is followed by a contextualisation of the study, an historical overview of the movement from traditional agricultural extension and communication to social learning or a community based approach around agricultural knowledge and information sharing in South Africa. This study is situated in the environmental education field and uses a social learning theory to investigate and interpret the activation of the learning network to encourage collaboration and communication in the agricultural sector. Community of practice and value creation are two bodies of theoretical literature that I explore to understand the activation of the learning network through the learning interactions and social learning process.

2.2. Water and Food Security Challenges in South Africa

Water and food are essential to the survival of people and the development of a nation; access to these important resources is, however, still not common South Africa (Altman et al., 2009). The country has a high level of poverty and a high rate of income inequality making it difficult to ensure access to water and food throughout South Africa (ibid.).

Water security is defined as "the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies" (Grey & Sadoff, 2007, p. 545). Only a few countries have achieved water security through large financial investments (ibid.). South Africa is a water scarce country as it fails to supply adequate quantities of fresh water to its growing population, and it is amongst the driest countries in the world (Muller et al., 2009). Access to water is one of the country's greatest challenges as the water supply is unevenly distributed across the country. As the effects of climate change are impacting on rainfall patterns, greater pressure on the environment is being felt (South African Weather Service, 2015). There is evidence presented by the South African Weather Service (2015) that South Africa's climate is expected to become warmer and dryer in the near future. This has implications for water availability and access.

In 1998, the National Water Act (NWA) declared water as a public good, implying and putting plans in place to ensure that everyone has access to this important natural resource (Lotz-Sisitka & Burt, 2006). Since then, integrated water resources management (IWRM) practices have been put in place where participation of diverse stakeholders is encouraged (ibid.). Community based natural resource management (CBNRM) has been another important approach in Africa in an effort to manage resources in a more sustainable way (Pijnenburg, 2002). By including local people in the co-managing of resources, such as water, they are said to become more aware and interested in the sustainability of the resource as well as becoming better at developing their own local knowledge and practices in managing the resource (Pijnenburg, 2002; Nare, Odiyo, Francis, & Potgieter, 2011). The CBNRM

approach is a way of engaging with people and implementing new practices that will help them use and manage resources, such as water, more wisely.

In South Africa, 62% of the water is utilised by the agriculture sector; this sector supports the national economy and contributes towards rural development (NWRS, 2013). As agriculture uses a large percentage of the country's allocated water, improved efficiency in water use is an ongoing challenge (Muller et al., 2009) and the National Water Resource Strategy (NWRS) emphasises that water conservation and water demand management should be rooted in agricultural practices (NWRS, 2013). The National Water Resources Strategy notes that commercial along with subsistence agriculture can guarantee food security for the country and in doing so creates a food production value chain where more jobs are available thus alleviating poverty to some degree (NWRS, 2013).

Given the high unemployment rate and resulting poverty in South Africa, social grants have been implemented for the elderly, disabled and for those with young children (Pollard, Biggs, & du Toit, 2008). In the Eastern Cape, 39.3% of the individuals living there benefit from social grants (StatsSA, 2015). By extending social grants to the rural areas in South Africa, there has been an improvement in food security but this has not provided a long term sustainable solution (Altman et al., 2009); it merely provides a false sense of security with unrealistic expectations as it is buffering the problem and not taking people out of poverty (Pollard et al., 2008). Denison and Wotshela (2009) added that accompanying the social grants there has been a steady decline in rural food production in South Africa. Additionally, Westaway (2012) noted that with the emergence of social grants, there has been a growth in the rural populations which may have contributed to an increase in food insecurity. He pointed to how rural households have become dependent on welfare (ibid.) noting that rural households spend most of their income on food, which is associated with a rapid decline in agricultural activity (ibid). Altman et al. (2009) suggested that to strengthen food production amongst households in South Africa, policy makers should consider context-specific support, for instance access to appropriate extension support could be an important contributor to a more positive outcome in agricultural activity. The above research presents a complex picture of declining reliance on subsistence rural food

production and the development of a sensitive rural economy and livelihood that are becoming increasingly dependent on government social security. Within this complex situation, this study explores networked learning structures and practices to ascertain how knowledge flows and how social relations might enable an improvement of water harvesting and conservation practices for food production amongst smallholder farmers.

2.2.1. Water and Food Security Challenges in the Eastern Cape Province

The Eastern Cape Province falls within the dryer part of South Africa and it experiences a small amount of rainfall all year around; for example, the town of Alice has an average of 581.94ml of rainfall per year with most of the rain falling within the summer months (University of Fort Hare, 2014). With the effects of climate change, it is expected that the coastal part of the Eastern Cape will experience a decrease in annual rainfall (Winkler, 2007). According to the general household survey from 2014, 78.5% of households in the Eastern Cape have access to piped water (StatsSA, 2015).

The Eastern Cape is the poorest province in the country and has a high percentage of rural dwellers (Westaway, 2012), with 56.6% of households relying on grants as the prevalent income (StatsSA, 2015). Thus there should be more attention on agricultural extension and other training facilities offered to people; this is discussed further in section 2.6. From documents dating back to 2006, the number of households spending the majority of their income on food security has declined (Westaway, 2012). Having said this, 39.5% of the households in the local Nkonkobe municipal area where this research is situated, were involved in agricultural activities; this still leaves a high percentage of the population in the province relying on produce bought from the commercial market (StatsSA, 2011).

2.3. Rainwater Harvesting and Conservation Practices as a Response to Water Security in South Africa

The history of water harvesting practices in South Africa dates back to the late Iron Age period when the nomadic lifestyles of the hunter gatherers became more sedentary as iron-work and crop production took root (Denison & Wotshela, 2009). During this time, farming skills and techniques, including water and moisture preservation for cultivation, were evident and crop production practices and techniques appear to have developed as people migrated south from Northern Africa (Niger-Congo area)(ibid.). During the 19th and early 20th century, it was evident that knowledge and skills related to various rainwater harvesting techniques were being shared among the rural communities in South Africa (ibid.). This valuable knowledge on water conservation has not been used to its full potential in South Africa (Denison & Wotshela, 2009).

There has been a scarcity of RWH&C design guidelines as well as high capital costs to develop some of the irrigation schemes (Mwenge Kahinda & Taigbenu, 2011). However, these days, in both the Eastern Cape and KwaZulu-Natal, it is relatively common to see rooftop rainwater harvesting (RWH) in rural areas (Mwenge Kahinda, Taigbenu, & Boroto, 2010).

Mwenge Kahinda, Lillie, Taigbenu, Taute and Boroto (2008) have developed a GIS-based rainwater harvesting model that has mapped the whole of South Africa, taking into consideration the geographical context and the suitability of certain rainwater harvesting practices. The maps give valuable information for implementing a strategy that guides sustainable RWH in South Africa (ibid.). Although there has been considerable research on water harvesting and conservation methods, the uptake is slow. They (ibid.) argued that ideas underpinning RWH&C should be mainstreamed into the agricultural curriculum and into farming contexts to have a larger impact on the problems the country is facing in terms of water and food security.

2.3.1. Challenges in Adopting Water Harvesting and Conservation Practices in the Agriculture Sector in South Africa

Some factors that affect the uptake of RWH&C practices include lack of knowledge, poor support systems, social cultural dynamics, lack of funds for infrastructure and lack of inputs (fertilisers, tool, seeds and insecticides/herbicides etc.) (Viljoen et al., 2012). These factors will be discussed below.

Viljoen et al. (2012) found that there was a need for more information on RWH&C practices to be more accessible to people in a user friendly format. They argued that community farmers are not being exposed to this information on RWH&C practices, and that they do not know where to get more information about these practices.

In a similar way, agricultural extension officers and community development non-governmental organisation (NGO) workers are not equipped with all the adequate information and resources to tell or show people how various RWH&C practices work and how they could work for them in their context (Viljoen et al., 2012). These poor support systems in South Africa often prevent the uptake or adoption of RWH&C practices in homestead gardens even though there is a considerable advantage to practising these techniques. They concluded that there is evidence that RWH&C practices can be a more agronomical and environmentally sustainable way of farming.

Social-cultural dynamics include the aspects of indigenous knowledge in rainwater harvesting practices and the roles of the different players in the community in these practices. In some cases, heritage knowledge practices and the role this plays in farming communities could slow down the uptake of new agricultural innovations, but in some cases it could also be an asset for practices to be considered and utilised in their current farming systems (Viljoen et al., 2012). Viljoen et al. also noted that internal social networks within communities could have a negative impact on the uptake of RWH&C practices into everyday practice with farmers, as women often play this role in communities and they are often

more socially vulnerable (ibid.). There are also complex power relations in most community structures where community leaders and other community members can affect the choices made by farmers in their agricultural activities (Pesanayi, 2007).

2.4. Agriculture as a Response to Food Security in South Africa

A large percentage of South Africa's economy is dependent on agriculture in some way or another (Worth, 2012). This has decreased over the last few years, together with the decline in people interested in taking up a career in agriculture (ibid.). Backeberg and Sanewe (2006) argued that "agriculture is the key to poverty reduction in rural areas" (p. 282). Not only can agriculture alleviate the cost of food and help maintain a food secure household, it could also create more employment and income opportunities in the value adding process. Emergent smallholder farmers have many barriers to their agricultural progress, such as inadequate extension support, theft, lack of credit and infrastructure (ibid.).

In the 1920s in South Africa, an agricultural curriculum was being established in schools and people in the rural areas produced food on land allocated to them by the government with new skills learnt from the schooling system (Paterson, 2004). In 2001, 82% of the secondary schools that offered agricultural science as a Grade 12 subject were located in the former homeland territory areas of the country (ibid.). Agricultural education is important at school level but without the practical side, Paterson (2004) argued that it only makes a small contribution towards sustainable agriculture and rural development (ibid.). Colleges can supply this practical side to agricultural activities to ensure success in farming.

Sustainable agriculture is an approach that draws on the history of agriculture and is not only a farming strategy, but rather an approach to learning, leading to action (Pretty, 1995). Mukute (2010) added that sustainable agriculture aims to encourage collaborative social learning processes amongst farmers. For sustainable agriculture to take shape and be understood, the focus needs to be on the culture, power, technology, development, institutions, policies and epistemology occurring in a certain setting and therefore is context

specific (Roling & Wagemakers, 1998). Farmers' participation in sharing and creating new knowledge plays a big part in sustainable agriculture (Mukute, 2010). Over the years, the image of a farmer from the eyes of the scientists has changed from being a progressive adopter of practices and idler, to a partner, collaborator and innovator (Mukute, 2010). A social learning approach to sharing agricultural knowledge can help bridge the gap between research and practice (Backeberg & Sanewe, 2006).

2.5. Knowledge Dissemination and Knowledge Flows

Gagnon (2011) has argued that knowledge dissemination focuses on communicating research findings to a certain target group and that the successful application of research can only be achieved through comprehensive knowledge dissemination (Backeberg & Sanewe, 2006). More active dissemination approaches need to occur when the target audience is diverse, these approaches include creating networks or communities of practice (Wenger, 1998a; Gagnon, 2011). A community of practice (CoP) is a group of people that come together over time around a shared practice or concern (Lave & Wenger, 1991; Wenger, 1998a). Knowledge dissemination should also encourage these communities to question the efficiency of their practices and how they could adapt them to improve them (Burt & Berold, 2012). It is argued that dissemination approaches should be developed so that they are driven by the knowledge users themselves to have full effect (Gagnon, 2011). The proposed knowledge and practices that are in the dissemination plan should be implemented in such a way that the users understand the potential impact the innovation could have in their everyday lives (ibid.). Networks or CoPs can be an effective approach in disseminating knowledge more widely into a community, as the purpose is to connect people who may have not interacted otherwise, as well as to fulfil their goals focusing on improving practice (ibid.). Pesanayi (2007) added that the choices farmers make with regard to their farming activities are influenced by the people that they interact with on a regular basis, such as family members and neighbours. Community-centred knowledge dissemination has been shown to encourage communities to question the efficiency of their practices and consider how they could be adapted to improve their farming practices (Burt & Berold, 2012).

The development of dissemination materials should ideally occur through engagement of the intended target groups so that the capacity is revealed and relevance and buy-in is secured with the community that it was developed with. However, in the *Amanzi for Food* case, the WRC RWH&C materials had been developed already in previous WRC funded projects. Despite the dissemination of these previously developed materials being a component in the *Amanzi for Food* action-oriented strategy, development of other learning resources and materials was also encouraged (Lotz-Sisitka et al., 2013). Therefore, additional learning materials that could be developed along with ways of presenting these materials to ensure a more successful dissemination process have been explored. Various communication channels and social learning processes used by the participants were investigated to get a greater understanding of how the materials could be disseminated to a wider audience and used to further develop farming practices to face current and future climatic variations.

2.5.1. Patterns of Social Learning Interactions among Agricultural Interest Groups in South Africa

The WRC identified that there needs to be more attention on the dissemination strategies of their different projects as the knowledge harboured in these materials have considerable potential to add positively to the growth of agriculture in South Africa. Backeberg and Sanewe (2013) added that in improving the communication channels with farmers, they would have access to information that they had never had before. Agricultural extension is the primary way in which emergent smallholder farmers access new information in South Africa (ibid.). In other parts of the world there has been a driving force behind increasing private sector involvement in agricultural extension due to a decrease in finances available from government institutions (Kidd, Larners, Ficarellin, & Hoffmann, 2000). A similar situation can be seen in South Africa where there is a growth in private agricultural extension support, due to higher levels of knowledge and skills of private practitioners, outweighing that of the State (Worth, 2012). The communication channels that were used as social learning processes to reach rural farmers were explored in this research. In the

next section, the movement from traditional agricultural extension to a social learning approach is discussed.

2.6. Extension, Communication and Social Learning

Pretty and Chambers (1993) defined extension as the spreading of knowledge from a learning centre to those presumed to be in need of that knowledge. Extension is often based on assumptions about development in a certain sector, i.e. agricultural development in this case (Roling & Wagemakers, 1998). Agricultural extension is aimed at trying to reduce rural poverty, improve the livelihoods of food growers and help increase food security (Haug, 1999). It has additionally played a major role in improving agriculture practices and systems globally (Kidd et al., 2000). However, one of the key issues is that the purpose is not always clear to the extension staff on the ground (Haug, 1999). The objectives for extension services should be defined at a local level so that it can achieve its goals at a community level as well as at a national level (i.e. in the long run contribute to foreign exchange earnings from export) (Haug, 1999).

In this study, I alternate between the terms 'extension officer' and 'extension advisor' as both terms are used for the people responsible for agricultural extension in a local context. The extension officer's role is that of a communicator linking the farmers to research knowledge (Mukute, 2010). This brings our attention to another issue: extension officers often lack the necessary knowledge and skills in farming activities, especially knowledge of irrigation practices and management to share with farmers (Backeberg & Sanewe, 2006). There is evidence that farmers depend heavily on this information for their agricultural productivity and to influence any change needed in their practices (ibid.). Extension officers, as professional trainers of certain practices, should be completely familiar with the information that they are sharing but this is often not the case. Due to this being evident throughout South Africa, there has been a decline in the credibility of and a developing lack of confidence in extension officers, leading to a dwindling extension presence over the last few years (Backeberg & Sanewe, 2006; Greenberg, 2010). Besides the lack in self-confidence of extension officers, there is concern that there is a low extension officer to farmer ratio

(Greenberg, 2010). In 2008 the ratio was 1:878 (ibid.), this is an overwhelming number of farmers for any extension advisor to support. To add to this alarming fact, the general household survey of 2014 reported that 13% of agricultural active households received agricultural-related support from the government (StatsSA, 2015). Consequently, there is an urgent need to restore the public agricultural extension system. Within this restoration process there has been talk about changing the name 'extension officer' to 'extension advisor', although this is not fully evident in practice yet. Thus in this thesis, I use the two names interchangeably.

The Department of Agriculture, Forestry and Fisheries (DAFF) have an Extension Recovery Plan that aims to revive extension services by hiring more extension officers and ensuring that that they have access to necessary information (Greenberg, 2010; Worth, 2012). This includes having access to infrastructure such as information and communication technology such as Extension Suite Online®(ESO) which is a system that had its inception in June 2010 (Van Zyl, 2014). Manstrat agricultural intelligence solutions build electronic internet support systems such as ESO for agricultural advisory services and farmers (Manstrat, 2015). This ESO system comprises many members and covers a wide range of information, making it easier for extension advisors to access specific information to address a diverse range of farmers' problems (Van Zyl, 2014). Additionally, there is an application produced by Manstrat that will be released at the end of 2015 called Agrisuite Online® for tablets and smartphones, which is aimed at farmers for easy access to key information (Van Zyl, personal communication, October 19, 2015). As mentioned before, one of the key aims of this research was to explore the avenues of agricultural extension support and what materials are used to disseminate knowledge to farmers, with an emphasis on RWH&C practices for smallholder farmers and household food security.

Due to the paucity of knowledge and skills in the public training sector, there has been a growth in private extension in South Africa (Worth, 2012). Worth (2012) presented three groups of private extension: commodity-based organisations, private consulting companies and non-governmental organisations (NGOs). In South Africa, there are NGOs that offer dedicated support for agriculture, rural development projects and land issues (ibid.). These

extension support systems are structured to help improve resource management in agricultural activities so as to increase food production and rural development, but these systems are lacking a social participatory approach to management (Backeberg & Sanewe, 2013).

Over the last few decades there has been a shift in the management of natural resources from a top-down, hierarchical and market-based approach to a multi-stakeholder social learning approach (Ison, Röling, & Watson, 2007). The top-down approach does not take environmental, social and economic factors into consideration and it fails to address resource dilemmas (Ison et al., 2007; Pahl-Wostl et al., 2007). Reed et al. (2010) defined social learning as "a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks" (p. 6). This social learning approach is often explained as participatory and engaging, as it encourages dialogue with farmers and their experimentation to strengthen rural farmers' capacity to improve their practices and increase innovation spreading (Hagmann, Chuma, & Murwira, 1996). Hagmann et al. (1996) emphasised that such a participatory approach requires extension officers to change their role as the conventional teacher, to a facilitator using methods and tools to share new innovations or practices in a participatory social process.

Social learning can be seen as a way to organise communities of learners (Wals, 2007) and as a context in which communities can deal with individual perspectives, solve conflicts and implement collective decisions (Pahl-Wostl et al., 2007). Knowledge can be socially constructed through collaborative thinking and sharing to achieve shared objectives (Daniels, 2002). Facilitators in social learning processes need to have skills in designing, facilitating and evaluating group processes (King & Jiggins, 2002) through which the competencies may develop to increase the possibilities of higher participation by the different groups (Wals, 2007). Wenger (2000) added that "knowing is a matter of displaying competences defined in social communities" (p. 226). Social change is often the outcome of these social engagements; in social learning people learn from one another and are active in

social participation where social-ecological systems can benefit by enhancing the flexibility and the response to change (Pahl-Wostl et al., 2007; Reed et al., 2010).

Wenger et al. (2011) claimed that "social learning is enhanced by the dynamic interplay of both community and network processes" (p. 13). Phiri (2011) described the communities, where he conducted his research, as active in networked participation in water management practice, and these interactive spaces created a platform for learning. Learning, according to Wenger (2000), takes place in the "interplay between social competence and personal experience" (p. 227). In this research, it was important to encourage and identify community participation, competence and experience amongst the Imvothu Bubomi network partners to find these learning spaces. Phiri's (2011) research also highlighted that much learning amongst rural farmers takes place in communities of practice, and is often supported by training interactions and various learning resources. Social learning is an important concept to consider when working towards education for sustainable development (ESD), as it enables effective processes to make sound choices towards achieving sustainable development (Wals, van der Hoeven & Blanken, 2009).

2.6.1. Education for Sustainable Development

As mentioned in section 2.4, sustainable agriculture is a positive shift in agriculture, and social learning processes enable this shift (Mukute, 2010). Wals et al. (2009) added that "… facilitated social learning, knowledge, values and action competence can develop in harmony to increase an individual's, a group's or a network's possibilities to participate more fully and effectively…" (p. 28). This expresses that to reach sustainable goals, social learning can enable the process towards sustainable development. Bangay and Blum (2010) proposed that ESD is an "… integrated approach to providing appropriate education and training in a diverse and rapidly changing world" (p. 362). ESD is the way in which agricultural institutions should adapt their curricula to ensure that sustainable development is taken into consideration. Learning about the changing world is important to move towards a more knowledgeable community that participates in ESD. The concepts of

learning networks and communities of practice are explored below to gain a deeper understanding from the literature around the structure of a learning community.

2.7. Learning Networks

Educational networks are flexible partnerships that develop around common interests, concerns and needs of their partners (Lieberman, 2000), much like a CoP. However, Brown and Duguid (2002) have suggested that the term 'network' is used when the relations among network members are significantly looser than the relations among those in a CoP. In the contextual work leading to the formation of the Imvothu Bubomi learning network, personal contact and face-to-face relationships were absent or weak due to the busy roles people lead in their various organisations as well as not having a platform to get together and meet new people in the agricultural landscape. Through this research I have investigated the formation of the network and the communication process used along with the learning that occurred.

Wenger et al. (2011) added that people in social networks use connections and relationships as a resource to solve problems, share knowledge and to meet more people. A case study in the Eastern Cape (Hobeni) showed that through facilitating and building effective networks, agricultural resources and information can be disseminated effectively (Fay, 2010). Partners in these networks share a great deal of knowledge even though they may not interact much. For a learning network to be successful, the participants need to be flexible, responsive and continually learning from one another. Furthermore, it is important for the partners to strike a balance between inside (experiential and internal knowledge) and outside (external research knowledge) knowledge to form successful collaborations (Lieberman, 2000).

A network can be a very effective learning resource when the network is designed in a way that learner differences, such as their diverse competencies, are accepted and utilised (Cousin & Deepwell, 2005) and individuals act as nodes and encourage information flows in the broader network (Wenger et al., 2011). The Imvothu Bubomi learning network was

brought together as a diverse group with many different competencies and interests in their line of work thus creating a rich environment for learning to occur (see sections 4.7.2.4). A networked learning community is an important platform for participation of the various partners for learning and change to occur (Pesanayi, 2009). In the Imvothu Bubomi learning network, a participatory certificate course was introduced to a community of agricultural actors linked to a local agricultural college, Fort Cox College of Agriculture and Forestry, to strengthen learning in the network (see section 4.2).

2.7.1. Agricultural Colleges

Pretty (1995) has noted how agricultural learning institutions frequently give the impression that they are the keepers and distributors of knowledge, and often teaching in these institutions is not focused on self-development in relation to farming practices. However, agricultural colleges in South Africa claim to balance lectures and demonstration elements equally, so that the students have sufficient practical training (Botha, 2009). Agricultural colleges provide training to prospective farmers, extension advisors, animal health technicians and attention is also given to farm economics and management training (ibid.). Agricultural colleges in South Africa have been evaluated by the Certification Council for Technikon Education since 1996, and offer accredited diploma courses, special courses and short courses (ibid.).

Research by Taylor (1999) found that many agricultural curricula are ill suited for local context as they do not always take the socio-economic and technological changes into consideration. Participatory curriculum development has emerged over the last few years and it aims to identify the different partners or stakeholders that are or need to be involved in certain practices and work collaboratively on the curriculum (ibid.). The participatory curriculum development approach aims at accommodating the needs of all the partners in an agricultural education network and fostering positive development in extension and rural development. There have been effective participatory curriculum development approaches in South Africa where networks meet to discuss essential topics, and ongoing communication between these networks has taken place (ibid.).

People from previously disadvantaged backgrounds are gaining access to information, facilities and resources in education and training in agricultural and rural development more than ever before in South Africa (Taylor, 1999). These people can then benefit from this education and training to pursue their personal goals for economic development and progress. Over the years agricultural colleges in South Africa have placed an emphasis on training extension service officers and only more recently has there been a shift to farmer training.

2.7.2. Fort Cox College of Agriculture and Forestry

Fort Cox College of Agriculture and Forestry is in the heart of the Eastern Cape Province in South Africa. The Tyhume Valley in the Nkonkobe local municipal area (see figure 1.3), where the College and the University of Fort Hare are situated, is historically an area of conflict and is culturally complex with many social differences (Morrow, 2007). The college was established in 1930 and initially offered agriculture training and education, and only in 1970 was the forestry section introduced (Fort Cox College of Agriculture and Forestry, 2014a). Fort Cox College is one of 12 recognised agricultural colleges in South Africa. The college states that its core business is to offer education and training to students who wish to improve rural livelihoods in South Africa (Fort Cox College of Agriculture and Forestry, 2014b).

The college collaborates with the University of Fort Hare to extend agricultural training (Morrow, 2007), and in 1991 the two institutions became affiliated officially by the Department of Agriculture, Forestry and Fisheries of Ciskei (Fort Cox College of Agriculture and Forestry, 2014a). These links are investigated further in this research (see section 4.2). Fort Cox College of Agriculture and Forestry has an additional training arm known as the rural development centre for most of the short courses and farmer training. The college has potential to benefit and contribute from other agricultural institutions if there are functional networked relationships where people could share experiences and learn from collaborating. This could be achieved through activating a community of practice, which is explored below.

2.8. Communities of Practice

As mentioned in chapter one and previous sections, the concept of a community of practice is revisited here is more detail. The term 'community of practice' was coined by Jean Lave and Etienne Wenger in 1991 when investigating what social processes could best provide a framework for learning. A CoP is defined as a group of people who share a concern and passion for an activity and who engage in frequent interactions around improving their knowledge and skills in this activity over time (Lave & Wenger, 1991; Wenger, 1998b; Wenger, 2006). The theory of CoP can be used to gauge levels of engagement, participation and learning, therefore it is very useful in addressing my research questions. Another concept quite similar to CoPs is learning networks (Lave & Wenger, 1991; Wenger 1998a). The concept of a learning network was introduced and discussed in section 2.6 above.

When individuals participate in learning activities (in the moment), with a community (with the history and cultural values) and with the tools at hand (materials, language and technology), it is known as situated cognition (Lave & Wenger, 1991). Situated cognition leads to a deeper understanding and often learning does occur. A hallmark of a CoP, as outlined by Snyder and Wenger (2010), is the "informal learning activities and the personal relationships" between members (p. 110). Members that join a CoP have ongoing interaction with one another to deepen their knowledge and expertise in their discipline (Wenger, McDermott, & Snyder, 2002). In the case of this research, agriculture and RWH&C practices were the domains in which all members identified themselves.

A recent paper that looks at three different case studies from the Australian farming context found that local community-based farming groups that function as CoPs are effective in expanding learning (Anil, Tonts, & Siddique, 2015). This learning concerns information that is contextually relevant. The research pointed out that these groups of people in the agricultural sector demonstrated notable competence in influencing change in farming practices, especially with regard to relevant research needs and effective extension and dissemination of relevant information (ibid.).

Wenger (1998a) regarded learning as social participation; such participation potentially could change the social structure of the group. Members of a community have their own competence and experience of practice when it comes to their ability to learn; their experience will eventually reflect the competence of the community thus giving space for learning to occur. As depicted in figure 2.1, learning occurs through doing, experience, belonging and becoming, these all relate to building competence and participating in a community.

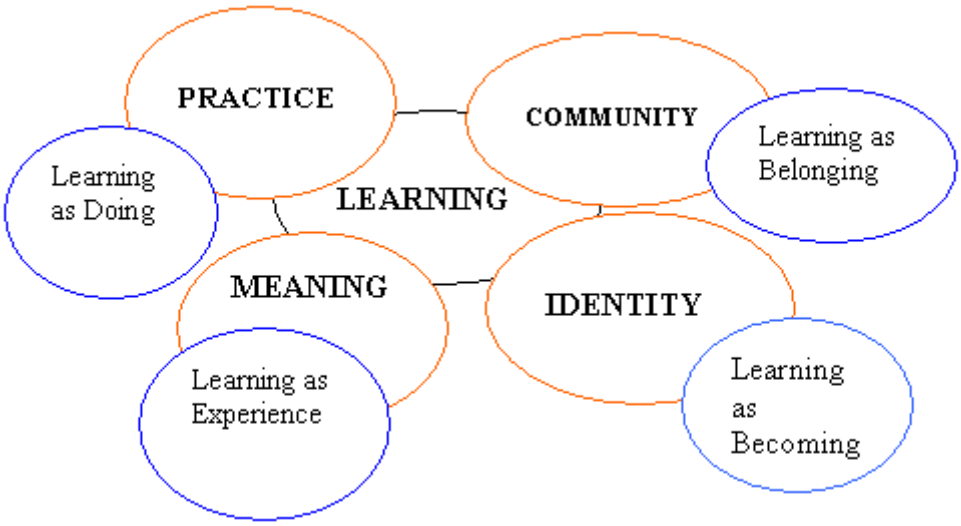


Figure 2.1: Ways in which learning can occur in a CoP (adapted from Wenger, 1998a)

Wenger (2000) added that learning takes place at the interplay between the personal experience and social competence of an individual in the group. Personal experience is all the individual experiences that people have from engaging and participating with their agricultural activities. Through participating with the practices, members negotiate their own competence. The social competence that Wenger (2000) referred to has three elements. The first one is that of a joint enterprise among members; this is where enterprise is negotiated among members and a shared motive or interest is realised. Secondly, mutual engagement is identified as an element of competence and this includes the relationships built in the engagement with other community members along with the communication processes among the members. The identity of being a member of the diverse community is something to consider too under this element of competence. Lastly, the community must

have a shared repertoire as an element of competence where there is “shared history of learning” and they have shared resources (Wenger, 1998a, p. 86). Edwards (2011) added that common knowledge in activities can mediate inter-professional activities. Therefore, attention must be placed on building common knowledge between people in a CoP. Responsive relational work in a group of people relies on common knowledge to enable quick transfers and easy translation (Edwards, 2011).

The three elements of competence are also referred to as characteristics of practice as the source of coherence in a community by Wenger. They are needed to enable the groups to emerge as stable learning communities. In the context of this research, I have identified these different characteristics in the Imvothu Bubomi learning network, as these were formed through the course activation. I did this to identify and describe how the network functions as a CoP and to better understand how the relationships could be strengthened in the learning network (see section 4.7). It is then at the interplay of these evident elements of competence and the personal experience shared in the group that learning occurs (Wenger, 2000). In a CoP, people are in their daily context and integrate their existing knowledge with field knowledge to develop new knowledge and new ways of doing things (Le Grange & Reddy, 2007). Therefore, learning in a CoP is more than the thought of learning by doing; it is learning through social participation and not simply the acquisition of knowledge, although it does involve this (Sfard, 1998).

Learning can be a characteristic of practice, where practice is an ongoing social process and is seen as learning by doing (see figure 2.1) (Wenger, 1998a). Social learning patterns of communication are an area explored in this research: the platforms, channels and processes of communication in social learning within the agricultural community (see section 4.3). Communication among the community members is important to consider and a strong relationships between the different members is vital. In a community, trustworthy members that are good practitioners have status, connections and tend to engage with the rest of the community better (Wenger-Trayner & Wenger-Trayner, 2015). For instance a good extension officer who has a good relationship with farmers and has the ability to support farmers where they need the assistance is likely to be trusted and respected in the

community. With farmers, it is important to encourage social learning interactions and involvement in the network to build strong relationships so that ongoing learning processes are supported (Anil et al., 2015). Furthermore, these processes can be used to recognise positive external influence, as this has been identified as an important contributor to the learning in localised CoPs (Phiri, 2011).

External influence is necessary for newcomers or outsiders who have a passive role in the CoP to interact on the boundary with the core and active members for learning interactions to take place (Wenger, 1998a). The core community of the CoP is often the smallest group of members, with a larger group of active or intermittent members and then an even larger passive or peripheral group of members. This categorisation is based on the level of involvement of the members (Anil et al., 2015). The core members are the individuals that keep the CoP alive and active by organising events and keeping the conversation going between the CoP members. With these relationships being built, CoPs can be viewed as social learning systems that arise from learning and practice; they have the complexity of a system, however, they are not isolated and form part of a broader landscape of practice (Wenger, 2010).

2.8.1. Communities of Practice in a Landscape of Practice

The metaphor of a *landscape of practice* is used to describe "a complex system of communities of practice and the boundaries between them" (Wenger-Trayner & Wenger-Trayner, 2015, p. 2). The boundaries referred to here are where learning occurs in the system or landscape. This complex landscape has some key characteristics: the landscape is political with the power dynamics that exist, the landscape is flat in the nature of practice, and the landscape is diverse and has boundaries of practice (ibid.). For a landscape of practice to form, the different CoPs need to interact across their disciplinary boundaries and this is where there is potential for unexpected learning (ibid.). These are the interactions that this project will identify when mapping the learning networks. The college network partners could be identified as CoPs in a complex landscape of practice and one would need to identify them in this networked system. Learning can be positioned in a landscape of

practice around practices and across the boundaries of practice between the CoPs where social participation occurs (ibid.).

2.8.2. Participation to Support and Expand Learning

Participation is described by Wenger (1998b) as the active involvement in social initiatives and the social experience in a social community. Active participation in a community involves four key ideas to be raised among the CoP as illustrated in figure 2.1 (Wenger, 1998a; Wenger & Snyder, 2000). Meaning making of the shared interest among members is important to establish. Secondly, members of the CoP must have a shared practice to engage in to bring their personal experiences together to learn from one another; this is what makes a CoP unique – the practice that they are actively engaged in as a group. The social identity of a group is the third component that a community needs to participate in so as to build relationships and work together to support learning and a deeper understanding of the practical activities they are involved in. Lastly, Wenger discussed the competence that develops around participation in the practice, this joint activity helps build competence amongst the members. These four key characteristics need to be cultivated in the participation of the community members to build a functioning CoP that supports learning (Wenger, 1998a).

Cousin and Deepwell (2005) understood participation as a condition to enable learning for transformation to occur. Pretty (1995) argued that full involvement of all stakeholders is essential for change to occur, adding that participation is a vital element to any learning system. Participation in a social learning system can be captured in three modes of belonging (Wenger, 1998a), more recently referred to as modes of identification (Wenger-Trayner & Wenger-Trayner, 2015):

- Engagement – engaging in the practice of a community in a landscape is a direct vehicle for 'learning the competence' of that community (p. 9). Active participation in the community needs members to engage with the community.

- Imagination – as proposed by Benedict Anderson (1983) in Wenger (2000), as imagining a nation as a community, although we cannot engage with the whole nation. This image constructed by ourselves of the nation or larger community helps to understand who we are and how we participate in the greater picture.
- Alignment–a mutual process of coordinating ideas, perspectives, actions and interpretations to reach a goal, in other words aligning our reality with a goal.

Each mode – engagement, imagination and alignment coexist and contribute different aspects to a social learning system forming (Wenger, 2000) and help make sense of our position in the landscape (Wenger-Trayner & Wenger-Trayner, 2015). Therefore, as an individual belonging to a community, these modes of identifications can help us locate ourselves in the complex landscape.

2.8.3. Stages in the Formation of a Community of Practice

Different stages in the life of a CoP are identified in Wenger's (1998b) article in which he presented these stages of development which are presented below (figure 2.2). Initially there is *potential* for a CoP to develop as there was in this research, where people are involved in the same activities and are known to one another but do not interact regularly yet. This is often seen when people from similar fields or the same sector work in their silos and do not venture out to interact with other people. The next step in development is when the group of people move to a stage of *coalescing* where members start recognising their potential and defining their joint enterprise in the formation of a CoP. This is the point when they identify themselves as a CoP with shared practice and interest. Once members are engaging in activities with one another and mutual engagement is recognised, they are in the *active* CoP stage. This is where a shared repertoire is being cultivated and resources are shared along with a shared history of learning among the members. This active stage is the most important and strengthens relationships and commitment to the project or practice that is identified as their shared motive. Members engage and collaborate regularly during this stage.

Moving on from this active phase, when engagements do not happen as regularly as they may have in the past, the members start *dispersing* although the community remains alive in some ways. This dispersal phase is when members are still communicating for advice or have collaborative projects that are ongoing. If the communication dies down and members do not communicate that often anymore then they move on to the *memorable* stage. Here the community is no longer central to the identity of the group but members still remember the group and the learning and engagement in activities together. However these stages may not work as a linear process as depicted in the image (figure 2.2); there can be movement between the stages depending on the activities and individual member involvement in the CoP. In practice, non-linearity often occurs through the re-negotiation of the joint enterprise. These different stages, proposed by Wenger (1998b), will be used in the analysis of the formation of Imvothu Bubomi learning network as a CoP (see section 4.4).

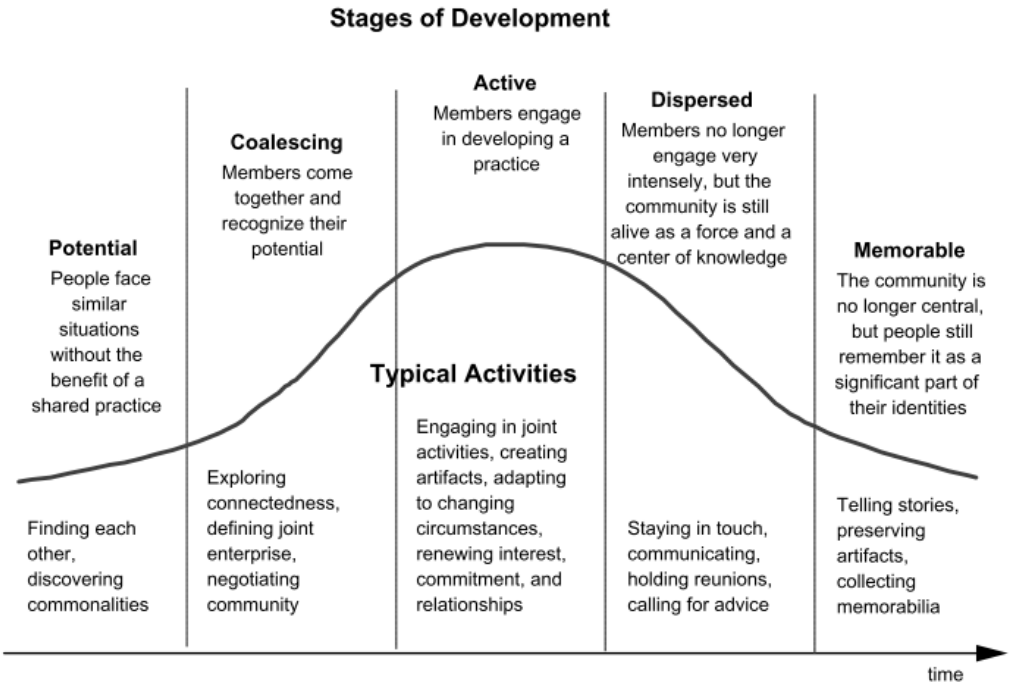


Figure 2.2: Stages of Development of a CoP (from Wenger 1998b)

As noted above, the stages discussed and depicted above are not always as linear as they appear in the diagram. The CoP can go in and out of the different stages when members are involved in different activities. In the case of the Imvothu Bubomi learning network, one

could expect the CoP to have been very active during the course engagements; this could happen again in the future if there is need for another course or further training or another activity that requires coalescing and collective action.

2.9. Course-based Learning and Change Projects

The course-based structure for mediating knowledge to support communities in making decisions around natural resource management practice challenges has been a focus of research from the Environmental Learning Research Centre since 1990 (Lotz-Sisitka, Burt, Berold, Rivers, Ntshudu, Jenkin, Stanford & Buzani, 2014b; Pesanayi, Mandikonza & Kachilonda, 2010). The structure of these courses attempts to leave behind traditional course structures and bring in a more of a social learning approach where change-orientated learning is encouraged (Lotz-Sisitka et al., 2014b). The courses designed from the Centre are often referred to as the *Changing Practice* course, as an effort is made to encourage participants to be reflexive about their practice and change towards a more environmentally focussed practice (Raven, 2005).

The structure of these courses provides the opportunity for participants to attend course sessions where they interact and engage with other people from their areas, working in similar contexts (Lotz-Sisitka et al., 2014b). During these sessions, there is time for participants to share their experiences and raise challenges that they are facing in relation to the course content.

Environmental Learning Research Centre's researchers designed a course for another WRC research programme, this design drew on over 20 years of professional development research (Lotz-Sisitka et al., 2014b). The *Changing Practice* course design for water knowledge mediators draws on various theories in social learning research for their relevance to change-orientated learning (ibid.). The curriculum framework for this course design had three principles from Lotz-Sisitka et al.'s (2014) research findings. The three

principles are (adapted from Lotz-Sisitka & Hlengwa, 2012 in Lotz-Sisitka et al., 2014b, pp. 49-50):

- Practice-centred and situated,
- Responsive, emergent and expansive, and
- Change-orientated and reflexive.

These three principles are important when considering a course framework that encourages a change in practice; the course content and assignments can set out to address the principles. A practice-centred and situated course allows for the course to be contextually relevant to the participants through them reviewing the current practices in the communities, this was achieved from the first course assignment (Lotz-Sisitka et al., 2014b). From the contextual profile and situated practices realised from the first assignment, participants then had the opportunity to respond to the challenges and this allowed for an expansion of learning around the practices being introduced in the course (ibid.). After identifying relevant responses to these challenges, participants were encouraged to reflect on their practice and identify if any new practices could be introduced to support change-orientated learning and practice in their activities (ibid.). These practices were then implemented during their change projects which was part of the course development. For these three principles to be met, the course design took on a *work together, work away* model during the course duration, this allowed for reflexivity and for social learning to occur leading to more sustainable practices being utilised (ibid, p. 50). A similar course curriculum framework and design was used for the *Amanzi for Food* ToT course.

With change projects being the key focus in these courses, participants engage with new practices and "join professional communities of practice that build networks and support institutional change and development" (Pesanayi et al., 2010, p. 36). The courses are designed so that participants attend contact sessions and in between have assignments where they are challenged to apply what they have learnt and reflect on their own practice and new practices that they may have been exposed to as discussed above (Lotz-Sisitka et

al., 2014b). When evaluating this type of course, two strategies were used by Lotz-Sisitka et al. (2014b, p. 51), the first being a reflexive practice where all facilitators and mentors have opportunities to reflect on the course and these are documented. Secondly, the value creation framework by Wenger, Trayner and de Laat (2011), discussed below, can be used to evaluate the participants' learning from the course.

Lotz-Sisitka et al. (2014b) drew on Wenger et al.'s (2011) Value Creation Framework to evaluate a WRC changing practice course that was mentioned above. They found the framework useful in that relative indicators were identified for data collection and for the structure that is provided to use these indicators as stories about participant's experiences in the course (Lotz-Sisitka et al., 2014b). These experiences were adapted into narratives where the value that was or was not created surfaced through the data; also this framework was found to be useful as a way of reviewing the course to evaluate the learning that occurred amongst participants (ibid.).

2.10. Value Creation Framework

Wenger, Trayner and de Laat (2011) have defined value creation by the learning that is enabled by networking and community involvement, and they have put together a useful framework that can be used to assess value creation, linking the activities to desired outcomes. The focus here is on the value that is created by the CoP in social learning activities. The learning network members are the primary value recipients and if the participants do not get value then they will stop participating, forcing the network to fall apart (ibid.). The analysis of the elements of value in this learning network has led to insights into how value has been created in the CoP and how this value created could potentially lead to a sustainable CoP over years to come (Cowan & Menchaca, 2014), see section 4.9.

This dynamic framework has helped guide me to identify the elements of value created from the *Amanzi for Food* ToT course network. Wenger et al. (2011) proposed that five phases serve as the foundation for the assessment and measurement process:

- *Immediate value: Activities and interactions*

  This phase involves the initial networking interactions that people partake in when a network or community is being established. Activities in this phase could include meeting people, getting their contact information, general interactions with fellow participants and passing on information and sharing experiences to the wider network. Here, value is created through these activities and interactions. It could be as simple as hearing someone else's story; this could trigger one's imagination of how things could be done differently.
- *Potential value: Knowledge capital*

  Knowledge capital in a network of people can be produced through activities and interactions, although this value may not be immediate and could only be realised at a later stage or never. For example, if someone shares a story about an experience and that knowledge or information was not used at all by the network members or used at a later stage by them when a similar experience occurs to them. Knowledge capital can take different forms. A *personal asset* can be a useful skill or a new perspective or idea. Another form of knowledge capital includes the *relationships and connections* that people make through the networking process; participants need to know who can be trusted and who to go to for certain information or resources. This is when a shared understanding and common knowledge is built and can lead to effective and efficient collaboration. The *collective asset* that a group of people can have from their reputation and their collective voice, is another form of knowledge capital. Lastly, the form of having a *transformed ability to learn*, participating in a facilitated network is a valuable way of learning from one another compared to the traditional methods of learning.
- *Applied value: Changes in practice*

  Applied value refers to knowledge capital that is adjusted and applied in different contexts so that it leads to a change in practice or innovations in the actions, tools

and approaches that people use in their practice. In identifying applied value, the way that practices have changed in the process of gaining knowledge capital are explored.

- *Realised value: Performance improvement*
  An improvement in practice is not guaranteed by the application of new ideas or using new resources in the practice. However, it is important to reflect on the effects of applying the knowledge capital to these practices and the achievement of what matters to participants.
- *Reframing value: Redefining success*
  This is the last phase of value creation and it is achieved when social learning forces a reconsideration of the learning requirements and the criteria by which success is defined.

This framework cycle would not necessary work as a linear process with these distinct phases of knowledge production and application. Rather learning is seen as a dynamic process where applying and producing knowledge cannot always be distinguished from one another but are part of the same process. The final stages of the cycle do not have to be reached for the process to be successful; different aspects will be important to different participants (e.g. facilitators may be more interested in successful activities or the production of outputs (phases one and two)). Members might care about solutions to challenges in their practice (phase three) and have different definitions of success (phase five).

2.10.1 Value Creation Elements in the Learning Network

Through narratives of learning networks and CoPs experiences over time, one can assess what learning has or is taking place (or not) and what value has been or is created (or not) (Wenger et al., 2011). Wenger et al. (2011) explained that “framing value creation through narratives emphasizes the importance of audience and perspective” (p. 15). They added that it was important to recognise that the value created in networks can have short-term and long-term features. Exploring the elements of value created in a network therefore investigates the perspectives and the goals of the individual network members. These

participants may have a short-term goal of incorporating some of the easier and cheaper conservation farming practices into their practice, thus giving them short-term value in solving certain issues. However, over time they accumulate the practices and solutions to their farming practice, adding long-term value to the network formation and meetings. Using these elements of value created as a way of exploring the perspectives and goals of the individuals, gave me as a researcher more insight into the value achieved.

2.11. Concluding Summary

The purpose of this chapter is to situate this research within the field of agricultural education. The conceptual and theoretical frameworks have been discussed in detail here for the reader to become familiar with the key concepts and theories that informed this research. The next chapter focuses on the research design that was used for this research in order to derive final conclusions and recommendations.

CHAPTER THREE

Research Design

3.1. Introduction

This chapter provides an outline of the research design decisions made to conduct this study over the research period. The decisions guided my investigation into the activation of the learning network as a structured community of practice through a course-led process. The chapter describes how I came to understand the value participants found from this network. The phases and research processes I used to answer my research questions were documented as the study progressed. As indicated in section 1.3, the purpose of the study was to explore the course-led initiative that formed a learning network and potential for strengthening the networked relationships, and sharing of resources in the agricultural sector. This chapter presents how I generated, managed and analysed the data. Additionally, I discuss the ethical and validity issues in my research design and process.

3.2. Research Orientation

The action orientated strategy characterising the *Amanzi for Food* programme aims to understand and improve ways of disseminating information on RWH&C practices into the agricultural sector (section 1.2.1). Therefore, understanding the activities and events that came to shape and influence participation and learning opportunities in the emerging learning community were important for identifying the processes that need to be included for effective dissemination of the WRC materials. An interpretive approach was used to gain a deeper understanding of the participants' experiences in the learning network (Pepper & Wildy, 2009). Merriam (2002) added that interpretive research aims to understand how people are experiencing and engaging with the social world. In this study, I worked with an interpretive approach to access and research how participants were experiencing the agricultural landscape in the Amathole District and more specifically, the Nkonkobe local municipal area, and the *Amanzi for Food* CoP.

Over the past few years a number of researchers have considered different aspects of the *Amanzi for Food* programme. Throughout my research journey I had constant support from these fellow researchers. This helped to provide perspectives on certain insights that were surfacing during the research journey.

3.3. Research Methodology

3.3.1. Qualitative Study

Qualitative research in the social sciences involves understanding behaviour and experiences from the point of view of the research participants (Merriam, 2002; Rule & John, 2011). Qualitative research is often non-linear and the researcher needs to be able to modify research decisions in response to changes and new developments in the research setting, yet maintain a coherent research approach (Maxwell, 1998). Merriam (2002) added that "… the researcher is the primary instrument for data collection and data analysis" in qualitative research (p. 5). Furthermore, Maxwell (1998) pointed out that qualitative research, characterised by an interactive nature and long-term involvement, allows for detailed and descriptive data. As this type of research requires long-term involvement, a sample of participants were selected to take part on a voluntary basis in the research.

3.3.2. A Qualitative Case Study Research Design

A case study approach was used in this research as I wanted to understand and explain the context of the agricultural sector and to gain an in-depth look into the social processes in the *Amanzi for Food* CoP in Amathole District (Yin, 2009; Rule & John, 2011). A case study approach does not involve taking control of the case that is being investigated, but rather needs an approach that allows for understanding it in its context (ibid.). A case study approach allows for an intensive description and analysis of the social situation (Merriam, 2002). Yin (2009) added that a case study is a method used when a social phenomenon needs to be investigated within its real-life context. In the case of this study, this social phenomenon is the interventionist nature of the course-led cultivation of a CoP.

In using a case study approach, I was able to draw understandings of how knowledge is shared within the learning network by understanding how social learning processes take place in the context of an emerging CoP. This case study's context is the learning network formed around the *Amanzi for Food* course in the Amathole District. My involvement with this learning network community was an engaged process where I aimed to have a reciprocal relationship with the participants to rejuvenate learning of new and old practices in the agricultural sector.

This engaged process was designed as a formative interventionist case study, where the *Amanzi for Food* programme introduced the ToT course to the agricultural community, as discussed in section 1.2.1. This methodology engages with the activities around the course structure and learning network engagements. The approach explores the mutual relationships that form through the intervention at play.

3.3.3. Community Engaged Qualitative Research

The strength in a community engaged research process is in its reciprocal approach. This implies a co-engaged and inclusive relationship between a community and a higher education institution (Lazarus, 2004). This inclusive approach is the way in which I approached and engaged the research participants. Bender (2008) claimed that using a community engagement approach in research has the potential to "… rejuvenate academia, redefine scholarship and involve society in a productive conversation about the role of higher education now and in the future" (p. 82). The *Amanzi for Food* programme aims to achieve these inclusive and collaborative dimensions in the goals for starting a process of including RWH&C practices into curricula, training and community setting.

3.4. Data Generation

A systematic approach was taken in the different phases of the study (Merriam, 1998, p. 197). Throughout this process I kept a research journal to keep track of any important

observations and discussions I had over the time I was immersed in this study; I have called these my field visit notes. Convenient and purposive sampling is used when selecting specific research participants to help advance the purpose of the research (Rule & John, 2011). This way of sampling and selecting research participants allowed me to be responsive whilst ensuring that I achieved representativeness obtaining the most accurate data possible within the learning network being explored, it allowed me to explore ideas close at hand and made participants accessable. The methods chosen are identified below. They were used to clarify the situation and were the means of generating data to answer the research questions. These phases were intended to help understand the developing context; in addition, an in-depth contextual profile was conducted (see section 4.2). Contextual data were gathered throughout the research journey.

Below I present the timeline for my research journey (Figure 3.1) to illustrate the timeframe of the data generation period. It is important to note that my engagement with research participants does not simply end after the last date in the timeline as it has continued in our expanding *Amanzi for Food* work. Through these interactions with course participants, I generated data which is discussed below and this data was managed through labelling and coding the data sets (see section 3.5). My colleagues have ongoing research in the area and will be engaging with the community members going into 2016 and I will remain in touch too through my work for the Amanzi for Food programme.

Date	Event
10-Jun-14	Fort Cox College focus group discussion
	University of Fort Hare focus group discussion
15-Jul-14	Fort Cox College Farm Manager
	College Rural Development Centre focus group discussion
	Middledrift DRDAR office focus group discussion
23-Jul-14	Middledrift annual agricultural show
12-Aug-14	First learning network meeting
16-Sep-14	**Module one**
16-Oct-14	**Module two**
29-Jan-15	Support visits and interviews
03-Feb-15	**Module three**
06-Feb-15	Support visits and interviews
15-Feb-15	Demo site support visit with expert J.Denison
06-Mar-15	Support visits and interviews
16-Mar-15	Support visits and interviews
17-Mar-15	**Module four**
07-Apr-15	Support visits and interviews
14-Apr-15	Support visits and interviews
29-Apr-15	**Module five**
11-May-15	Support in demonstration site implementation
12-May-15	Support in demonstration site implementation
10-Jun-15	Middledrift annual agricultural show
01-Oct-15	**Learning network strategy meeting**
06-Oct-15	Nkonkobe annual agricultural show
15-Oct-15	Imvothu Bubomi certificate ceremony

Figure 3.1: Timeline of my research journey

The table below (table 3.1) is a representation of the data generating and analysis process; the various phases are described in detail in sections that follow.

Table 3.1: A schematic of the data generating and analysis process

Phase	Data generating	Data analysis
Phase1: Context mapping of the learning network. What relationships and social learning processes were evident?	Focus group discussions with college staff and other network partners about their relations and communication channels as social learning processes (one meeting per organisation in the network – where it was possible).	Descriptive analysis: Mapping the broad network members and relationships in the landscape of practice, and the communication channels and approaches used in this context (see section 4.2).
Phase 2: The cultivation of the learning network as a CoP through the course-led activation to foster learning.	Module training report observations and assignments. Semi-structured interviews about their activities and involvement in the course. Observations and document analysis of learning network module reports and assignments (one in-depth interview with three farmers and three trainers).	Learning pathways and the sourcing of information on water conservation practices. CoP themes evident in network interactions that will sustain the social learning processes (see sections 4.3 to 4.8).
Phase 3: Investigating the elements of value created through participating in the learning network activities.	Module training reports, observations and assignments. Semi-structured interviews on water conservation practices and food production and how they came to know about it, as well as the value they find in being part of the network interactions (one in-depth semi-structured interview with a few of the network members – same as above). Questionnaires were given to trainers and educators to explore the value they found in the learning network activities.	Wenger et al.'s (2011) value creation framework's proposed five phase process (section 2-10) and the value found at each stage. Identifying the indicators of value that the members have expressed. Elements of value created surfaced through the analysis (see section 4.9)

A diverse group of people participated in the Imvothu Bubomi learning network that was established through the ToT course. To make my contextual analysis more structured and

clear, I have divided the participant group into four categories. These are farmers, trainers, researchers and educators, roles chosen by the participants. In the next chapter (chapter 4), I discuss all four groups with respect to emergent roles and social learning processes. My main focus was on the farmer and trainer groups as these are the main users and implementers of the RWH&C into practice reflected in the WRC materials.

3.4.1. Phase One: Initial Contextual Profiling and Mapping of the Landscape of Practice

In this phase of the study, a focus group discussion was conducted with a few staff members at the Fort Cox College of Agriculture and Forestry to identify the links or connections to other institutions or individuals. It was important to build on the existing embryotic network of relationships and practices in the area. The head of the agriculture department and three lecturers were present for this focus group discussion. Subsequent phone calls and meetings were held with some of these institutes: the University of Fort Hare, the Rural Development Centre at Fort Cox College, and Middledrift Extension Office (as seen in the timeline, figure 3.1). This inclusive process expanded as we contacted others mentioned by other research respondents and individuals were identified who would be participating in the *Amanzi for Food* activities. Before the focus group discussions started, the intentions of my research and that of my colleagues were explained in full before providing respondents with the choice to participate in our respective studies. In focus group discussions, the researcher's role is to engage and facilitate a discussion between participants so as to identify and explore what they are wanting to find out (Rule & John, 2011). Focus groups were used as an opportunity to probe and get a clearer picture of the situation from a range of different participants (ibid.).

A discussion guideline was used with pre-set questions to initiate and guide the discussion while allowing flexibility for adding questions that arose in deliberations (Rule & John, 2011). The pre-set questions in the guideline (see Appendix 3) were formulated around the *Amanzi for Food* programme goals, including our individual research questions, and aimed to better understand the landscape of practice and the different communities that support learning interactions in the agricultural sector. These initial discussions were directed at

understanding the landscape and the network links and discussing the different partners to map these relationships. An inclusive contact list was compiled. During the discussions with the participants, their existing relationships were explored to scope the various network partners in terms of knowledge dissemination and materials, media and activities used in the existing communication structures and processes operating between the partners. This process also established whether participants thought RWH&C practices for food production were important or not. (Note: this was building on and wider contextual profiling research being undertaken in the *Amanzi for Food* programme as indicated above).

Further similar investigatory discussions took place as other network partners were identified via interactions with institutions and individuals. In these subsequent discussions with the other network partners, similar contextual information was explored. The institutions or individuals that were identified are listed below with the number of individuals per group that engaged with *Amanzi for Food* activities.

- Fort Cox College's Rural Development Centre, four trainers;
- Agricultural Department at the University of Fort Hare, one lecturer;
- Phandulwazi and Winterberg Agricultural High Schools, two teachers;
- Department of Rural Development and Agrarian Reform, four extension officers;
- Döhne Research Institute, two researchers;
- Nkonkobe Economic Development Agency, one trainer and three interns;
- Local farmers, three farmers.

These institutions and individuals, along with Fort Cox College, agreed on a date in August 2014 for the first learning network meeting to participate in a course-led *Amanzi for Food* process to constitute a learning network in the area. An agenda for this meeting was put in place (see Appendix 4). Additionally, we attended the Department of Rural Development and Agrarian Reform Middledrift Agricultural show in July 2014 that happens on an annual basis. We shared *Amanzi for Food* programme introductory flyers (see Appendix 5) and spoke to people from the agricultural landscape in the area who were interested in

attending this first learning network meeting. A few joined in for the first meeting and ultimately there were 29 people attending the first learning network meeting.

The first learning network meeting was used as a space and time with everyone together to explore ways of working together effectively and efficiently to share information. Both the focus group discussions and the discussions and observations from the agricultural show and the first learning network meeting provided enough contextual evidence to develop an initial image of the agricultural landscape and water conservation farming knowledge and practice.

3.4.2. Phase Two: The Course-led Activation of an Agricultural Learning Network and the Cultivation of a Community of Practice to Foster Learning

This phase started when the various representatives of the different institutions and individuals that were identified in the agricultural landscape (phase one) met together in the first learning network meeting held at Fort Cox College. Here, I generated data on the emerging interactions and the learning through the course introduction. The *Amanzi for Food* programme consists of a Training for Trainers (ToT) course that was introduced to the learning network (see Appendix 2). They were informed that a course was due to start the next month and many of the network members showed an interest in signing up for it to develop a deeper understanding of RWH&C practices and how these can be implemented in the area. This ToT course is accredited with a Rhodes University certificate if fully completed, which was an incentive to many participants. The course is split into two streams, both with the same content but different assignments, at different national qualification framework (NQF) levels. The curriculum innovation and changing practice short course, NQF level six certificates went to the educators who were competent and completed all the stream one assignments. An environmental learning and changing practice short course, NQF level five certificate was awarded to the competent farmers and trainers who completed stream two's assignments. My colleague researchers and I explained our research objectives to the participants in the first meeting and they agreed to participate in the course and the associated research.

The network members were observed and interactions recorded during the scheduled module meetings around the *Amanzi for Food* ToT course, there were five module sessions as presented in the timeline (figure 3.1). One uses situations as a source of data when generating data through observation (Rule & John, 2011); I observed the interactions and learning processes in various meetings. Evaluation questions related to knowledge and learning were asked at the end of most training module meetings (see Appendix 6). Responses gave insights into what the members said that they gained from the learning interactions and what they hoped to gain from continuing individual and collaborative work in the future. A total of five module training reports were written to document these responses and throughout the course process (see an example of one in Appendix 7). I played a dual role of participating as a facilitator as well as a researcher. This helped with immersing myself in the study and the local environment.

A selection of participants were interviewed using a semi-structured interview instrument (Appendix 8) in an attempt to gain clarity on their roles in the learning network community (who they may have work relationships or links with) and included the sharing and accessing of knowledge on agricultural practices. The data generated was used to scope the emerging network and to map its functioning as a CoP (see sections 4.3 - 4.8). The learning pathways and activities were also explored through these interviews. The materials, media and activities that were being used by the network partner's social learning processes were collected and analysed in relation to the developing networking processes. It was a key concern to identify if and how RWH&C practices for food production were part of the disseminated knowledge to other agricultural actors.

3.4.3. Phase Three: Finding the Value Created through the Learning Network

An important part of this research was to get a full understanding of the value that people were finding through participating in the learning network activities. Three farmers in the Imvothu Bubomi learning network context were asked to share stories of how they became farmers and the value created from the participation in the *Amanzi for Food* course and

being part of the Imvothu Bubomi learning network (via at least one in-depth semi-structured interview supplemented by course interactions and observations).

Additionally, three extension officers were interviewed to share stories of how their interest in agriculture began along with the value created through the course process and building the learning network. Questionnaires (see Appendix 9) were filled in by researchers and educators in the learning network to add to the collective narrative of the group, the questionnaires were used qualitatively to access vale enhancement. These questionnaires were handed out during the last formal module meeting, so only those who wanted to complete them, returned them. Six questionnaires were returned and collected at the end of the session, two from researchers, two from educators and two from trainers, one extension officer and the other from Nkonkobe Economic Development Agency.

Nine course participants completed all five module assignments; I analysed these assignments with my colleague, Tichaona Pesanayi, and the analysis was formulated into curriculum and capacity development documents (see example in Appendix 10). These documents were used as data to explore their competence and find any relevant information in terms of learning and value created.

Clandinin, Murphy, Huber and Orr (2009) claimed that narrative inquiry is a way of understanding people's stories of their experiences and relationships. This approach helped to understand how participants access and use information in their context; hearing their stories of their experiences was useful for understanding their situations. The farmers' narrative accounts revealed rich insights into their experiences (Pepper & Wildy, 2009; Rivers, 2014). The value that had been created over the duration of the course was explored by looking at participant involvement and commitment, reasons for participation, participation processes, innovation and change as well as the elements of value found. This helped to understand the expansion of learning and the changes in practices that occurred throughout the course and what might still happen once the course has ended, i.e. the sustainability of the learning network.

The data reveals the development of the network, the activities members were involved in and the roles that people had during their interactions and experiences (Wenger et al., 2011). The analysis of the data surfaced the different elements of value created during the learning network engagements.

3.5. Data Management

Field participant observation notes were made in a research journal which was always accessible; it was constantly used for reflections and when I needed to refer back to the interactions with the research participants (see Appendix 11 for an example of journal entries which are referred to as field visit notes). The focus group discussions and interviews were audio recorded and transcribed to documents to explore developing networked relations and associated learning interactions. These data enabled me to track knowledge flows.

Managing data from interactions with the network members was challenging. I organised the data in an ordered and easily retrievable way as I needed different data sets at different phases of analysis. Appendix 12 is a table of all the data that was generated through the research journey. Below (table 3.2) I describe the codes I used to label the data; these codes are used in chapter four when presenting that data through analysis.

Table 3.2: Data code labels.

Data code	**Data code in full**	**Data generating method**	**Data source**
FG	Focus Group and then a number to indicate who with	Focus group discussion transcriptions	Various institutional focus group discussions
LNR	Learning network report and then a number to indicate which report	Observations and report writing	The first learning network meeting with participants

LNMP	Learning network meeting photo	Observations	The first learning network meeting with participants
FVN	Field visit notes	Journal entries and various notes written during field visits of observations or informal interviews	All encounters with learning network members in the field and visits to their plots
MTR	Module training report and then a number to indicate for which module session	Observations, informal discussions and report writing	Module session
If	Interview farmer then a number to indicate with whom	Semi-structured interviews	Four farmers
Ieo	Interview extension officer then a number to indicate with whom	Semi-structured interviews	Four extension officers
Qe	Questionnaire educator then a number to indicate with whom	Questionnaire	Two educators
Qr	Questionnaire researcher then a number to indicate with whom	Questionnaire	Two researchers
Qt	Questionnaire trainer then a number to indicate with whom	Questionnaire	One trainer
Qeo	Questionnaire extension officer then a number to indicate with whom	Questionnaire	One extension officer
IBWA group	Imvothu Bubomi WhatsApp group	Text messages	Learning network members on WhatsApp
SMSf	Text messages farmer	Text messages	One farmer
CDD	Capacity development document	Assessing course assignments and report writing	All participants that submitted assignments
LNSMR	Learning network strategy meeting report	Observations, informal discussions and report writing	The meeting with all present participants

I started the analysis process by mapping the agricultural landscape as existing relationships and links were important. Then the expanding social learning processes and knowledge flows were considered before giving attention to the question of RWH&C practices and the learning of these practices on the *Amanzi for Food* course. In documenting these processes I was also concerned with the value that the course was creating for the participants and the way that expansions in the CoP were developing as these emerged in the phases of analysis that are described below.

3.6. Data Analysis Phases

Data analysis was an important and lengthy process. According to Merriam (2002), data analysis happens simultaneously with data generating, suggesting that the analysis begins with the first data generated. This can add reflexivity in the research journey and allow for adjusting where necessary as the researcher goes along. Additionally, this approach allowed for an early start in looking for themes in the data.

Both inductive and abductive analysis approaches were used in my data analysis. I opened the reading of the data with inductive analysis which helped to identify learning interactions, relations and flows, through mapping and probing for the emerging themes. I then audited the analysis to see that no patterns of learning interaction were ignored. Inductive analysis is a way in which the researcher *lets the data speak* in a way that allows categories to emerge from that data (Mukute & Lotz-Sisitka, 2012). Abductive analysis occurs when themes or categories in the data are based on and drawn out of the data using the theoretical framework. In doing so, I used the theory to make sense of the data (Danermark, Ekstrom, Jakobsen, & Karlsson, 2002). For example, in phase two of my data analysis, I used the CoP's learning and experience framework along with the elements of competence (Wenger, 2002) to identify categories in the data. These categories reflected the purpose of the research and were orientated to identify data that would answer my research questions (Merriam, 1998). An understanding of theory helped me focus on rich data engagements that revealed relations and an emerging sense of the presence (or absence) of flows of knowledge supporting the learning of RWH&C practices. I used these

approaches to address my research interest and questions. Categorising the data made it easier to understand and support the claims made in the study (chapter 5). I tried to maintain a systematic approach to the different data analysis phases as described below.

3.6.1. Phase One: Initial Contextual Profiling and Mapping of the Landscape of Practice

This phase was essential for my research as well as the wider *Amanzi for Food* programme. The situation before the course-led activation of the learning network community as a CoP was the main focus here. The initial scoping focus group discussions exposed evidence of small isolated functional units in the area that were interacting on an ad hoc basis. This informal networked landscape had various relations between institutions and individuals in the agricultural sector in the Amathole District that I was investigating.

I worked with the transcriptions from the focus group discussions to map the relationships and interactions in the landscape of practice between the different stakeholders and understand how knowledge was being shared amongst them. This landscape of practice was complex in its social structure; the roles that different partners played were explored so as to identify a way in which people were being brought together to share resources and materials on water conservation practices, the goal of the wider *Amanzi for Food* programme as outlined in section 1.2.1. The partners were looked at as individuals in a learning network in a complex landscape of practice, my focus being on water harvesting and conservation practices and the sharing of the WRC resources.

3.6.2. Phase Two: Course-led Activation of the Community of Practice

The *Amanzi for Food* ToT course activated the different actors in the agricultural sector to form a more formal network where learning could occur. In this phase, I explored the learning that occurred in these networked engagements through finding evidence for personal experience and social competence being achieved in the joint enterprise, mutual engagement and shared repertoire that emerged. Additionally, I explored the functioning of

the networked learning group as a CoP. I used analytical memorandums (see Appendix 13) with categories that were derived abductively from the theoretical framework of this study. Analytical memorandums are a way of bringing the data together into each emerging theme. Analysing the data was an ongoing process from the first interactions with participants in June 2014 till the learning network strategy meeting in October 2015. These interactions helped me to investigate the learning processes occurring in the complex agricultural landscape.

3.6.3. Phase Three: The Value that is Created in this Learning Network Functioning as a CoP

This networked learning community functioned as a CoP and could be seen as a social learning system that was creating value around the common interest and shared purpose for the research participants. Use of the value creation framework by Wenger et al. (2011) gave me an analytical structure and direction to investigate the value being created. Using a narrative analysis of a few of the participants' life stories allowed me to explore whether aspirations were met and if RWH&C practices had been learnt and implemented in the various agricultural practices of members. I found elements of value from analysing the data, thus an inductive data analysis approach was also used here to identify the recurring patterns that were evident in the data.

3.7. Ensuring Validity and Trustworthiness

Throughout the duration of my data generation, I was very involved in the processes of data generating and the ToT course facilitation. Having fellow researchers and facilitators generating data with me was helpful in that we discussed various concerns that were surfacing in our engagements with the participants. It is important to note that my relationship with the research participants could influence the nature of the research outcomes and findings; I kept this in mind when engaging with the data to ensure reflexivity. I remained reflexive and focused on my research questions and what I aimed to understand. Maxwell (2009) referred to this as internal validity which can be difficult when

one is immersed in the study area and participants. Merriam (2002) added that the biases that one has in being involved in the data generating and analysis need to be identified and monitored so that they do not have an influence on affecting the findings and conclusions. In this reflexive process, I kept a research journal where I actively wrote about the days in the field. Transcribing soon after the field days encouraged me to engage with the data as soon as possible. By visiting the field on a regular basis and constantly interacting with the participants I was able to reflect on what emerged from the interviews and discussions. This was useful to validate what was emerging from the data.

The data I generated came from a range of participants from their different settings, using a variety of data generating methods. This allowed me to reduce the risk of chance association, surface reading and bias (Maxwell, 2009). With multiple sources of data I was able to compare and verify patterns of interaction and social learning processes in the case study. The different data generating methods used were focus group discussions, interviewing, analysing documents and observations during the field visits. I comparatively verified the richness of my data which allowed me to make the claims more valid, this is known as methodological triangulation.

3.8. Research Ethics

Ethical concerns have been addressed throughout the research journey by following Bassey's (1999) ethical guidelines focussing on respect for persons, respect for truth and respect for democracy. I orientated myself in the area, introduced myself and shared my research goals with all the participants and other people I met and engaged with during the field visits.

In the *Amanzi for Food* ToT course, the research participants were all aware that I played a dual role as a facilitator and as a researcher (Rule & John, 2011). I presented a consent form to my research participants to read and sign; it stated that they had the option to either participate in my research or not and assured them they could withdraw from the study at

any time during the research journey (Bassey, 1999). This consent form addressed all the ethical considerations and the arrangements agreed upon (see Appendix 14).

All interactions with the participants were treated with my utmost respect. I ensured that participants were aware that our engagements were a collaborative process towards reaching their personal goals as well as working with me on a research goal to document and understand the case (Bassey, 1999). The data were transcribed and coded in such a way that the participants remain anonymous to the readers, and the data is kept in a secure folders so that only the *Amanzi for Food* programme team have access to the raw data.

3.9. Limitations

Throughout the engaged data generation phase I was living in Grahamstown which is in the Makana municipality and approximately 100km from the study area. Our research team visited the area relatively often though I could not drive through as often as I would have liked due to time and financial constraints. These visits provided many occasions for engaging with Imvothu Bubomi network members.

It often proved to be logistically difficult to organise one-on-one interviews with the research participants. It was not possible to interview all the participants I had intended to interview, so I did not get all the personal insights I wanted for some cases. For example, I may have missed some interactions at agricultural events or meeting between farmers or extension advisors outside of the course contact sessions due to my not hearing about them.

Major changes in successful participatory approaches require a time frame of five to ten years (Hagmann et al., 1996). This time allows for adequate planning, implementation of the plan while monitoring the outcomes and ending with an evaluation and follow-up of the intervention (Hagmann et al., 1996). The *Amanzi for Food* programme's lifespan was three years and I was engaged in this project over a two-year period. The data generation time of

my research consisted of sixteen months, and so the results cannot be used to fully evaluate how sustainable this network is or the extent of the use of the WRC materials into the wider community. This research reports on a way in which a community of practice as a learning network can form and has value to the members in their learning of RWH&C practices and curriculum innovation through a course-led intervention.

3.10. Concluding Summary

The research design was influenced by my research aims and questions which led me to the decisions I made over the course of my Master's degree. The data generation process went smoothly with no big glitches or disappointments. The data management and analysis involved a range of processes as outlined above. In the next chapter, I present the data.

CHAPTER FOUR

The Agricultural Landscape and Establishing a Community of Practice

4.1. Introduction

This chapter starts with describing the in-depth contextual work that was achieved in phase one of my data generation and analysis phases, looking at the agricultural landscape around Fort Cox College of Agriculture and Forestry. I then move on to explain the ways in which a CoP developed through the course-led activation. The learning that occurred through the course-led process is unpacked and understood. Thematic coding informed by Wenger's CoP theory is then discussed with reference to the learning network's activation. The Wenger, Trayner and de Laat (2011) framework for value creation was used for phase three of my data generation and analysis to explore the value creation elements in the formation of the learning network. I present the data in this chapter to set the scene for chapter 5 where I discuss the findings of the analysis of the data in the form of analytical statements that can be made out of the data presented in this chapter. From the initial WRC *Amanzi for Food* programme proposal and deliverables (Lotz-Sisitka et al., 2014a), it was evident that it would be vital for the *Amanzi for Food* research team to do this contextual work so as to continue with the action orientated strategy (AoS) that was set out for the project.

4.2. Contextual Analysis of the Case Study Area

In the initial scoping and brief of the *Amanzi for Food* programme, the agricultural colleges in South Africa were identified as very important knowledge hubs for agricultural practices amongst practitioners in the sector; therefore it was decided to work with a network of stakeholders situated around an agricultural college in a specific geographical location to explain how the learning network could strengthen the use of the materials to inform RWH&C practices (Lotz-Sisitka et al., 2014a). The *Amanzi for Food* research team had been in contact with various colleges around the country for initial scoping of the inclusion of RWH&C practices in their curricula. Very little information about RWH&C practices was found in the curricula and training programmes in the country (Lotz-Sisitka et al., 2013).

Global and national policies emphasise knowledge dissemination for more efficient farming practices for smallholder farmers, including water use practices (Lotz-Sisitka et al., 2013). As reported in section 2.2, South Africa is a water scarce country with all its water resources already allocated. In the project materials, deliverables and purpose it has been emphasised that "water conservation, rainwater harvesting and rain fed irrigation should therefore be considered as mainstream rather than peripheral activities in relation to agriculture and food security" (Lotz-Sisitka et al., 2013, pp. 17-18). In the first learning network meeting with agricultural stakeholders in the area, they all expressed the need for information on RWH&C practices as they understood the importance of them although they had very little resources and experience with them.

4.2.1. Mapping who is Linked to Fort Cox College of Agriculture and Forestry

Through a focus group discussion with the head of department of agriculture and three other staff members at Fort Cox College (FG1), we mapped existing direct and indirect relations in the local surrounding area. The college has a rural development centre which is situated on the campus farm. They receive external funding and are involved in training projects (FG3). Over and above the campus arm of the college, the institution is mandated to have some sort of involvement in a local community development project although funding is often an issue (FG1). Fragmented college links with local projects were evident from the opening discussions so we contacted and where possible visited all of the groups mentioned. To develop an expanded picture of the organisations and farmers involved, we conducted focus group discussions with some of the institutions or organisations. The group discussions helped build a greater understanding of the links and relationships that already existed in this area around agricultural activities.

After the initial scoping discussions with Fort Cox College and the exploration of other links in the agricultural landscape of practice, a picture (4.1) was put together from my earlier contextual data collection work to depict the different institutional links that were evident and to illustrate relationships. It became clear that all the loosely interacting agricultural institutions had some involvement with farmers.

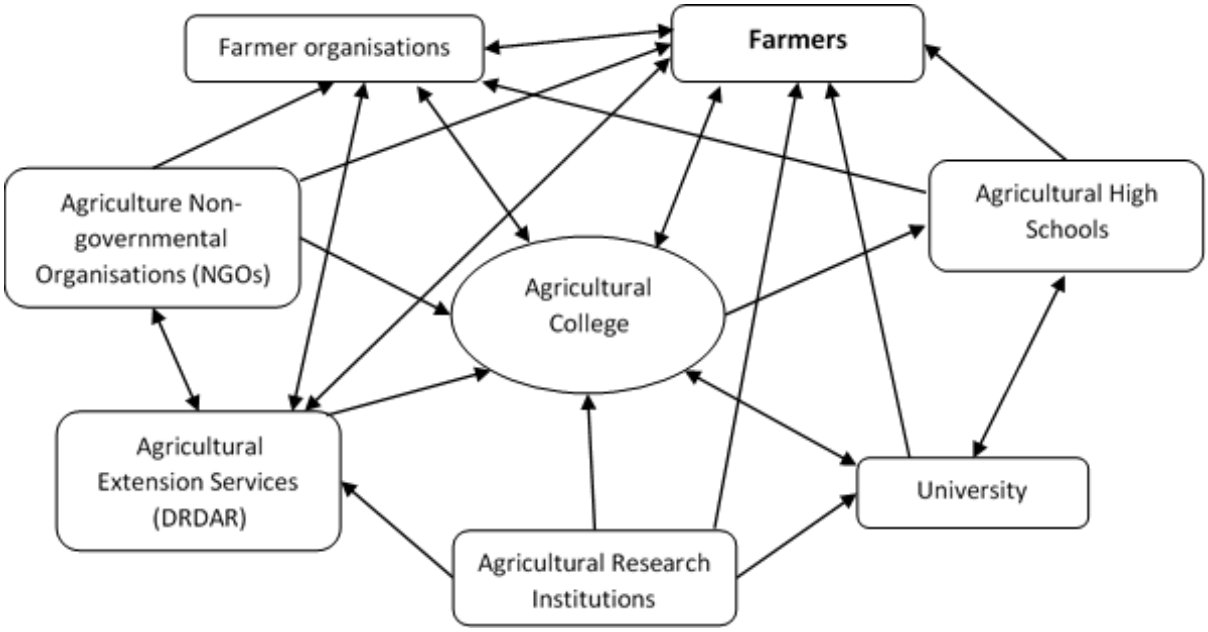


Figure 4.1: The agricultural landscape around agricultural colleges and their links

The learning network concept is the approach that the *Amanzi for Food* programme used to disseminate information on RWH&C into the wider community. The activation and mobilisation of this network was made possible through the course-led initiative. Using this image, it was easier to portray the idea of a learning network functioning as a social learning system to the different stakeholders that were loosely associated in the agricultural landscape. This was done at the first learning network meeting (LNR).

4.2.2. The Imvothu Bubomi Learning Network Members and their Roles

Agriculture was taken as a common practice to all organisations and institutions that the *Amanzi for Food* research team encountered through the initial contextual profiling work (FVN). Each of the network members was engaged by the research team to gauge their interest in learning more about RWH&C practices. People showed positive responses to the idea of forming a learning network pointing to a need for a platform as a learning space for sharing ideas. The head of department of agriculture at Fort Cox College emphasised this by

exclaiming: “I don’t see how we won’t want to be part of this!” (FG1). Once the interested members were identified, a date and place for a first meeting learning network was set and communicated across the existing landscape of interest and somewhat tenuous interaction.

This meeting occurred in August 2014 with 29 participants present. Three *Amanzi for Food* field researchers including myself outlined the proposed project and what the course would entail. Additionally, the aims that we hoped to achieve were discussed at this first meeting. The group was presented with a map of the different players in the agricultural sector that we had heard of and spoken to following our initial discussions with some of the participants. This image was similar to the detailed mapped network below (Figure 4.2).

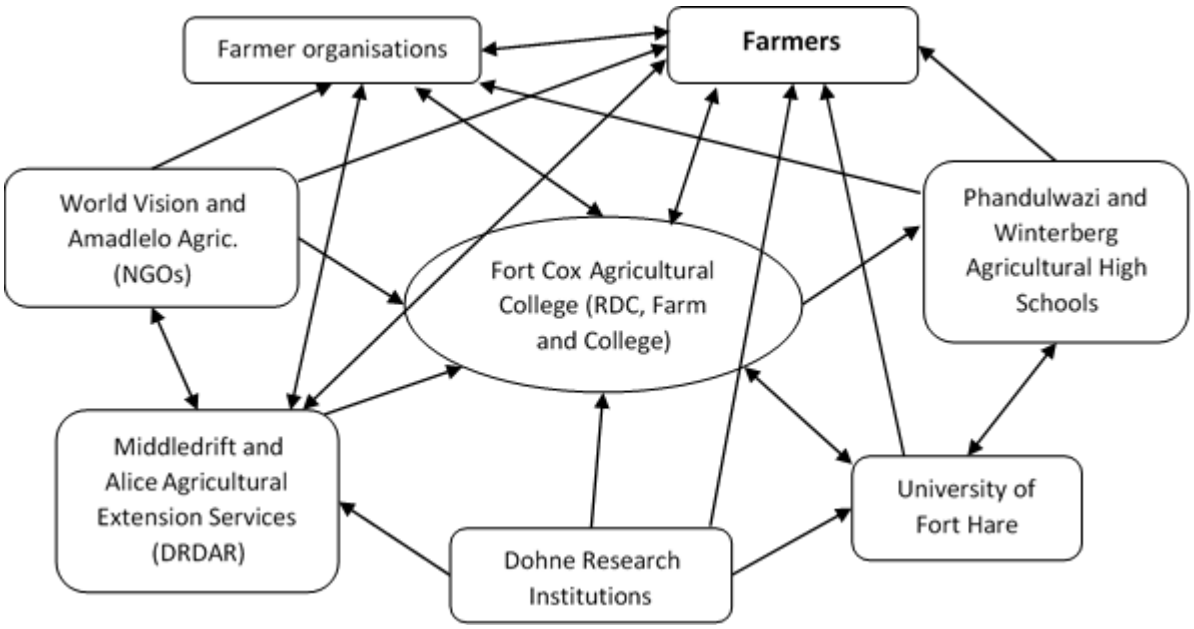


Figure 4.2: The agricultural landscape in Amathole District depicting agricultural institutions and organisations

All the different stakeholders in the agricultural landscape who are depicted in this diagram play different roles in the sector which have been grouped under four categories in my research: farmers, trainers, researchers and educators. I now discuss the roles of the

different members and how these were probed amongst the four groups in the farming of the learning network as a potential CoP.

Farmers

Most of the farmers in this area were subsistence farmers and many aspire to make a contribution to their income from their produce (FVN). The farmers in the learning network have connections with diverse organisations and people in the agricultural landscape; this is how we had made contact and invited them to participate in the *Amanzi for Food* training of trainer's (ToT) course (FVN). However, only a few farmers actively participated in the course. The ones that did participate in the sessions could all communicate in English although at some stages they would converse in isiXhosa where a member (a researcher) of the network would translate for those who could not communicate in isiXhosa (MTRs). A few of the farmers were literate and could complete the assignments and read through the module handouts (FVN). Only one farmer achieved full competence in the ToT course and received a certificate (Stream 2, NQF level 5) while two others received letters of participation.

Although some of the farmers were found to be reasonably connected with agricultural experts, there were many in the area who were not. This was kept in mind when considering the assignments and other connections farmers may have going back to their communities. Most rural farmers are part of some sort of community group such as a commodity group or co-operative and attend meetings where their chairperson addresses community interests including farming, both crop and livestock. Department of Rural Development and Agrarian Reform extension advisors often encourage commodity groups to form around the different agricultural activities to apply for project funding. There was the hope that the farmers active in the learning network would take back what they learnt from the ToT course engagements to the rest of their commodity or cooperative group members. However, it was evident that some of the farmers that were active in a farmer group did not take back all the materials and activities that occurred through the course while others did (FVN at Lloyd village). For example, a farmer from Lloyd Village represented his community garden cooperative group in the ToT course and when engaging with the rest

of the farmers in this group, it was evident that he had not spoken to all of them about the ToT course (FVN at Lloyd Village), although they had all engaged with RWH&C during the demonstration site implementation.

Trainers

When discussing trainers in my data presentation, I discuss them as a broader group made up of participants from the following organisations: the Department of Rural Development and Agrarian Reform agricultural extension offices, Research Development Centre at Fort Cox College and Nkonkobe Economic Development Agency. Unfortunately NGO facilitators did not join the course-led process. All participating trainers or facilitators had some sort of a background in agriculture; some had agricultural degrees or diplomas, so they all brought along an understanding of and experience in how to work with agricultural systems to enable learning and change. Each had his/her own experiences and education and brought new knowledge to the emerging learning landscape. Many of the trainers had received some in-house training in their specific workplaces. One extension advisor from Middledrift and the leader in agricultural development at Nkonkobe Economic Development Agency achieved necessary competence in the ToT course to be awarded a certificate (Stream 2, NQF level 5).

The Department of Rural Development and Agrarian Reform extension officers have a very important role in the agricultural landscape in rural areas as many people rely on extension services for technical and financial support of their agricultural activities. They were envisaged as the bridge between research and implementation as discussed in section 2.6. From the interactions I have had with extension officers, their jobs appear to often have a high level of administration involvement, which often seems to hinder their role as a facilitator or advice giver to local farmers. For example, extension officer two explained how they met on Fridays to report on what they had done the previous week and what they plan for the next week. He added that the controller of their office “reports on what was happening at the meetings in East London” in these Friday meetings (Ieo2). Governmental meetings in East London and Bisho occupied much of the Middledrift office controller’s time (FVN). Limiting funds and assets such as vehicles added to their pressure as they know what

they should be doing but often cannot, for instance at the Middledrift office, extension officer 2 explained that “There is only one permanent pool vehicle then there are subsidies”, he explained that the subsidy vehicles are “being supplied by the department, you make an application you see and then if it is approved then you have to perform the duties of the department”. He added that “this pool vehicle is for the officials and administration but this is why the department is striving for each official to have his or her own vehicle” (Ieo2). Some of the officers try to work around not having their own vehicles; for example, extension officer three said that “I plan with my colleague to utilise the vehicle. Maybe two or three times a week and he can drop me” (Ieo3). Many of the extension officers really enjoy being with the farmers and pride themselves in the work they do with them, as reflected in this statement “I enjoy to see the change, when I am working with that community and then I notice that there is a change, I enjoy it” (Ieo3).

The Research Development Centre at Fort Cox College play an important part of bringing community members into the formal college environment. Although the centre is situated on the old college campus, a small distance away from the current college, there were close links between the two. This section of the college provides a training, mentoring and facilitating role for community members. The courses they run provide an integrated learning approach for people wanting to learn about relevant agricultural activities (FG3). Their main focus as indicated in the name is rural development, with agricultural development playing the key role in their work.

Nkonkobe Economic Development Agency is a government organisation which works at a municipal level to encourage economic growth, with agriculture being one of their main focus areas. They receive external funding for their projects and have an energetic team who are having a positive impact on the people of Nkonkobe. They recently rehabilitated the Alice gateway where people can socialise and work on various other projects (FVN). They have a system that takes fresh produce from farmers to the market, encouraging small scale farmers to branch out and work towards their aspirations of being semi-commercial farmers. Nkonkobe Economic Development Agency staff have supportive and logistical roles to play with local farmers bridging the gap in communication.

Researchers

The researchers in the area were from Döhne Research Institute situated close to Stutterheim in the Amahlathi municipal area next to Nkonkobe in the Amathole District (see figure 1.3). It is the only research institute in the Eastern Cape that focuses on the four areas of agricultural research, namely, analytical research, animal research, crop research and pasture research (FVN). The interested people who we contacted were from the pasture research section; they participated in the course sessions and received letters of participation. The participants felt there was a need to gain a deeper understanding of RWH&C practices and their application in pasture research to increase fodder flow. They have the role of producing new knowledge on agricultural phenomenon through research along with learning from local farmers that they interact with through consultation and case studies while visiting farms.

Educators

Educator participants were from both higher and secondary education levels. The higher education institutions were the agricultural departments at both Fort Cox College and the University of Fort Hare. Lecturers from these institutions attended the meeting as well as participated in the course.

The secondary education schools that teach agriculture in the area were Phandulwazi and Winterberg Agricultural High Schools (AHS). Teachers from Phandulwazi AHS showed interest initially but then found the course too pressurised and pulled out of the *Amanzi for Food* course. Winterberg AHS did not show interest at all even after a few attempts to get hold of the principal and agricultural teachers. In addition, the receptionist helped very little with the communication attempts.

The agricultural departments at Fort Cox and Fort Hare play a vital role in the agricultural landscape as they have the responsibility of facilitating the learning of agriculture for trainers and farmers. Students attend these institutions to learn more about agricultural

practices whether they intend to farm or train in the agricultural sector. Three lecturers from Fort Cox College achieved accreditation at NQF level 6 (Stream 1).

4.2.3. Other Links in the Agricultural Landscape of Practice

Certain groups of people were identified as missing from the map (figure 1.1) in the first learning network meeting; these included: traditional leaders and the chairperson from each village; politicians; Department of Water Affairs; water user and farmer associations; local municipality representatives; early childhood development centre; FET colleges (skills development centres); Amatola Amanzi; other NGOs such as Heifer and Siyakholwa. These various groups of people or institutions were considered by the *Amanzi for Food* team, and some were contacted. However, not much enthusiasm came from the organisations from this list and only a few participated in some of the meetings; this is relatively normal in community engaged research: some people show very little interest in extra work that is not part of their mandate, for example, the two teachers who joined initially from Phandulwazi Agricultural High School were eager in the beginning as the Principal of the school had encouraged them to join but after a while they stopped attending course sessions (FVN, MTR3). Some were unable to attend as their schedules were simply too busy or due to transport limitations, for example, one of the farmers did not join for most of the course sessions due to his construction work and transport issues (If3).

4.3. Patterns of Existing Social Learning Interactions and Processes

The way people communicate with one another in the agricultural landscape is important to consider when trying to build a functional learning network or CoP. Along with the communication channels and processes that people use in this context, I explored the ways in which new agriculturally related information was accessed by the participants. The data that was generated in the scoping FGDs, the course contact sessions and interviews were used for investigating these platforms. As part of the *Amanzi for Food* AoS, these communication channels were important to consider for the project to have a greater

dissemination impact and to provide *insights potentially useful for improving the accessibility* of RWH&C knowledge, information and practices to the wider community. Through asking questions and gaining insights into the network members' context, it was found that the different groups have different ways of communicating with others outside of their workplace as well as different ways of finding new agriculturally related information to suit their needs.

Farmers

Of all the groups of people in the learning network, the farmers that attended the meetings were the least connected in terms of communication channels. The most common way of sharing experiences and new farming practices was through informal and formal meetings and discussions with other local farmer community members. This often occurs when farmers group together to form an association, co-operative, or a commodity group or meet at other forums and training (MTR2, p. 7).

The farmers also shared that they listen to agricultural shows on the local community and commercial radio stations (MTR2, p.7). Community and commercial radio stations have agricultural programmes at allocated times during the week; these often have informative guest speakers and were interactive in a way that the listeners can phone in with questions. However, agricultural radio programmes are often at obscure and inconvenient times. For example, Umhlobe Wenene is an isiXhosa commercial radio station which has an agricultural show on Fridays at 3am till 4am. Forte FM, a community radio station in the Nkonkobe municipal area, has a more appropriate time for their agricultural show: on Mondays between 6pm and 7pm.

Local Department of Rural Development and Agrarian Reform agricultural shows and training opportunities connect farmers with one another and to their extension support. For example, the Alice extension office advertised a training session on poultry at the University of Fort Hare for all farmers in the villages around Alice and the extension advisors were expected to attend too (FVN).

All the farmers I interviewed explained that that their phones were used to communicate directly with other people, especially their extension officers or non-governmental organisation facilitators. The younger farmers who participated in the course said they sometimes used Facebook and Twitter to share their ideas and read about new ones regarding agricultural practices (MTR2; If3).

Trainers

The agricultural trainers in the course have many more opportunities than the farmers in the area. These trainers all have some sort of diploma or degree with an agricultural type focus and use this previous experience and the learning materials that they received as their main source of information and learning (MTR2). When providing advice and guidance to local farmers that they work with, trainers often need to find new information if they do not know something to help the farmers. A popular means of accessing new information among the extension staff is to ask one another for advice to give to farmers as they all have different experiences. Often the controller of the office and older extension officers are looked up to for advice as they have experience, as revealed by extension officer three "Okay so if I don't know something, then there is maybe other people in the office and I check the information from them" (Ieo3) and a young intern at the Alice extension officer shared "I'm interning here so the officers here help us to learn with the farmers" (Ieo4). Experimentation in their own practice and with their farmers is another useful space for learning and sharing information amongst trainers; this includes on-site observations, experience and reading literature (FVN). The extension advisors also call on other institutions to come in for training sessions with farmers as they may have expertise in certain areas, as reflected in this statement: "I can organise specialised people like …. for animal diseases from Döhne Research or Mpofu training centre so that they can come to do the workshop for a day at the village" (Ieo3).

The Department of Rural Development and Agrarian Reform extension offices, Research Development Centre office and the Nkonkobe Economic Development Agency office all have access to Internet and there are computers that were available for them to use. The extension advisors mostly use sites that they are familiar with already, such as Extension

Suite Online® (ESO) which was developed through the Extension Renewal Programme for agricultural extension officers as a support system (Van Zyl, personal communication, October 19, 2015). All the extension officers that were interviewed were aware of this system and used it to access information and support for the farmers they work with in their wards; extension officer three shared that "there is our own in the internet, there is an agriculture extension on the internet, so if you don't know you check there" (Ieo3) and she was so excited about the ESO that it was made for the extension advisors. I then gained access to this ESO and it is user friendly and informative, however it does lack information on water supply or usage which is a prevalent problem in many rural areas in South Africa. ESO is a system which has been made available to all the Department of Rural Development and Agrarian Reform extension officers to easily access information that they may require for their farmers. ESO is easy to navigate with different subsections; this system is discussed in more detail in section 2.6. Extension officer two shared that when he used the system: "Then you go to the computer and whatever the farmer is asking and wanting information then you can find it" (Ieo2). Additionally, ESO sends out a monthly electronic newsletter with topical and up to date news and information about the online system, farming practices and agricultural phenomenon. Other sites are also accessed by the trainers to find information, but none of them were as popular or mentioned as much as ESO when this contextual work was done.

As mentioned in section 2.6, Agrisuite Online® is an electronic application that has been developed and will roll out to the wider community near the end of 2015. It is aimed at farmers so that they have access to similar information as extension advisors. This application should take some pressure off the extension advisors in South Africa (Van Zyl, personal communication, October 19, 2015).

The two systems discussed above will be linked to the *Amanzi for Food* website near the end of 2015 or beginning of 2016. The developers of these online systems have recognised the importance of the information on the WRC materials that are displayed and made accessible on the *Amanzi for Food* website (Van Zyl, personal communication, October 19, 2015).

Printed media such as popular magazines, articles and newsletters are often delivered and read in these workplaces and applicable information is used and often referred to, as represented in this statement: “But we have links with Grain SA, so every month they are sending out the Pula Mvula, you know these pamphlets and Wool pamphlets or books” (Ieo2). Farmer’s Weekly appears to be the most accessible for wider up to date agricultural information while certain livestock specific magazines are used too (Ieo2; Ieo4).

Radio is another interesting format that trainers claim to use to find out about new and exciting agricultural information (MTR4). The community and commercial radio stations can be context specific and inform people about opportunities for further networking as well as training possibilities (MTR4).

Researchers

Only a few researchers participated in the learning network and they contributed very little to the conversations around communication channels and processes during the contact sessions. However, they did add that they had access to internet and used it quite extensively in their work. Training course materials were also used (MTR2). Part of their work is based involves consulting where they visit farmers and their role is advisory; through this, they often pick up new ideas and practices (MTR3).

Educators

The educators in the network access information in similar ways to the trainers and researchers; all of them have tertiary education so they have those text books, notes and course materials to refer to when making lesson plans (MTR2). The curricula that they use in their assigned modules also have relevant information to use in their teaching. The internet is a common source of information for educators relating to their course content (MTR2). The college, university and schools have internet access, although they often have issues with their connectivity especially the college (FVN).

Agricultural research is published in journals, books and print media which educators have access to and use to keep up to date with agricultural work, for example the text books that are used in their teaching and various research reports from the University of Fort Hare (FVN). The libraries at the university and college are quite extensive (FVN). They have in the past and present also received information from farmers and through sharing experiences with them. In module two's training session, the educators grouped together and answered questions; when asked where they get information from, they responded saying that farmers and their shared experience is where new learning often occurs (MTR2). The students at these institutions often come from a farming background where they come with their own experiences too, which enables them to contribute and learn together (MTR2, p. 5).

4.4. Course-led Activation of the Learning Network

The previous sections explored the process mapping relation in getting people together to establish the learning network around the accredited course. This process provided the founding interactions for a CoP to emerge as the course developed (see figure 2.2). In building this network and holding the learning network meetings around the course modules, relationships between the network members were formed and strengthened. This strengthening developed at and between the course contact sessions and through collaborative RWH&C work on productive demonstration sites that were planned as participants worked together as an emerging CoP (see figure 3.1). Through the course-led activation of the CoP as a learning network, participants began to identify themselves as a group along with their common interest in rainwater harvesting for water conservation farming (LNR2). The emerging group named itself the *Imvothu Bubomi* learning network at the first network meeting (LNR2, p.1, line 2). This gave the learning network an identity for the core group of course participants and a name for other to associate with. Participants found the idea of networking a great incentive to sign up for the course as there were not many opportunities for people in the agricultural sector to get together for learning purposes on such a diverse scale (LNR1). Many people knew of the other organisations but there were limited personal relationships between the institutions or organisations (LNR2).

The networking processes enabled collaborative brainstorming about complex problems in the sector and the emerging CoP platform provided a context for the sharing of ideas; for example, in one of the trainer's questionnaires, his response to: How has participation in these learning network interactions benefitted you in your work? His response was "knowledge sharing and collaboration" (Qt1) and an educator wrote "Collaborated with members from other organisations" (Qe2). Participants wanted to learn about RWH&C practices to incorporate into their individual teaching and farming practices. At the first learning network meeting, a participant wrote of his expectations of the course: "Expect increased visibility of RWH practices in our area of operation" (LNR1). Wenger (2000) noted that "communities of practice are born of learning" (p. 230) meaning that the learning is what brings the CoP together and encourages individuals to be part of the CoP. To investigate how the Imvothu Bubomi Learning Network developed and functions as a CoP, I used Wenger's literature to identify emerging themes that captured the learning processes and the structures and practices enabling these. In section 2.8, I have discussed Wenger's CoP theory and concepts in detail. Below, I present and discuss the data emerging in the developing course-led project and the associated CoP. Through this work of carefully documenting the development of the learning network as a CoP, I initially examined the data to develop a picture of the learning that occurred through the experience and the valued competence that participants gained through the learning interactions in this network as this developed as a CoP (Wenger, 2000).

Through the research questions explored through this research, I aimed to understand the course-led activation of the learning network as an expanding process of relational engagements. The themes that were used to explore the data serve to track these processes allowing me to investigate the processes of participation and learning along with the emerging interplay between experience and developing competence. The detailed elements of competence examined using Wenger's framework are: mutual engagement, joint enterprise and shared repertoire. The themes used in the data analysis were broken down into sub-themes and are described in greater detail below along with the evidence of these concepts in the data.

4.4.1. Participation

Learning opportunities such as the *Amanzi for Food* ToT course, do occur relatively often in the Amathole District through the education institutions in the area (FVN). The University of Fort Hare provides opportunities for people in the agricultural sector to participate in training courses; extension officers have been invited to these training courses and invitations are often extended to farmers too (Ieo1).

Active participation was evident in the module sessions where a total of 47 people attended at least one of the module contact sessions. The attendance in general was good at these sessions; there was a slight reduction over time as seen in figure 4.3 below. This decline in attendance was due to other interests or engagements that arose for the participants during the months that the course went over (FVN).

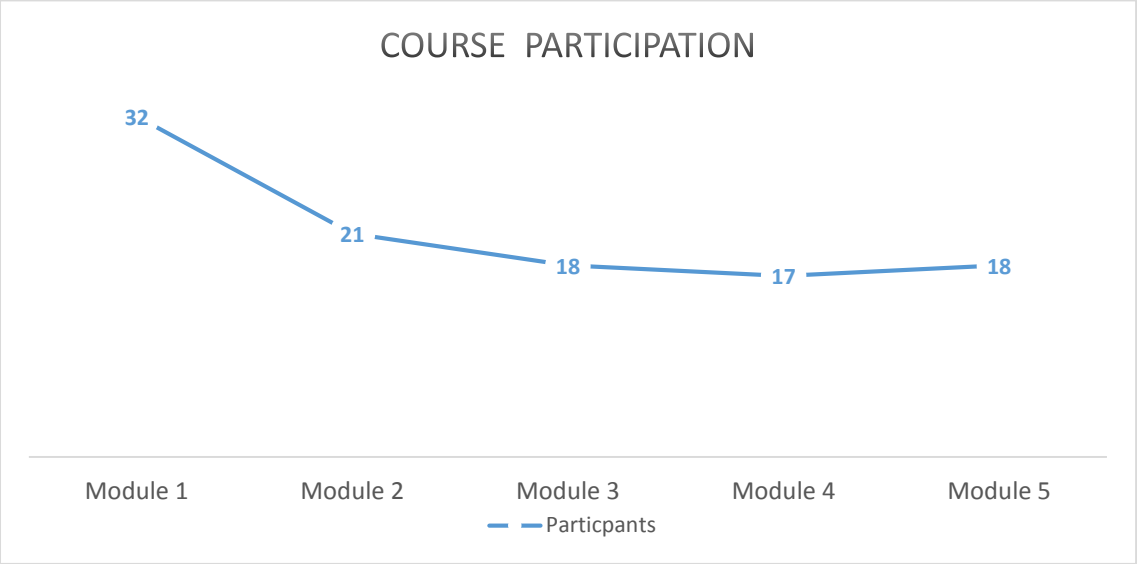


Figure 4.3: Course module participation over the five sessions

As depicted in the figure 4.4 below, the level of engagement of participants shows the levels of engagement during the ToT course. The highest level of active participation with RWH&C practices and other network participants across the levels was seen in the demonstration site planning and implementing. For example, when implementing the demonstration site at

Lloyd Village, there was a large group of people that came together to help; this is discussed further in section 4.8.1 (FVN). The core CoP participants were the participants that had attended more than 80% of the sessions (four or five of the module sessions) and included a group of 14 individuals who kept and continue to keep this CoP alive. These 14 participants were three farmers, five trainers, two researchers and four educators. They were active players in the agricultural landscape and played an important role in going forward. The intermittent (14 individuals) and peripheral (19 individuals) participants are the individuals that bring in their experiences and encourage learning interactions. This is discussed in detail in section 4.5.4 on developing boundary crossing expansions.

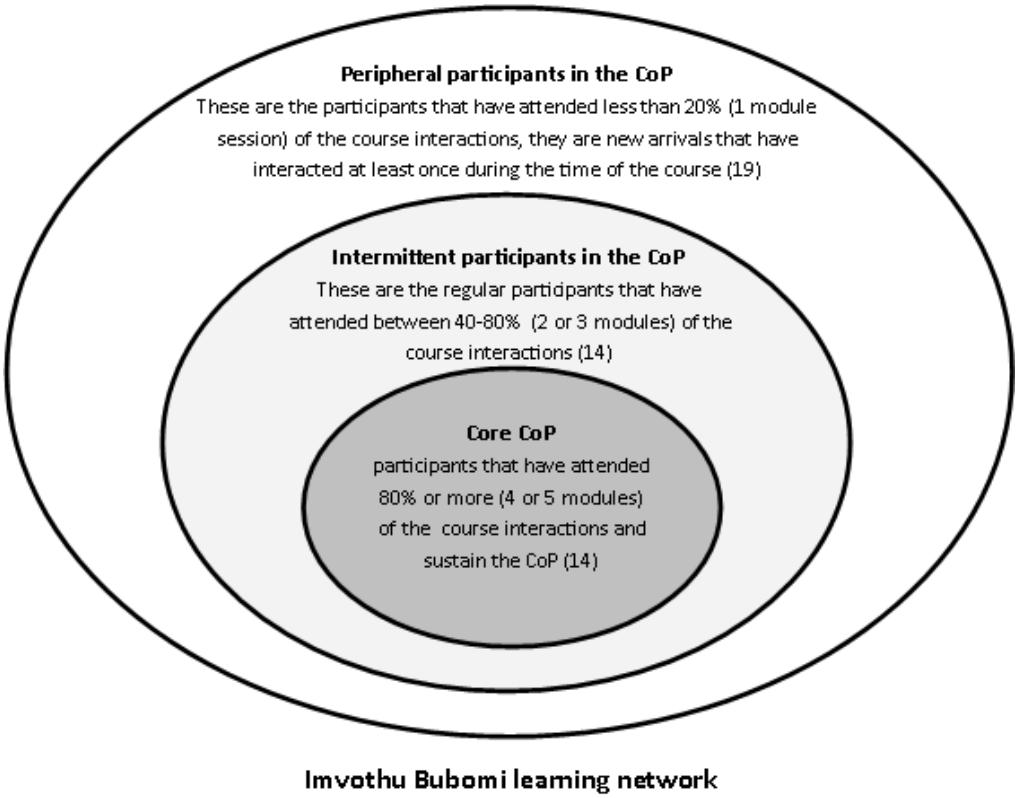


Figure 4.4: The levels of engagement of network members

There is evidence of the core participants establishing themselves in the community while other participants attended on an ad hoc basis and belonged to the intermittent and

peripheral participant groups (see figure 4.4). For instance, one of the peripheral participants, a young farmers that only attended a few of the first sessions and stopped participating, shared that he was too busy and did not have access to a car to attend the contact sessions (If3). He added that he was not too interested in achieving a Rhodes University certificate as he was involved in construction work for income and agriculture was only on the side for additional income and to feed his family. Farmer three expressed his initial thoughts of the project: "from my side I believe that with such projects like madanyana and all those, is for the small gardens but on my mind I am thinking about bigger plots so that's why I am thinking, how is it going to work?" and this was another reason for his sporadic attendance (If3). However, he did link up with a fellow farmer (farmer 4) in the area to find out what was happening in the course (FVN). This fellow farmer attended all the contact sessions and achieved accreditation by successfully completing all the assignments.

Knowing is described as "an act of participation in complex social learning systems" (Wenger, 2000. p. 226). In the first learning network meeting, members expressed that they expected to "know different types of water harvesting …" from the course so that they could see a change in the practice of farmers (LNR1). This knowing that people expected from the course was reflected as learning in the demonstration sites that members collaborated to develop. Three of the demonstration sites, Keiskammahoek, Lloyd Village and Fort Cox College, were successful in their implementation during the course period and the RWH&C practices that were used at these sites have enabled a change in the water availability for these farmers (FVN). These sites were evidence for active and positive participation with the learning materials as well as with other members from the learning network; they are discussed further in section 4.8.

Due to the reputation of the course and its outcomes, a few people had heard about the course from participants and joined the learning network strategy planning meeting held in October 2015. They participated in the discussions during the meeting and two of the outsiders have joined the committee; one is a farmer on the committee of the Alice Farmers Association and Water Users Association and the other is an intern at Nkonkobe Economic

Development Agency while doing her post graduate studies at the University of Fort Hare. They will thus to be part of future training events and activities of the learning network.

4.5. Learning of Rainwater Harvesting and Conservation Practices

For this section I analysed the course module reports along with the assignment outcome documents as well as all the interviews, observations and the field visits notes. These pointed to the course content and how it was received by the course participants. I explored what was new in the content for the participants through the discussions that were had during the course module contact sessions.

Looking for learning can be difficult to measure or find tangible evidence of, and so Wenger's CoP theory helped me to explore the learning that has occurred through the CoP's interactions. Wenger (2000) defined learning as at the "interplay between personal experience and social competence" (p. 227). This dynamic interplay can display personal transformation in the activities that were practised. These two concepts of experience and competence were evident in the analysis of the data and so we can say that learning has occurred at this interplay between the two. They are discussed in detail with reference to the data in the next sections. I explore a few learning sub-themes that emerged through analysing the data. They are group interactions, intergenerational knowledge, boundary crossing and interacting with resources. These sub-themes are discussed below with reference to the data.

4.5.1. Learning through Interacting with Text and Practical Resources

As already mentioned, the *Amanzi for Food* programme aims to disseminate the WRC materials on RWH&C practices more widely in the agricultural landscape and also increase the use of them (section 1.2.1). This was done by making information on RWH&C more accessible through having a networked training course where people could support one another in the adoption and implementation of these practices in their farming activities,

training or educating (see section 4.7.3.1 where participant's shared resources are explored). The *Amanzi for Food* field team was present throughout this process to facilitate the use of these materials and were also involved in creating supplementary training materials such as posters and videos through the implementation of productive demonstration sites (FVN and see Appendix 15 for example of a poster of ponds in English and isiXhosa). As seen in figure 4.10 in section 4.8, an extension office intern is using the WRC resources to guide them in constructing an A-frame to measure slope for the diversion furrows to be made.

The agricultural sector has a rich body of agricultural knowledge based on research and experience of how things can be done in a more productive way. But people were not networking enough throughout the sector for this information to be readily available. For example, from the expectations of the course, participants shared that they wanted to see an "increase of food production in our area/reducing poverty in our community" and wanted to be able "to conserve water for sustainable use for food production for a long period" (LNR1). These expectations surfaced due to participants all being involved in agriculture but working in an isolated manner (FVN). Through the course, participants felt that they engaged with RWH&C materials; a lecturer from the college shared that she was able to "enrich the content in a production course that I am teaching", she added that she "learnt/gained knowledge and skills in RWH&C" (Qe2).

The programme has an online portal (www.amanziforfood.co.za) which was not live during the full duration of the course; it went live in February 2015. One can access information on RWH&C practices in a user friendly way on the *Amanzi for Food* website. Network members have been shown how to navigate the website and access relevant information; it is hoped they will interact with the site and use the resources to learn and teach around RWH&C practices (FVN). A Facebook page and a WhatsApp group have been created as easy ways of communicating relevant information, news and events, for example the Imvothu Bubomi WhatsApp group is used to communicate about demonstration sites (FVN). They were both relatively active and part of my contribution to the project. These learning expansion media tools are discussed in section 5.4.1.

4.5.2. Learning through Expanding Group Interactions

Through the literature explored in sections 2.6, it is apparent that people learn from others in social environments (Reed et al., 2010; Wenger et al., 2011). Agriculture has often been seen as a social activity where people learn from one another (Pesanayi, 2007; Mukute, 2010), this is discussed in detail in section 2.4. Participants I interviewed reiterated this in our discussions, one of the farmers expressed that "I mix myself with experienced people…" (If3) which strengthens the concept of social learning in a farming context. Collectively during the module two session, farmers exposed ways in which they share with others: "meeting in forums or associations, training sessions and agricultural shows" (MTR2). These are all social interactions where they have opportunities to network with other farmers, as seen in figure 4.5 below during an *Amanzi for Food* training session.

Figure 4.5: Farmers working together during module two training session

The course modules aimed at mobilising participants to engage with one another in discussion and activities as seen in the figure 4.5 above. One of the objectives mentioned in the module one training report is "to mobilise and engage participants from a diverse range of stakeholders to participate in RWH&C learning in a learning network community" (MTR1). In the reflections from the sessions, people expressed that they learnt about various water conservation practices through discussion and the planning and implementing of

demonstration sites, as expressed by this participant: “the sites will serve as a long term source or place of interaction for the network members even after the course has been completed” (MTR3). During module five’s contact session, there was a reflection session on the importance of RWH&C practices the responses of the benefits of these practices reflected that participants had engaged with the learning from the course through interacting with one another. The benefits of RWH&C practices listed were: “strengthen the community in working together, it can improve vegetable production and extend the growing season, reduce costs of production and ploughing, supply water to livestock, soil erosion control, improving soil quality and moisture and provide sources of clean water” (MTR5). The benefit of assisting with soil erosion control and soil quality and moisture were important points that one of the farmers raised and the other participants agreed (she had surfaced this in a previous contact session from her experiences but it was discussed in detail among participants in the module five’s reflection session). Another key point listed above is that the engagements around RWH&C practices “strengthen the community in working together” (MTR5). This networking process and having a diverse group from the agricultural sector together benefits the community, as participants rarely get the opportunity to work across institutions and disciplines to learn together and share their experiences and ideas (FVN). For instance, a trainer shared engagements that influence his work, “we are now implementing projects together, for example: the University of Fort Hare with Nkonkobe Economic Development Agency conservation agriculture and Nkonkobe Economic Development Agency with Department of Agriculture, animal and management programme” (Qt1).

At the learning network strategy planning meeting which took place on 1 October 2015, it was again agreed that meetings or events are important for the learning network to remain successful. It was suggested that meetings occur on a quarterly basis and could include information days or agricultural shows (LNSMR). These proposed meetings would be decided upon by the committee and the communication co-ordinator would inform the rest of the learning network. The next meeting will be in January next year (LNSMR).

4.5.3. Learning through Emerging Intergenerational Knowledge Sharing

For the people in the network, farming has been part of their lives for many years. For those that I interviewed and who discussed their past with agriculture, most of their general knowledge has been passed down from their families. Some comments from the participants: “What I can say is that farming is in my blood …” (If2), “You know for me, farming is a gift, it is just something I was born with” (If3) and “Well I grew up doing farming …” (Ieo4). These statements from interviews express the passion for farming and where it comes from for both farmers and trainers.

Many farmers seemed to have relationships with family members that are also involved in agriculture. One farmer shared that his sister had a job in agricultural economics and that his daughter was studying at Fort Cox College while his own father was a farmer too: “my daughter and sister but they are not very strong about the crops, they are doing forestry and agriculture economics so it is different” (by this he means that they cannot always help with cropping advice for his agricultural activities (If4)). When reminiscing about his father’s farming activities, he shared that “this is my father’s land”, pointing to where he is growing his crops (If4). This shows how several generations can be involved in agricultural activities and the passion for farming seems to be passed down. The extension officers that were interviewed expressed a love for agriculture and recognised the importance of it for local rural communities. One of them even goes to his father’s land often to keep encouraging him to continue farming: “my father is staying in one of the villages here, that is also why we like to encourage farmers” (Ieo2). This is evidence of strengthening agricultural practice through intergenerational relations and indeed most of the participants expressed that they had come from families where agriculture was a pivotal activity. Many participants had studied agriculturally related subjects at school and that is where their interest started. Examples from the data are: “you know in the Ciskei it was forced to learn agriculture” (If2); another farmer added: “I started agriculture at school and I passed my matric there at this school. I studied Landbou, which is agriculture” and “I sit and think of what I am going to do because I was taught at school how to do it” (If4).

4.5.4. Learning through Developing Boundary Crossing Expansions

The *Amanzi for Food* programme acts and functions as a 'boundary zone' between the different network partners and their professions in the local agricultural sector (as discussed in section 2.8)[7]. Figure 4.4 (see section 4.4.1) illustrates how a CoP is made of the core, intermittent and peripheral participants. These boundaries between the groups were the interaction zones where learning opportunities were created between the different participants.

These boundary zones were places where local expertise and involvements could be made explicit so that others could draw on it later in their own context; for example, in the module training sessions, new members would often ask questions or raise concerns that the core participants could address (FVN, MTR2). As a diverse group of people together listening to the challenges that the farmers express, they could collaborate towards solving these problems that surfaced at these boundaries between the different participants; for example, trainers from the core group of participants suggested ideas for including youth in farming activities: "to involve the youth, we need to take the active youth to activate or motivate the inactive youth" (MTR4). Another example is that Döhne researchers offered to help farmers with soil testing when possible (FVN).

4.6. Personal Experiences of Network Participation

Participants shared their varied experiences from their different occupations or lifestyles regarding conservation agriculture during the course contact sessions. The farmers stood out as the most vocal about their experience and practice. Often the contact sessions were spaces where they would ask for advice or for clarity on something that they had experienced in their gardens. For example, one of the farmers constantly raised concerns around seed choice and planting times and seasons; the conversation was often steered

[7] The boundary zone is where the core and intermittent community interact with the CoP members on the periphery, this creates an opportunity for learning interactions to occur (Wenger, 1998a).

away from RWH&C because of these discussions but it was evident that the platform was a rich space to surface his concerns (FVN). This always started interesting discussions around practices and challenges facing local farmers, as shown in the extract from the module two training report: “how can we implement this to communicate to the youth to show them how important agriculture is?” (MTR2). After the topic of youth was raised, a rich discussion around why they are not interested in agriculture and what can be done about it, started; this is discussed in more detail in section 4.6.2. This network’s CoP is well represented as the farmers can share their concerns and needs and these may be addressed by the other network partners and possible solutions suggested. The contributions from the network involved sharing information and case studies from their experiences (challenges, successes and aspirations), documenting case studies together, trying to change people’s attitudes and starting to shift the mind-set about agriculture, as discussed in the sub-sections below.

The extension officers shared their experiences of projects or programmes that worked and that didn’t work in the area (see figure 4.6 – an extension officer sharing what she understood from a previous project, LNMP). From their experiences, programmes that work were those that were supported by other institutes in the area that drive the initiatives. For example, Fort Cox College assists in selling the beef after it has been slaughtered and the farmers get paid for the cows that they bring in. This has encouraged livestock owners to sell their cattle rather than keep them for the traditional monetary value they had in the past, as quoted by the extension officer: “people sell their live animals and then from there they are also selling the skins or hides, then there is a project here at Fort Cox where we are being assisted by the national agri-marketing council where we are trying to add value to their livestock because the problem is that they like to not sell and have large numbers of cattle so that they can be recognised at their villages so we are trying to add value to their livestock” (Ieo2). This programme is successful as it addresses land degradation and stock theft challenges that are being experienced in the local villages by reducing the stock on the land and subjected to theft, as explained by extension officer two: “this is contributing to the degradation of the land and also the stock theft is a problem because people are losing livestock to theft” (Ieo2).

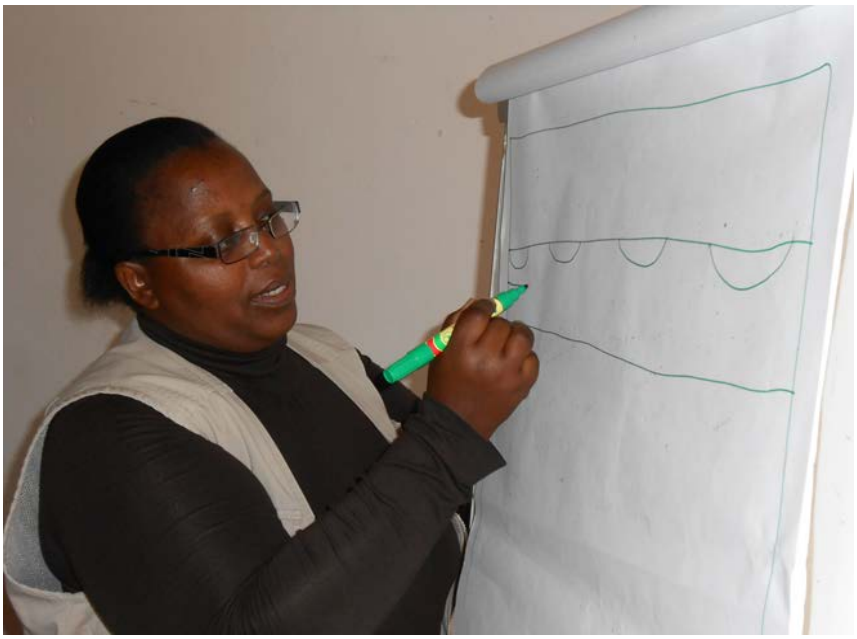


Figure 4.6: An extension officer sharing what she understood about a RWH&C practice from previous experience (LNMP)

However, some projects start up in the area and do not seem to work; this was discussed with regard to a previous RWH&C project that was implemented a few years ago by the Agriculture Research Council (ARC), but it did not take off into the wider communities. The extension officer in the image above reflected on this programme and her view of why it failed: if people come in and tell farmers what to do and financially support them through the process, it does appear that the new practices will be implemented. She said: “the ARC supported them with water tanks, some fencing, fertilizers and seeds,” adding, “they need injection [of support and resources]” (Ieo1). She reflected that once the support leaves, some of the farmers revert to how they did things before: “when the project comes to an end, some went back to their own doings” (Ieo1). She added that “they [the farmers] didn’t forget, they simply thought that now that nobody is going to supply us with anything then, I am not sure what happened but then they go back” (Ieo1). There were only a few individual farmers who have taken these practices on and were still implementing them. Higher yields seem to be the reason for continued practice of these RWH&C techniques: “some they do ... there is, even when these two are put together, the madanyana [RWH&C practice] and the

old way, they did see a difference, higher yields. But immediately when those guys [ARC] left, they lost interest. But these ones [a few farmers] keep on doing it. Even now there is a difference" (Ieo1). She added that there is an issue with coming in and injecting resources and leaving although "… if you give them [farmers] something, they can do wonders." (Ieo1). From this experience, it seems it is important to both know the challenges in the area and supply appropriate resources and support for local farmers.

Through experience of active participation, the network members negotiate competence. This competence will be discussed further in the following section. First I will explore the aspirations and challenges that network members felt were critical to their success and what drove their participation in the course activated CoP.

4.6.1. Aspirations behind Participation in the Community of Practice

Participants were hungry for change in their communities (LNR1). They wanted to see more people farming for themselves and their families in their local communities. Through this programme, they wanted to gain a deeper understanding of RWH&C practices, as expressed in these excerpts: "know different types of water harvesting and the use of the conserved water" and "to have an in depth understanding of rainwater harvesting techniques and their application" (LNR1). The farmers want to increase their production and have higher yields to sell and make profit, they have their minds set on having money to do this though which can prove to be a hindrance to adopting new practices as noted by a few of the farmer participants during visits to their farms (FVN).

Extension officers in the network were really passionate about the work that they do with their farmers and they liked to see the changes after they had been involved with the communities. For example, extension officer two admitted that "… you kind of change their lives, it is quite rewarding…" (Ieo2) and extension officer three added that when she "… is working with that community and then you notice that there is change, I enjoy it" (Ieo3). It is not easy to change people but they still try to implement new ways of doing things to

encourage change and better practice as explained by an extension officer when discussing the livestock programme: “we are trying to change their mind set to think of livestock as their bank” (FG4).

When thinking about change in agricultural communities as envisaged by the extension officers, the demonstration sites implemented in the *Amanzi for Food* programme (see section 4.8) are good examples of successful change projects in the community. From the beginning of this research, we were told that people believe in learning by doing (MTR2). Through the implementation of the productive demonstration sites, participants were engaging with the practices and realising that the practices could make a difference for water availability and efficiency in their farming activities and increase yields (FVN).

4.6.2. Local Priorities and Challenges Driving Participation

Through the course sessions and discussions I had with the participants it is evident that the local farming communities have daily challenges. These are presented below with reference to the data. Programmes and projects should be addressing these as much as possible. Climate variability and rainfall pattern changes emerged as pressing issues for these farming communities, which is where the initial interest lay for participating in this programme. As one farmer shared “I don’t know how to describe it [the climate], sometimes the rain comes in August then other times in December” (If2) and from the expectations of the course: “application of old agricultural methods to modern time as the climate changes” (LNR1). Water availability is also a challenge to farmers in the area as there were not enough dams and allocated water for irrigation, as expressed by farmer two’s village water issues “the pump is broken from last year. I am still on that to get the municipality to get the engine back. Because I want to use for the blue pipe to take water from there to there as we used to,” and he added “I will be very happy if something can be done about the water so that people can carry on with the land” (If2). Many homestead farmers use municipal water if it is available (If3; FVN). However, municipal water is not always available and so their yields were not as high as they could be. *Amanzi for Food* addresses this challenge with

introducing alternative ways of increasing soil moisture content which is why the course and the project were of such interest to the local agricultural community.

Funding emerged as another major challenge for the agricultural sector. The farmers expressed that they did not have enough money to meet their aspiration of a larger production output (FVN). The older farmers in the network (farmers 1, 2 and 4) have had previous jobs before so they had the basic financial contributions needed to start the gardens or fields but not enough for farming on a larger scale. Farmers often rely on external financial support as farmer three said "… farming is expensive. Our government doesn't give enough, they give a little bit" (If3). This is often where the problem is: the extension advisors felt that farmers expected too much from the government and other external funders (FVN and Ieo3), "We give them the general advice, technical and general like maybe where they can get funds or else where they can get those loans so not only relying on technical and also organise for those people who can maybe the company who are having the loans so you organise them, for example last month maybe about eight of my farmers have applied for them" (Ieo3). She added that "sometimes we [extension] don't have the funds to assist them so when I don't, then I look to Nkonkobe municipality and everywhere to assist us. That is another constraint in our department because we don't have enough funds for the farmers" (Ieo3). Much of their work involves applying and managing funding for their allocated farmers which takes considerable time (FVN), leading to the sector challenge discussed below.

Many participants felt that government extension support often does not live up to what it is meant to be doing; this is often due to the lack of resources as mentioned above and the high expectations of agricultural extension staff. There is often not enough capacity to do all the administration work in addition to the farmer advisor role they are meant to play in the community, as seen and expressed by the extension officers during my field visits (FVN). Farmer two expressed that their village is allocated a new officer every year and so as a result nothing gets done and support is often delayed because of this: "always a different person [extension officer] every year. So you can not follow up for something that you want. Cause maybe this year he says he doesn't have a budget now so we can see the budget next

year but then next year that man comes and says no" (If2). In their defence, an extension officer noted that they have very little time to play their advisory role as they so much administrative work (FVN). Extension officers two and three added that they only support those that are already active in farming activities and so there is no time for them to do agriculture promotional work as they would like to (FVN).

Another mammoth challenge that the area is facing is the lack of interest in agriculture by the younger generations in the communities. This emerged in most of the discussions around the future of agriculture in the area, as shown in these quotes from the data: "the youth should be shown how important farming is" (MTR2), "we need to encourage the young people to have some patience to grow and see what they can do with the land. The money is here, farming is no more farming, farming is business. If you have the land then you know you have the money" (If2) and "the youth is not interested [in farming]" (Ieo2). A few younger farmers attended the course interactions and had much to contribute regarding the challenges they face as younger farmers. Young farmer three contributed his view on why younger people were not farming: "youth of today want to talk money and they don't have the patience to wait for money from their farming activities ..." (If3). Other participants added their thoughts, that agriculture is seen as an unpleasant activity because schools and parents in the area often use agriculture or working in the garden as a form of punishment and so children grow to dislike it (MTR4). Extension officer two and farmer two added that they think that the children today are spoilt by their parents and grandparents, and they are simply given money rather than having to work for it which creates what he calls an uninterested generation (Ieo2; If2). There is a national youth programme which the Department of Rural Development and Agrarian Reform is trying to implement through the extension advisors, which aims at encouraging youth to be more active. In each office, there is an extension officer assigned to this programme over and above their normal day to day work. It is still a new programme but one of the officers I interviewed is responsible for the programme at the Middledrift office. She did not have too much to say about the programme: "I try to go to visit the school to facilitate the programme" (Ieo3). Extension officer one posed the question: "Maybe we don't do enough to convince them [that farming can be enjoyable and beneficial to their communities]?" which is an interesting perspective

on this issue but as discussed before, there is limited capacity in departmental extension to promote agriculture into the wider community.

Theft and sabotage is another challenge and concern that came up in the discussions with participants in the agricultural landscape. Farmer four has had numerous sabotage attacks on his small plot, the fence has been cut and cattle have been driven into his cropping field where they have destroyed his crops, as shown by this statement: “I planted mielies here and then they were growing and then the cows came in through this cut hole in the fence [pointing to a point in his fence where people had cut his fence]” (If4). This is not an isolated occurrence as extension officer two added that some people try to make a point that cultivating farmers won’t succeed: “there is another old guy in this village, Perksdale, with arable lands there, that guy was ploughing his fields and growing. And then there was this other guy who during a cultural event or funeral, he would drive his cattle there to eat it. It is the same thing Tata [farmer 4] is talking about, these people who are having cattle don’t take care of them. They make the point as making the guy that cultivates not succeed. They make him stop cultivating. I have told these guys, why you don’t give people a chance to cultivate the land and take your cattle elsewhere” (If4). With regard to livestock, farmers often lose livestock to theft in the communal grazing lands, as expressed during the focus group discussion at Middledrift extension office: “there is a little bit of stock theft” (FG4; FVN). These are ongoing challenges that a farmer has to face in these areas.

As can be seen from the above, discussing the personal experiences that people have had in relation to the practice of RWH&C in food production systems at a local level and the challenges expressed over the course participation is important to consider when trying to cultivate learning communities. When encouraging learning amongst a group of people it helps to create spaces for them to voice their opinions and concerns. I move on to discuss the social competence that participants gained from the course engagement and interactions with other participants as they reflected on the learning that stimulated change.

4.7. Evidence of Social Competence among the Learning Network Members

Wenger (2000) has defined competence as a combination of three elements (see section 2.8). The network first needs to describe its purpose and what it is about and hold one another liable to its joint enterprise, then members need to build mutual engagement into a community. Lastly, the network needs to build a shared repertoire over the time they have been engaged with one another.

4.7.1. Joint Enterprise

This element of competence sees enterprise as an initiative that the CoP has built on in order to contribute to the activities and learnings in the community (Wenger, 2000). The sub-theme here is the negotiated enterprise between the CoP members which can also be expressed as the shared motive that brings these people together.

4.7.1.1. Negotiated Enterprise

As established above, the network members bring their own experiences and differences to the group, yet they still find a way to work together towards a common enterprise. Working together and coordinating activities towards their respective goals and aspirations is a process of negotiation, as shown in the module one report. Participants negotiated and decided on the most appropriate RWH&C practices in their context: “dams, roof water harvesting, mulching, ploegvore /pitting and fertility pits, tied ridges/madanyana and gelesha” (MTR1). The different network members all seemed to work together in the module contact sessions as well as on the demonstration sites (FVN; see section 4.8). All those involved seemed to have a passion for agriculture no matter their discipline within the agricultural landscape (FVN, see section 4.5.3).

The shared motive of the group was obvious through the discussions and interviews forming the learning network encapsulated by these data extracts from the expectations of the

course during the first learning network meeting: “to see people around my communities using water efficiently and effectively” (LNR1), “farming communities that are capable of practising water harvesting and conservation techniques (which means change for the better)” (LNR1) and “to have an in-depth understanding of rainwater harvesting techniques and their application” (LNR1). As represented in these expectations, participants felt there was a need for learning about RWH&C practices as water is one of the most widespread challenges for farmers in this area (LNR1; FVN). During the module one training session, participants agreed upon the most appropriate practices for the area as listed above as the negotiated practices. These practices were considered when planning the demonstration sites and thinking about capacity and curriculum development later in the course. This need for the learning of the RWH&C is the shared motive of this group, which was formed in phase one of this study. This common interest is what held this group together. Through the course evaluation throughout the contact sessions, participants expressed the importance of RWH&C practices in their work or activities, as shown from the following data extracts: “the different RWH&C practices were most valuable” (MTR1), “The innovation and new ideas that were brought as proposals to the network” (MTR2), “I know how to conserve water in simple ways/methods. To obtain more ideas or information from other people” (MTR3) and in module five’s session the participants listed “the benefits of RWH&C and how they can contribute to food security” (MTR5) (these were discussed in section 4.5.2).

4.7.2. Mutual Engagement

One of the elements in a CoP is to be competent in engaging with the other individuals in the CoP and to trust and be trusted in activities and interactions with other members (Wenger, 2000). In relation to this, I explored the sub-themes below which are relationships, membership, engagement in practice and diversity within the group.

4.7.2.1. Relationships

Through observations and the various discussions we had with the network members, there is evidence of new relationships that formed over the duration of the course. Some key examples of these are between: a farmer and a college lecturer, extension officers and the local economic development agency staff, the agency staff and farmers, a university lecturer and farmers and Lloyd village, researchers from Döhne and local farmers. From the first learning network meeting, people wrote down their expectation of the engagements and there were a few responses that emphasised the importance of building and improving relationships to share experiences and learning (LNR1). After the module two contact session, people expressed that they had gained new contacts in the sector through the growing network, as expressed in this feedback: "new contacts and ideas from the 'growing' network were achieved" and "building confidence and the ability to network with other people" (MTR2). Throughout the course and contact sessions, people would mingle over tea and lunch time and became acquainted with new people all the time as shown in the image below (figure 4.7) where participants posed for their first photo as a learning network.

Figure 4.7: All participants at the first learning network meeting posing for a photograph and engaging with one another for the first time as a learning network

The demonstration site planning and implementation really grounded and strengthened some of these new relationships by bringing people together, this is discussed further as individual cases in section 4.8. An example of new relationships forming is expressed in the words of farmer one who said: “I am working with [an educator], she is a strong woman.” (If1). This farmer was talking about the implementation of the Keiskammahoek demonstration site on her land where one of the educators was facilitating and assisting with the planning (as discussed in section 4.8.2). Other data based examples are the relationships that Nkonkobe Economic Development Agency formed with the Middledrift extension officers and local farmers in the learning network. Another example is between a lecturer from the University of Fort Hare and local farmers from Lloyd village (FVN).

My observations and field visit notes (FVN) depict that I may have missed out on a few of the interactions between participants due to limited time and access, although many interactions were recorded in my field visit notes, as shown in the examples above. Not all the participants were interviewed so I may have missed a few interactions by simply not hearing about them. The interactions observed and heard about are evidence of relationships forming between the Imvothu Bubomi learning network members, through the demonstration sites, radio broadcasts, their WhatsApp group and Facebook page. The radio broadcasts brought people together to participate in the discussions around water conservation practices on air, the panels for these broadcasts have had a mix of individuals together, for example the panel represented in figure 5.3 for the first broadcast included a lecturer from Fort Cox College, a farmer from Keiskammahoek and two Amanzi for Food field team members (FVN). The Imvothu Bubomi WhatsApp group which has been active since May 2015 was used as a general communication platform where members discuss and share news in the agricultural landscape. For example, photographs of demo sites were shared with other members to keep them informed about any activities that were happening in the landscape at the time. A network member from the economic development agency shared images of the Lloyd village ponds on 9^{t} June 2015 for other members to see (IBWA group). This proved to be a very effective platform for communication; it did however exclude the farmers as none of the farmers in the network had access to a phone with WhatsApp (i.e. a smart phone).

4.7.2.2. Membership

It was evident that people felt like they belonged to the learning network by their participation in an activity and in their joint decision on a name for their learning network. The name is a form of an identity which gives a sense of ownership to the network members. In the first learning network meeting, participants chose the name *Imvothu Bubomi* which means *water is life* (LNR2).

Along with a sense of belonging to the Imvothu Bubomi learning network, many of the participants belong to their own institute, organisation or farmer co-operative group as indicated in section 3.4.1. It was important that they were seen as representative of all the other members of their group and that they would take back to their groups what they learnt from our engagements.

4.7.2.3. Engagement in Practice

As mentioned in section 1.2.1, all the course participants received a navigation tool which enabled them to access the particular WRC materials relative to their needs. The course had many opportunities for network members to engage with one another regarding an activity and its relevance (see figure 4.8 where participants are engaging with a practical activity during the third module session). A simple teaching garden was used to demonstrate how participants could use the support materials for teaching water harvesting and water delivery with easy to access resources, mulching was also shared as a technique to conserve water at this demonstration (MTR3).

Figure 4.8: Course participants engaging with practice during the third course modules

The planning of four demonstration sites with the implementation of three sites are key examples of participants engaging with practice (introduced in section 1.2.1 and discussed in detail in section 4.8). The one undeveloped site was still in the planning phases and may move towards active implementation in the near future under facilitation of the Imvothu Bubomi learning network members. The active implementation of the three sites were very interesting engaged experiences where the different network members were deeply engaged in the practice of conservation agriculture. Farmer one collaborated with an extension officer and college lecturer in planning and implementing her garden (section 4.8.2). Farmer two and the rest of his community garden group members collaborated with trainers and educators for their garden and the implementation of the small dams, furrows and mulching (section 4.8.1). These sites were visited by the members that assisted with the implementation and they have continued to provide support with advice on how to maintain these sites. The end purpose of the sites were for them to be used by trainers and

educators as demonstration plots for people to be able to engage with the practices and learn how to use them themselves, as well as to provide immediate benefits to farmers.

The radio programmes (introduced in section 1.2.1.) that have been broadcast have called for active engagement of participants with one another as well as the content from the course, as I observed when listening to the broadcasts (FVN). Various groups of network members have participated in a number of radio shows discussing the RWH&C practices and their uses; this is discussed further in section 5.4.1.

4.7.2.4. Diversity

The network has a diverse group of people from the agricultural sector (see figure 1.3). Members came from different disciplines and backgrounds, even different ages and cultures (FVN). Each person brings his/her own diverse experiences to the group making a larger space for sharing from a wide variety of differences. Reflecting on the expectations put forward by participants, there was a need for strengthening cooperation between the diverse stakeholders in the agricultural sector. This is illustrated in these extracts from the expectations listed by participants: “seeing the departments and other stakeholders that are supporting agricultural related projects being active in the network” (LNR1), “increased and improved networking” (LNR1) and “to promote integration among the relevant stakeholders” (LNR2). We aimed to do this through the *Amanzi for Food* course interactions. An example is seen in the figure 4.9 below which shows a group of participants working together on an activity during module two’s training session. From left to right they are: a trainer from the rural development centre at the college, a farmer from Middledrift area, a farmer from Keiskammahoek, an extension officer from the Middledrift office, a lecturer from Fort Cox College and a researcher from Döhne Research Institute near Stutterheim.

Figure 4.9: A group of participants engaging with one another over a course activity

4.7.3. Shared Repertoire

The last element of competence is for members of the CoP to have access to the shared resources and history or repertoire and be able to use these appropriately (Wenger, 2000).

4.7.3.1. Shared Resources

Wenger (1998a) has described shared resources as tools, words or concepts, action, ways of doing things and routines. In this course all participants received the same resources in the form of course files which contained all the module handouts and other worksheets for completing the course: this also served a purpose of structuring the course. Course materials and resources contained in the file are listed below:

- *Water Harvesting and Conservation*, Volume 2, Part 1: Technical Manual and Farmer Handouts, by Denison, Smutters, Kruger, Ndingi, and Botha (2011) from WRC Project No: K5/177;

- *Agricultural Water Use in Homestead Gardening Systems*, Volume 1: Main Report and a disk with volume 2, by Stimie, Kruger, de Lange, and Crosby (2010), from WRC Project No: K5/1575/4;
- *Amanzi for Food* ToT course orientation (Appendix 2);
- Possible options for integration into college curricula;
- Contextual profile toolkit for trainers;
- Navigation tool (Appendix 1);
- Copies of handouts from the two sets of WRC materials;
- Module one course handout;
- Module two course handout;
- Module three course handout;
- Module four course handout; and
- Module five course handout.

The course was based on the first two WRC resources listed above; these were introduced in section 1.2.1 and are shown in figure 1.1. Along with the learning tools, participants were invited to attend the contact sessions and various support or demonstrations site implementation sessions or any events that were happening in the area. For example, participants were invited to the first learning network meeting, the five module sessions, agricultural shows and two days (11-12 May 2015) at the Lloyd Village demonstration site implementing RWH&C practices. These shared materials and events are what strengthened the course interactions. When asked if the network interactions had had any value to him, a trainer responded: “they have been of great value in that now we share resources when implementing projects ranging from human capital to capital equipment” (Qt1).

Through the shared history of learning (in the section below), participants all built an understanding of the concepts and language used when talking about various RWH&C practices, they built a common knowledge amongst themselves.

4.7.3.2. Shared History of Learning

The history of learning is the experience that all participants had during the network interactions. Although some members missed a contact session here and there, they all were exposed to the learning interactions while they were involved in the course. There was a sense of common knowledge amongst the learning network members near the end of the course and during the strategy meeting as they all had a deeper understanding of RWH&C practices. For example, the practice of *madanyana* and *gelesha* were at first RWH&C practices that people had heard of but not really engaged with and not necessarily practiced themselves, but by the final module meeting and the learning network strategy meeting, participants had an understanding of these two practices (MTR5; LNSMR). *Madanyana* are small ponds or tied ridges, which are well known in the area although very few people implement them in their agricultural activities (LNSMR; FVN). *Gelesha* is when the land is prepared before the first rains, and then planting is done immediately after the first rain has fallen (Denison & Wotshela, 2009) –participants had a good understanding of this practice (MTR5). The individuals who were not involved in the course interactions who attended the learning network strategy meeting came from institutions or co-operatives that had active participants so they felt a part of the network, and two women have taken on responsibilities in the committee (LNSMR). They were both keen to see more training in RWH&C practices and by taking on a committee chair, they can encourage and ensure that this happens.

4.8. Course Change Project Stories

Through the implementation of the three active productive demonstration sites (introduced in section 1.2.1), the participants had the opportunity to participate in change projects and engage with the WRC RWH&C practices. It is evident that participants engaged with the WRC resources in implementing RWH&C practices into their farming activities, as seen in the photograph below (figure 4.10).

Figure 4.10: An extension office intern using the WRC resources to guide

The importance of these practices was realised during the production of these sites in local contexts as participants started to engage with the practices in context. For example, one of the farmers shared her story: “water is going straight to my garden and making soil erosion there so I am starting to see that I make something [diversion furrows] so that this water go to the garden, so I do these things from this picture [shows WRC book]. So I look at my garden and see all this water” (If1). She later added after creating a furrow to divert the water to her garden, “I see there now it is not making soil erosion so it is coming to my furrows that I make there and the water is going there to the garden” (If1). Participants had been told by the *Amanzi for Food* team that it is vital to maintain these sites after the implementation of these practices to ensure that they continue to work. Maintenance involves cleaning out to ensure no obstacles. Below I discuss the different change projects where participants engaged with the course practices in their own practice.

4.8.1. Lloyd Village Demonstration Site

Lloyd village, which is located outside of Alice (figure 1.3), has a community garden that is made up of a cooperative group of twenty four farmers, and the majority of the group were

elderly women. They have had water problems for many years and because of this they have struggled to produce food as consistently as they did in the past. Farmer 2 shared when asked when he had last farmed in the community garden: “it is about three years back because it is too dry here. But I still have the impression if it is raining lots to take the tractor and go there. I was making very well there with maize, beans and butternuts” (If2).

When deciding on a plan for the garden, the WRC *Amanzi for Food* field team joined the group of farmers to discuss the possibilities which is shown in figure 4.11, we were also joined by a water engineer Jonathan Denison, who was part of the wider WRC project team; he co-assessed the context and provided advice (MTR3).

Figure 4.11: Most of the gardeners at Lloyd village gathered to collaborate with experts to plan their garden

The site was designed with five ponds positioned down the side of the garden, three metres by two metres and one metre deep each; they were measured and dug using spades and shovels (figure 4.12, FVN).

Figure 4.12: Two farmers working with an extension officer measuring the pond and beginning to dig

Each pond has a diversion furrow that channels water into it from an empty field next to the garden (figure 4.13). The furrows were made using a tractor from the University of Fort Hare, organised through the help of one of the lecturers, and then cleared by the garden members and other community members. Other people from the University of Fort Hare, Nkonkobe Economic Development Agency and other local farmers joined in to help set up the RWH&C structures for the community garden demonstration site on the two days set aside for this (11 and 12 May 2015) (FVN).

Figure 4.13: One of the ponds with a diversion furrow leading into it

The garden members shared that they were happy with the RWH&C practices, as expressed by one of the farmers with a smile on her face: “we are improving the state of the garden so that the vegetables can grow and have enough produce” (FVN). The members no longer had to travel long distances to carry water to the garden (FVN). There has been an increase in agricultural activity in the garden since the implementation of these practices; empty or inactive spaces in the garden have all been worked on quickly due to the garden’s new additions (FVN).

The image below shows one of the dams that is full after some rain (Figure 4.14). The above quote and other discussions during the two days of working on the plot are evidence of the farmers regarding the demonstration site as an important move towards reaching their goals of producing food for their families with some extra to sell (FVN).

Figure 4.14: Dam 1 at Lloyd village community garden full of water after the spring rains

Lloyd village requires maintenance of various RWH&C practices. The diversion furrows which have the purpose of capturing water and leading it to the small ponds need to be maintained constantly as they gather litter and also start to fill up with sand, as indicated by the *Amanzi for Food* field team in the discussions around the demonstration site (FVN). Another challenge is the moles making holes in the plastic lining which causes leaks in the ponds (FVN). The farmers have made a temporary plan to fix the holes but a long term plan needs to be discussed and implemented before farmers become despondent again and lose agricultural activity momentum. One of the trainers, an Alice extension office intern, took on the responsibility of reminding the farmers to maintain these structures, to ensure the sustainability of the productive demonstration site.

4.8.2. Keiskammahoek Farmer Plot Demonstration Site

An individual farmer from the learning network showed an interest in implementing a demonstration site on her private property. A college lecturer and the farmer's extension advisor both facilitated the use of the WRC RWH&C materials to build tied ridges, a type of

infield RWH&C practice, into her sloped garden. She also used mulching on her plot, as seen in figure 4.15.

Figure 4.15: A photograph sent to the Imvothu Bubomi WhatsApp group of the demonstration site, showing the tied ridges and mulching

A Fort Cox College lecturer and extension advisor both got involved with helping the farmer with logistics and planning of the site (Figure 4.16). She has subsequently had visitors to her plot and has showed them the practices and how they work well for harvesting and conserving water in the soil (FVN). The extension advisor is not formally part of the learning network although he has shown an interest in the RWH&C practices and has used the WRC resources as well as the farmer's plot as a demonstration for other farmers (FVN).

Figure 4.16: The farmer (behind man in overalls), college lecturer and extension advisors planning the site

4.8.3. Fort Cox College Demonstration Site

One of college lecturers spearheaded development of this site. He is an agricultural engineer and is very enthusiastic about RWH&C practices (figure 4.17 below shows this lecturer standing on one of the pond walls). Other lecturers and researchers from the local research institute facilitated with ideas and planning of the demonstration site. There were a number of ideas that surfaced, but in the end, the leader of the project decided on a site and the practices that would be implemented (FVN). He went out in the rain to see where the water ran to get an idea of what was happening in terms of run off and slope (FVN). A large dam was built using a digger loader. He was going to line the pond with plastic but the rains came before he could do that and the dam filled up as the soil has a high clay content. He had designed the dam so that there is a diversion furrow leading excess water away from the fields (FVN, figure 4.17). Water from the dam is going to be pumped up to a header tank where drip irrigation has been laid out onto the fields as explained by the college lecturer (FVN). The solar pump has not been bought yet so in the interim he has asked college students to manually fill the header tank (FVN). This is not sustainable but works well for

now. The site has been a success and other lecturers have used it to show their students too (FVN).

Figure 4.17: The lead college lecturer showing us the rain fed pond at Fort Cox College farm with the diversion furrow in front of him leading excess water away from the field

4.9. The Value Creation Elements

During the course-led activation of the learning network as a functioning CoP, I started exploring the reasons people decided to participate in the learning network activities and engagements. It was evident from the beginning in the contextual phase of this research that people felt that the course had value; this was expressed at the end of the formal contact sessions too. The value creation elements that emerged from the data are discussed below in terms of their alignment to the value creation framework proposed by Wenger et al. (2011), discussed in section 2.10.

4.9.1. Knowledge and Learning of Rainwater Harvesting and Conservation Practices

Core participants of the learning network showed a key interest in learning about RWH&C practices since the beginning of the research (as discussed in section 4.7). During the first few sessions, participants were asked to write down their expectations of the course. Many participants wrote that they wanted to learn more about different RWH&C practices to take some pressure off their farming activities as water is one of the biggest challenges for homestead and small scale farmers (MTR1&2).

One potential value stage in the value creation framework discussed in section 2.10, is knowledge capital and this was produced through the course interactions and activities. The potential for knowledge capital was realised in the beginning of the participant interactions as mentioned above. Only towards the end of the course sessions was knowledge capital actualised in the form of personal assets as skills and practice (discussed in section 4.7.2.3), and with relationships and connections (discussed in section 4.7.2.1.) which is also expanded on below in terms of value created in section 4.9.2. The transformed ability to learn, as proposed by Wenger et al. (2011), where participating in a network encourages collaborations and social learning, is seen in the assignments that participants produced. For example, farmer 4, completed all the course assignments and received a certificate for his work, which was good evidence of a transformed ability to learn. A comment in his capacity development report regarding enhanced knowledge of RWH&C practices was noteworthy: "the farmer's knowledge and appreciation of the significance of RWH&C was enhanced as shown by his responses and discussion in the assignments. The course reinforced his understanding of gelesha as seen in his second assignment" (CDD). From another participant's capacity development report: "the course reinforced his understanding of RWH&C practices and what is appropriate for what level of farming". An extract from this farmer's assignment 4: "These [practices] are chosen for I view them to best fit the different farmer's needs and circumstances in the various areas of operations, varying from home gardens/backyard gardens, community gardens and fields and their levels." (CCD)

4.9.2. Networking Interactions

All learning network members expressed a great need for a platform for collaborative encouraging engagements among different partners in the sector, as previously discussed in sections 4.5.2 and 4.7.2. It was evident from the very first discussions with participants to the strategy planning meeting with participants, that agricultural actors need more opportunities to get together and discuss solutions to challenges they are facing their agricultural activities (FVN). This especially the case for farmers as they are key partners in the sector.

This element of value created fits in with the immediate value phase that Wenger et al. (2011) proposed. The networking interactions and activities that come with engaging with others bring value to participants immediately as they have the chance to meet new people and collaborate with them on similar interests. Hearing stories of other people's experiences can generate new ideas and stimulate discussion as discussed in section 4.6 where personal experiences of network participation were presented.

4.9.3. Support in Training and Implementing Demonstration Sites around Rainwater Harvesting and Conservation practices

Some of the network members were very interested in the information and resource support that they would receive through the implementation of the demonstrations sites as indicated by the drive in implementing the change project sites discussed in section 4.8. One of the demonstration sites was in Keiskammahoek (section 4.8.2). The farmer had been very eager to have a site on her plot (FVN). She ultimately drove the process and the site was completed in a few days (FVN). The *Amanzi for Food* team did not even have a chance to document the process, by the time we had driven to Keiskammahoek, the site had been developed and seedlings were already planted (FVN).

Another farmer received some lining for two ponds on his property and some support from college lecturers although nothing has happened as yet on his land. One extension officer reflected that often when projects hand out too much, people simply take the support and do not engage with the practices and resources (Ieo1, discussed in section 4.6). The Amanzi for Food project was only able to provide minimum financial support for participants to implement demonstration sites.

The success in implementing RWH&C productive demonstration sites demonstrates the applied and realised value proposed by Wenger et al. (2011) (discussed in section 2.10). The applied value was realised when the knowledge capital gained through the engagement in the CoP was used and applied within the context, when the changes in practice were achieved. This was achieved here through the implementation of RWH&C practices into the demonstration sites as described in section 4.8 when the value in the course was realised. Particularly in the three successful demonstration sites, there was evidence of an increase in agricultural activity along with improved water practices which is what the participants wanted to achieve, raising their interest in the *Amanzi for Food* course.

I go on to describe the need for the support in training of RWH&C practices and the implementation of productive demonstration sites as discussed while planning the way forward during the learning network strategy meeting in October 2015. The participants that attended discussed issues of sustainability of the group and continuing the RWH&C practice training conversation (LNSMR). A committee was elected to ensure that activities and events continued to occur. The Imvothu Bubomi Committee positions chosen were a Chairperson, Vice chairperson, Secretary, Training coordinator and a Communication coordinator. The positions were filled quickly by college lecturers, a farmer and an intern at the local economic development agency. The Secretary position was not as willingly accepted and the candidate still needs to confirm. A lecturer at Fort Cox College, an active ToT course certificate holder, was elected as chairman. The vice chairman position was taken up by a local farmer and active member and secretary of the Nkonkobe Farmers' Association; she is eager to assist the training coordinator with planning and logistics. Either a university lecturer or extension advisor will be acting as the secretary of the learning

network; this is still to be decided by the next meeting in early 2016. The training coordinator to be assisted by the vice chairman was selected as a young female intern at Nkonkobe economic development agency; she is energetic and very positive about RWH&C practices and local farming initiatives. The communication coordinator is a vital part of this committee to continue the conversation around RWH&C and inform all network members of various events and activities in the area. The elected candidate is a lecturer at Fort Cox College who is very active in the network and she has also received a certificate for her efforts in the ToT course. I wrote a profile for her position as many of her responsibilities were the ones that I had fulfilled during the course engagements.

This committee has the responsibility of continuing RWH&C activities in the area, although the *Amanzi for Food* project team based at Rhodes University will continue to facilitate the process over the next few years. The WRC project officially ends in July 2016, but there are students and there is operational funding for the engagement to continue for a while longer.

4.9.4. Rhodes University Certification

A few of the participants were attracted to the course networking sessions because of the Rhodes University accredited certificate aligned with the ToT course (FVN). The certificate is very valuable to some of the network members. One of the farmers, in particular, was eager to receive his certificate and worked very hard to meet the requirements of the accreditation. He constantly messaged to receive news about the certificate progress, as shown by these text messages: “Hi Kim, u alright. Tell me please mama, when I am going to get my certificate. I want it urgently mama, please reply” (SMSf) and “I remind you about my certificate please. Waiting for your reply. Thanks” (SMSf).

The certification ceremony was held on 15 October 2015 and six participants achieved full accreditation with an additional nine participants receiving letters of participation (see figure 4.18). The six that received certificates were a farmer, an extension advisor, a

Nkonkobe Economic Development Agency employee and three college lecturers. The letters of participation were awarded to those that did not meet the requirements in their assignments or did not submit all their assignments, although they did participate in most of the contact sessions during the course. There were three participants (two researchers and an extension intern) who were close to achieving competence but a few mishaps resulted in them not achieving adequate competence for certificates; they did still receive letters of participation.

Figure 4.18: A collage of all the participants receiving their certificates or letters of participation from the Dean of Education at Rhodes University

This element of value is one of pride and accomplishment; it does not particularly fit within the value creation framework proposed by Wenger et al. (2011). However, a certificate does represent new knowledge and competence in the practice and participants certainly took pride in having a certificate from a recognised institution.

4.10. Concluding Summary

This chapter serves the purpose of providing insights into the course-led activation of the learning network as a CoP and the *Amanzi for Food* project activities with reference and description of that data. The agricultural landscape is a well-represented sector in the study area with all parties bringing different qualities and in so doing, adding value to the sector and its potential for growing as a linked and functioning community that share experiences and learning. From this representation of the data over the project's lifespan, I now explore the claims further in the form of analytical statements in the next chapter.

CHAPTER FIVE

Discussion, Conclusion and Recommendations

5.1. Introduction

The previous chapter, chapter four, presented the data that was generated over the research journey. Raw data was analysed and presented in a way that was informed by Wenger's CoP theory. In this chapter I worked with the presentation of the data in the previous chapter in reference to the purpose of the study – to gain an understanding of the course-led activation of a CoP around shared practice in agricultural RWH&C – to derive analytical statements based on the evidence of course activated learning and change. The research that was explored in chapter two is also drawn on when discussing these statements. Analytical statements are used to condense the data and facilitate discussion (Bassey, 2001). I then discuss how this approach can support knowledge sharing and social learning in an agricultural context.

I used the literature that I reviewed in chapter two to guide my thinking around the course-led activation of the learning community, as well as to validate and discuss the findings. Wenger's CoP theory enabled me to gain insights into the learning and how the expansion of the learning could occur. The research questions addressed in this research were:

- Can cultivating a learning network amongst different actors in the agricultural sector strengthen engagement with RWH&C practices, and if so how?
    - To map learning network links and social learning processes that were evident amongst agricultural institutions and individuals?
    - Can, and if so, how can a participatory course-led activation of a learning network cultivate a community of practice that fosters learning, or not?
    - What value creation elements are evident in a course-led approach to activate the formation of a learning network focussing on RWH&C practices?

This chapter provides a summary of my research findings along with recommendations towards cultivating learning communities in the agricultural sector. This is achieved through

drawing on chapter five's analytical statements and the data presented in chapter four. By reflecting on my research questions, I was able to draw on the findings to provide final comments on my research journey. Lastly, I review the research process and discuss possible recommendations for future research.

5.2. Course-led Activation of the Learning Network

The course-led process of activating a community of practice where learning about RWH&C practices is positioned centrally was achieved (as reported in section 4.4). The course was designed and based on previous research by the Environmental Learning Research Centre (see section 2.9). The three principles of the *Amanzi for Food* ToT course curriculum framework were proposed by Lotz-Sisitka et al. (2014b) included: practice-centred, expansive and change-orientated. This brings us to the first analytical statement below.

Analytical Statement 1: The ToT course mobilised a collaborative and expansive process of initiating change in the farming communities through centralising farmers' knowledge and experience in the learning network of RWH&C for food production.

The contact sessions during the course opened a space for farmers to discuss their challenges and successes as explored in section 4.6. Farmers shared their challenges with other network members and collaboration towards solutions emerged through discussion and sharing, as discussed in section 4.7.1. For example, the issue of youth being uninterested in agricultural activities was shown to be an increasing issue in the sector. Causes of this challenge were discussed in detail (see section 4.6.2) in order to understand the phenomenon of a generation not interested in rural farming activities. Solutions and programmes to encourage more involvement of the youth in farming were shared and discussed, but there was still the issue of limited capacity in institutions to act on these solutions. Aspirations and success stories were shared too during sessions (see section 4.6.1), which seemed to give others an incentive to continue with their work. Extension officers expressed their reasons for sustained commitment to their jobs and it seemed that

the ones with an interest in local agricultural success, have the greatest passion to engage in farmer support.

Through the course there was active involvement of participants towards expanding learning and training around RWH&C practices. This expansion of the learning network is explored in greater detail below in section 5.4. Through the various media tools introduced in section 1.2.1, used as a means of extending the course interactions into a networked learning system, there were opportunities for participants to expand learning and teaching of these agricultural practices. Additionally through the election of a committee for the Imvothu Bubomi learning network (see section 4.9.3), the importance of further training was raised. The learning network aimed to have a training co-ordinator committed to drive this process.

The ToT course fostered change through the change projects discussed in section 4.8. The demonstration sites as change projects, encouraged participants to work together towards using the WRC resources to implement RWH&C practices (see section 4.5.1) and in so doing, farmer knowledge and experience was centralized among the other participants.

5.2.1. Participation and Learning

As shown in chapter four, the participants in the *Amanzi for Food* Project actively participated in the course interactions where RWH&C practices were implemented into their practice (see section 4.4.1). Wenger (1998b) places learning as situated in the active participation in the context in which people are situated. The evidence of learning explored in section 4.5 added to the value of the course explored in section 4.9, as many of the participants joined the course with the hope of implementing these practices. Through participating and engaging with the practices there was a greater sense of common knowledge and shared experience growing (see section 4.7.3.2). This experience is where meaning making of the concepts and practice is met.

As this study shows, the course-led approach for bringing a CoP together over a shared matter of concern is effective. The participants engaged with the WRC resources and course handouts when working during the course module sessions as well as on assignments leading to the implementation of change projects when working away from contact sessions. This enabled an engaged process with the content in the resources as well as with the other network members, as all participants wanted to see an increase in agricultural activity in the area. With the introduction of the ToT course into the sector among the different agricultural actors, there was a common interest bringing them together with, as described by Wenger (2000), a shared motive (see section 2.8 & 4.7.1). As described in section 4.5.2, the course presented the opportunity for participants to engage with different players and form new bonds. The next analytical statement attempts to capture the cultivation of the CoP through the ToT course activities.

Analytical Statement 2: The ToT course facilitated the emergence of new relationships and collaborative engagements, which provided a platform for learning about RWH&C practices through implementing productive demonstration sites.

This statement captures the description of the CoP in the learning network that has been discussed in detail in section 4.2 and it captures the three dimensions of social competence that were achieved in section 4.7. The negotiated enterprise and common interest of the Imvothu Bubomi learning network (see section 4.7.1.1) centralises the community, identity, practice and meaning of RWH&C practices for food production. Introduced in section 2.8, Wenger's (1998a) image (see figure 2.1) illustrated the four attributes contributing towards learning in a CoP: practice, community, meaning and identity. The sense of belonging and becoming contributes to the learning that is enabled by building a community with a shared identity; this was explored in section 4.7 for the Imvothu Bubomi learning network. The practice and meaning was developed through the collaborative activities that took place during the course interactions where participants had a shared history of learning (section 4.7.3.2). Learning occurred through experience and doing of the practices which was achieved in the course activities and in the implementation of the demonstration sites (section 4.8).

The three demonstration sites discussed in section 2.8 were the main activities requiring collaboration and new participant relationships were formed (discussed in section 4.7.2.1). The social interactions that occurred in the learning network nurtured learning of RWH&C practices in the CoP. Participation and learning that was central to the learning network supported and enabled the growth and expansion of the CoP.

5.3. Value Creation in the Training of Trainers Course

The five cycles in the value creation framework proposed by Wenger et al. (2011) were discussed in section 2.10, and were explored in the course-led activation of the CoP. The four different elements of value that emerged from the data discussed in section 4.9 had attracted individuals to participate in the course. These were knowledge and learning of RWH&C practices; beneficial network interactions; support in the form of training and the implementation of demonstration sites; and the prospect of achieving Rhodes University certification (section 4.9). When analysing the data for value creation elements expressed by the research participants, it was evident that course attendance was related to the potential value of the course to the participants. The more value attributed to and experienced in the course, the higher the levels of attendance in course sessions and the more actively involved participants were in working towards accreditation. This leads to the third analytical statement.

Analytical Statement 3: Participants found value in the course, making it worthwhile for them to attend the sessions and attempt to achieve competence in the practices being taught.

Elements of value were important to consider for the *Amanzi for Food* ToT course. When looking at the cycles proposed by Wenger et al. (2011), it was interesting to see those surfacing in the data as presented in section 4.9 through the elements presented. The cycles that serve as the foundation of the assessment of the Wenger et al.'s (2011) value creation framework were considered together with the elements that had emerged; there was an

overlap with what Wenger et al. (2011) described and the data as discussed in section 4.9. Immediate value was found in the social interactions and activities around the course structure with a diverse group of agricultural actors. Potential value was found in the knowledge capital that participants sought and gained from the course interactions around RWH&C agricultural practices. When the change projects were implemented (section 4.8), applied value was found with the practical experience participants gained. As these demonstration sites developed, the performance of the sites and the agricultural activity improved and realised value was found through the course activities. These four stages of value creation were not necessarily achieved in a linear fashion and could have been found and realised at different times during the course.

The reframing value stage which Wenger et al. (2011) listed as the last cycle, is where success is redefined and the social learning process encourages participants to reconsider their learning requirements and achieve competencies that are important for a CoP. This reframing process will then challenge the status quo and participants will seek solutions for challenges and problems that occur in the community. In the data explored in chapter four there is evidence of this cycle being reached, where participants seek knowledge for what they consider necessary in their context. For example, through the ToT course process, the participants who were engaged in the change projects and on course assignments, used the WRC materials to introduce RWH&C practices into their individual activities. Demonstration sites enabled RWH&C practices to be implemented as a solution to the water challenges faced by the communities (section 4.8). The trainers and educators used the resources to incorporate information of RWH&C practices into their training and teaching (CCD). Additionally, as the CoP continues into new stages of development (see figure 2.2 in chapter two) with the appointment of a committee to take their activities further into future actives stages while the core CoP members move between the active and dispersed or memorable stages, they may redefine success in their context as future challenges and new collaborations occur.

5.4. Momentum and Expansion of Social Learning in the Imvothu Bubomi Learning Network

Elements of both experience and competence have emerged amongst the network members, and were reflected in their change projects. Participants fully engaged with the course process and learning did occur with regard to RWH&C practices as well as their networking ability, as shown in sections 4.5.1 and 4.5.2. The Imvothu Bubomi learning network has elements of a functioning CoP: events that serve to reify practice; leadership or the core participants in the learning network; connectivity among network members; membership to the Imvothu Bubomi learning network; artefacts such as shared resources; and change projects. The wider network comprised many people who interacted with the idea of RWH&C practices in order to incorporate this into their practice. This network can be divided into three different groups of people: the core, the intermittent and the peripheral participants. These three groups are depicted in figure 4.4 in chapter four and all three in the Imvothu Bubomi learning network. The core group contained the champions of the group's learning interactions and the main participants who kept the network going. The momentum of the core group in developing and implementing RWH&C demonstrations sites, led to the expansion of agricultural activities into the wider local community.

5.4.1. Media Tools for the Expansion of the Social Learning Processes

The media tools discussed below were intended to be used as ways of keeping the discussions alive around RWH&C practices between the learning network participants and the rest of the expanding community. There were various activities and platforms that had been made available to participants through the *Amanzi for Food* programme which I discuss below.

5.4.1.1. The Amanzi for Food Website and Blog

The *Amanzi for Food* website and blog went live in February 2015 after a careful process of developing the site. It was key for the site to be accessible and easy to navigate in a way that a diverse audience could obtain various information required. Figure 5.1 presents an image of the home page of the website. The blog enabled the conversation to keep going while the website was being developed. The main contributors have been the *Amanzi for Food* field team based at Rhodes University, although participants have been encouraged to contribute to the blog, with some having shown great interest. The hope was that the website would be used for accessing water related information and for overcoming challenges in food production and that the blog could serve the purpose of continuing the conversation around RWH&C practices for food production.

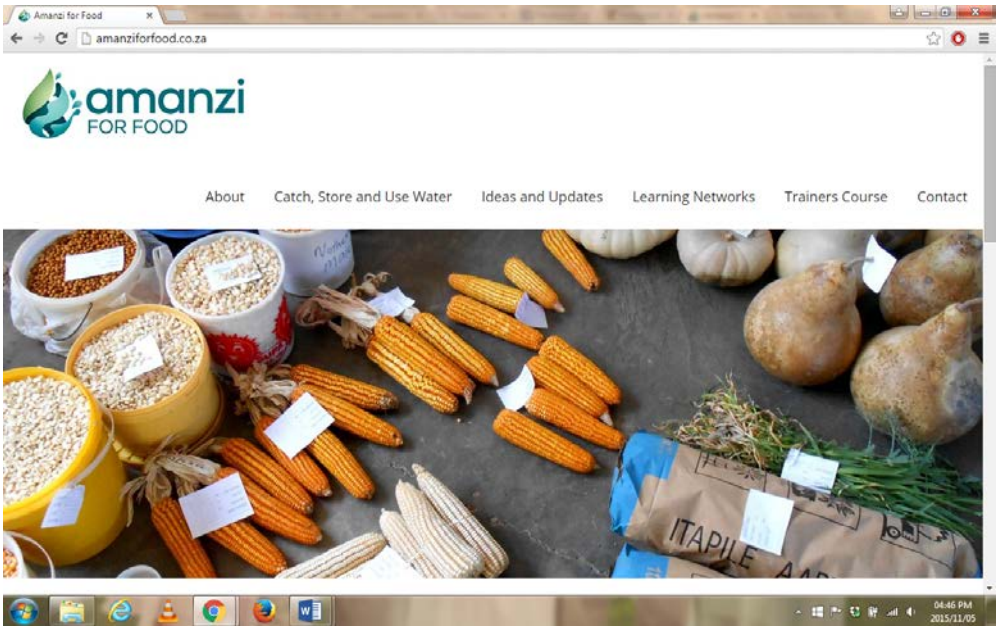


Figure 5.1: The *Amanzi for Food* Website home page (www.amanziforfood.co.za)

The *Amanzi for Food* website will be linked to Extension Suite Online® and the new Agrisuite Online® that was introduced in section 2.6. Both these platforms are very important for disseminating knowledge into the training and farming circles, as reported in section 4.3. The team that runs these systems from Manstrat agricultural intelligence solutions have acknowledged the importance of the work that *Amanzi for Food* is promoting and so there is

a plan to link the sites to one another at the end of 2015 or early 2016 (see section 4.6). This should increase the amount of trainers and farmers that can access the information around RWH&C practices for agricultural activities throughout the country through gaining access to their users too.

5.4.1.2. The Amanzi for Food Facebook Page

The Facebook page was opened along with the website and blog site in February 2015 with the purpose of sharing the new blogposts and ideas around RWH&C practices. Additionally, the page should be a communicative platform for conversations around these practices and a space for people to ask questions and interact with one another. Figure 5.2 is a screenshot of the Facebook page. There has been a slow start to the page with not too many posts, although after various events there is more activity on the page. For example, after radio broadcasts there is always an increase in followers or likes to the page. The *Amanzi for Food* team is currently updating the page and responding to questions and queries around conservation agriculture, but in the future, it is hoped that network participants will follow up on these especially the Imvothu Bubomi communication coordinator.

Figure 5.2: the Amanzi for Food Facebook page

5.4.1.3. Amanzi for Food Radio Broadcasts

Commercial and community radio stations have shown to be effective agricultural information sharing tools that many people, especially farmers, claimed to use for accessing new agricultural information as reported in section 4.3. The *Amanzi for Food* team started exploring the possibility of contributing towards their agricultural show, Ezolimo, on a community radio station in Nkonkobe municipal area called Forte FM. This radio station is based at the University of Fort Hare and is aimed to support students and other local people in the villages and communities in the area with contextually relevant information. Figure 5.3 below shows the *Amanzi for Food* team and network members participating in broadcasting at Forte FM's studio. Network members along with a few *Amanzi for Food* team members participated in four agricultural shows on Forte FM, a community radio station based at the University of Fort Hare. They shared ideas and stories around RWH&C practices (FVN). A fellow Masters student, Chisala Lupele, is researching the radio broadcasting's impact on the learning network and wider community (Lupele, 2015). There will be more shows in 2016 as she conducts her research.

Figure 5.3: The Amanzi for Food team with network members during a live broadcast on Forte FM.

A very popular commercial radio station in the isiXhosa speaking region, Umhlobe Wenene, also has an agricultural programme. The *Amanzi for Food* team members have also contributed to a show on this station, and more may occur next year. Both radio stations have had a positive response to the *Amanzi for Food* contributions towards the show. Lupele's (2015) research should help with developing a deeper understanding of the impact of radio on the agricultural landscape.

5.4.1.4. The Imvothu Bubomi WhatsApp Group

WhatsApp is a messaging application for smart phones that allows people to message one another in a group where all receive messages. It uses data or Wi-Fi and so it is more cost effective than sending text messages. One can also share photos easily through this application. Many Imvothu Bubomi network partners have mobile phones with this application, so I created a WhatsApp group including as many participants as possible in May 2015. Participants have participated in the discussions on the group, sharing stories, ideas and events on the group. Unfortunately there were no farmers on the group as they did not have smart phones. This WhatsApp group has then been restricted to trainers,

researchers, educators and the *Amanzi for Food* team members. There were 14 participants, including most of the core participants that were active in this group. Most of the network committee members were in this group.

5.4.2. Learning Network Expansion

The learning network concept was quickly adopted by the agricultural actors that actively participated in the learning network engagements as reported in section 4.4 and 4.4.1. They found great value in this concept and found the networking platform useful for connecting with other agricultural players and beneficial to their agricultural activities as reported in section 4.9.2. There was great interest to continue with networking activities as discussed above in section 5.3. Various media tools were explored as ways of doing this as discussed above (Section 5.4.1). The next analytical statement captures the findings around these tools and how it facilitated the expansion of the network.

Analytical Statement 4: The media tools used in this project enabled and continue to enable the expansion of the learning network into the wider local community.

The ToT course enabled the creation of shared resources and a shared history of learning as discussed in section 4.7.3 .The course provided the tools that the network members used to communicate with one another. Additionally, they used these tools to continue the conversation and plan towards the common goal of integrating RWH&C practices into their different practices. Direct media tools such as WhatsApp and Facebook have been used by network members to discuss plans and to share events and photos, as discussed in section 4.7.2.1.

The community radio station and the website enabled the conversation around RWH&C practices to expand beyond the networked community who interact with one another to the wider community. These two wider-reaching tools allowed for people who were not directly linked to the network to find out about various activities in the area. The use of

community and commercial radio broadcasts to disseminate information about the project and RWH&C practices surfaced results that strengthened the participatory extension approach. By having network members participate in the radio show panels, there was the sense of the project being local. It had created a space for farmers and extension officers to share their experiences. For example, a local farmers association's secretary was listening into one of the broadcasts and was interested in finding out more when she recognised an extension officer on the show. She then took the initiative to contact him to find out more about *Amanzi for Food* in order to get involved in creating training opportunities for herself and other farmers in the association. The broadcasts have also informed people about who was participating in the project and who could provide advice towards implementing these practices into their activities.

Participating in the local municipal agricultural shows also contributed to the expansion of the learning network. The *Amanzi for Food* team attended a few of these shows where they set up a demonstration and provided materials, posters and handouts (see figure 5.4). A team member also shared the programme during the introductory speeches. This opportunity created awareness of the project and RWH&C practices among other farmers and trainers in the area. During interactions at these shows, the demand for more training and information was evident (see the discussion in section 4.9.3 about the Imvothu Bubomi Committee and the importance of having a training coordinator). During one of the speeches, the *Amanzi for Food* partners were mentioned in the hope that any interested people would approach those institutions to continue the conversation around RWH&C practices.

Figure 5.4: Chisala Lupele discussing RWH&C practices displayed in the posters with local farmers

In the learning network action plan discussed during the learning strategy meeting, there was mention of information days where participants had site visits to learn from the experiences of others. These days could be used as effective dissemination points of the WRC materials to learn about different RWH&C practices.

5.5. Farmers Access to Information

The patterns of social learning interactions explored in this research provide useful insights into improving accessibility of resources into the agricultural community (see section 4.3). The farming community is the key focus here, as they are the end users of the learning resources and the implementers of the practices. The next analytical statement reflects the findings around the farmers' learning communications channels and social learning processes.

Analytical Statement 5: Rural farmers in the learning network rely on agricultural extension for support in their agricultural activities and training opportunities; training materials are often received from extension officers.

Section 2.6 contributed an understanding of this claim by expressing the importance of extension support for food growers especially in a rural setting. Both governmental and private support has been given to farmers for the development of agricultural activities, as was also evident in the roles of the extension and economic development structure in the learning network discussed in section 4.2.2. These support structures are vital for farmers to develop and change their practices if necessary, although more social collaborative ways should be considered. As discussed in chapter 2, knowing can be established through social interactions and this was evident in the data, as reported in section 4.5.2. Communication amongst different agricultural actors was needed for a process where knowledge could be constructed through collaboration, as shown in section 4.4.

Agricultural support as in advisory and financial are the two ways in which agricultural extension advisors support local farmers, the latter being the more critical and needed in rural areas. Training opportunities are often made available through the extension advisors in particular areas, these training activities connect farmers involved in similar agricultural activities (see section 4.3). Often experts are called in to provide these trainings so that expert advice can be given to the farmers involved in these activities, extension advisors are not always knowledgeable in all fields.

The WRC learning materials that were the core focus of the learning network were used by the farmers, trainers, researchers and educators in implementing the demonstration sites (see section 4.7.3.1). The handouts were the most used during the sites implementation as they are easy to follow and show step-by-step what needs to be done. For example in figure 4.10 in section 4.8, the image shows a young intern from the Alice extension office using a handout from the water harvesting and conservation report to guide him and a few farmers in constructing and using the A-Frame to measure slope for running the diversion furrows

across to collect rainwater and lead it to the small ponds. The WRC resources were engaged with during the course process and all participants still have them and know how to engage with the knowledge for future agricultural activities.

Other than the obvious training opportunities made available to farmers and others to encourage and challenge changes in practice, there are a range of other social learning processes that were discussed in section 4.3. They provided insights into what communication platforms worked with the other groups of people in the agricultural sector. These insights were useful to the *Amanzi for Food* programme as well as my research in suggesting ways in which to connect with the different agricultural actors to continue the discussion around RWH&C practices. These practices are important for creating a food secure nation.

5.5.1. Training Support

As mentioned above, farmer training was the most important way to reach rural farmers to give support and insights into different agricultural activities and practices. Agricultural extension advisors were seen to be key people who supported these farmers, along with other training facilities. In section 2.6, the literature around extension and social learning was explored. In the Nkonkobe area, there were extension advisors, a few NGOs and local development agencies that provided training services to farmers, as was reported in section 4.2. Training was mentioned as an integral part of the plan going forward that the Imvothu Bubomi learning network committee members discussed at the learning network strategy meeting as discussed in section 4.9.3.

5.6. The Complex Context of the Agricultural Landscape

It was evident that communication and engagement among actors in the agricultural sector was often lacking and the actors do not interact as much as they could as explored in sections 2.5 and 2.6. The contextual findings reported in section 4.2 were important for the

study to move forward towards understanding the dynamics in the activation and cultivation of functional learning communities in the agricultural sector. The contextual data pointed to a diverse agricultural landscape where many stakeholders were focusing on agricultural development in some way or another (their roles were explored in section 4.2.2). The last analytical statement therefore summarises the findings and concerns regarding this context.

Analytical Statement 6: The agricultural sector has diverse actors working towards similar goals in an isolated manner who lack the platform to come together to discuss solutions towards various problems.

In section 4.2, the context was reflected as complex with many different groups of people working in the Amathole District's agricultural landscape as noted at the start of this research. The different players involved in agricultural activities tended to work in isolated 'silos' within their institutes and rarely engaged with people outside of their work place. As shown in this study, after the initial focus group discussions with the key players in the sector, other links to agricultural stakeholders in the area continued to emerge even towards the end of the course interactions. The area has many people and institutions that are active in agricultural related activities. The importance of the different roles of the diverse stakeholders, from the formal educators to the more informal trainers, was emphasised in the data reported in section 4.2.2, as well as in the literature in section 2.6.

Wenger et al. (2011) suggested that social networks provide a platform for collaborations around solving problems. This was seen in the data where the course-led initiative of activating a learning network enabled the participants to discuss problems and possible solutions (see sections 4.4; 4.6). This literature reviewed in section 2.6 guided the decision to cultivate the CoP in an attempt to encourage collaboration and multidisciplinary involvement between institutions in the sector. The relationships, membership, engagement in practice and diversity of the learning network which is discussed in section

4.7.2 added to the participants building social competence to foster learning and creating value to redefine their success for agricultural activities.

5.7. Summary of Research Findings

In formative interventionist research such as this, it is useful to get an idea of how to intervene in a way that enables positive outcomes of participant interactions. This research allowed for a grounded engagement with real world concerns and the mobilisation of participants in new ways. The cultivation of the learning network through the ToT course has strengthened and supported relationships in the Nkonkobe agricultural sector.

My approach to this research was to first understand the context of the Nkonkobe municipal area's agricultural sector, and who the main agricultural actors were. Once these institutions and individuals were identified, the *Amanzi for Food* team introduced a ToT course as a way to cultivate a learning network with RWH&C practices as the main focus of learning. Engaging in the ToT course sessions with the research participants as a facilitator of the course and visiting them in between sessions for support visits or interviews enabled me to generate data to document the process of cultivating a CoP. Most of the focus group discussions and one-on-one interviews were recorded and transcribed in order to gain a deeper understanding of the process. Insights into the process of cultivating a CoP were achieved through thematic coding and compiling analytical memos. The thematic coding drew on Wenger's CoP theory which served as a useful framework for understanding the collaborative engagements that enabled learning.

Relationships transpired through the numerous contact sessions and events that took place during the course and which continue to occur. Collaborations in the planning and implementation of demonstration sites helped bind these individual relationships where participants actively communicated with one another and worked together on these projects. The demonstration sites were one of the main attraction bringing members together as reported in 4.9.3. The learning network plans to have information days and farm

visits where they will invite people to visit their sites and show them what RWH&C practices are being demonstrated. This will act as a way of exposing other key agricultural partners and hopefully young farmers to RWH&C, ensuring that collaborative engagements continue to occur and may for a long time after the direct course engagements.

Strategies for dissemination of information through networking and media platforms were explored through this research. This is discussed further in the next section where recommendations towards cultivating agricultural learning communities are explored.

5.8. Recommendations towards Cultivating Agricultural Learning Networks

By drawing on my analytical statements above, I am able to make some suggestions or recommendations for the agricultural sector to encourage learning networks amongst the agricultural community. Additionally, I draw on the learning network literature discussed in section 2.7 to inform these recommendations which focus on learning through agricultural farmer activities.

5.8.1. The Need for Networking in the Sector

The first two analytical statements discussed in sections 5.2 and 5.3 emphasise that there are very few platforms for agricultural actors to meet and discuss their work and common local issues. Due to this lack of communication between isolated stakeholders, there is a need for collaborative engagement where networked learning is encouraged within the agricultural sector. Although the course-led cultivation of a CoP was successful, it may not be viable on a regular basis as there would be a need for a project to drive the initiative. This can be time and resource heavy which is not always practical when actors may have day jobs and resources may not be available. But there are still opportunities where networking can be encouraged and this is important for collaborative and social learning.

Being able to draw on farmers' knowledge and experience can be valuable to the other agricultural actors, as they have the opportunity to hear what is happening on the ground. There were very few opportunities for university and college lecturers to meet farmers and discuss with them what information was needed. The lecturers were the people responsible for teaching and training the extension advisors and NGO facilitators as well as prospective farmers. Through the discussions with the participants it was evident that these interactions were valuable to them, as reported in section 4.9.2. Researchers often only interact with commercial farmers, so this space where they interacted with small scale farmers opened up interesting discussions and interactions between the two. Small scale farmer participants often thought of researchers from Döhne as inaccessible and unable to assist them, which is not always the case, as explained by the researchers. They are able to assist the farmers with soil samples if the requests are made at specific times when their facilities are open to the general public.

5.8.2. The Need to Use the Community of Practice Framework to Increase Learning Opportunities

In sections 5.3 and 5.4, where analytical statements 3 and 4 were discussed, the CoP framework enabled the successful collaborative engagements within the learning network. The learning that is facilitated among network members occurs through the joint enterprise, mutual engagement and shared repertoire that is achieved through the emergence of a CoP. Having the shared interest and motive (see section 4.7.1) in joining the learning network and participating in the course enabled the participants to engage with the RWH&C practices introduced through the course and in the implementation of the productive demonstration sites. The relationships formed during the course interactions enabled collaborative engagement around specific challenges facing the community and learning of new possible agricultural practices. The ToT course acted as a conduit to the formation of the diverse CoP, although there may be alternate ways of doing so. The learning network explored in this research is unique in that it is inclusive of a diverse range of members in the agricultural sector.

5.8.3. Various Media Tools were Useful in Disseminating Agricultural Information

Section 5.4.1 presents the different media tools and platforms that were explored in this research to extend learning in the CoP. Radio will be explored further in Lupele's work. These tools have been found to be useful avenues for mobilising people in the agricultural sector to discuss RW&C practices. Therefore, the media tools could be used to disseminate relevant agricultural information into wider communities for small scale farmers to use in their agricultural activities. Radio, Facebook, WhatsApp, a blog and a website were all important media tools to reach out into the wider community regarding the dissemination of agricultural information. The agricultural sector should be utilising these media tools and platforms in order to reach a wider audience for agricultural learning of practices especially with sustainable agriculture in mind with climate variability as a challenge farmers are facing.

5.9. A Critical Review of my Research Journey

The CoP framework can maximise learning opportunities and engagements. As expressed by Cox (2005), the theory of communities of practice is used in a diverse number of ways. The way it has been used in this research is in a way to guide the process of knowledge sharing and learning of particular agricultural practices. Cox (2005) added that it is used critically as a lens to refer to an informal community who are facilitated to increase productivity and learning around a shared interest.

When thinking about the research and what has been achieved, there are a few things that I would do differently if I were to start over. In the beginning of the research journey, I would have spent more time engaging with the literature for a deeper understanding before setting out to generate data. I would have also taken every opportunity possible to interview more of the research participants although time is always an issue.

When reflecting on the research questions and the purpose of this study, it is evident that more data could have been generated through interviewing more the research participants. This data could have provided a better understanding of the interactions and learning that may have taken place during the research period. A few follow-up interviews would have provided further insights into the value that was created from the course. However, this study set out to gain a deeper understanding of the course-led process of cultivating a CoP that encourages learning of RWH&C practices. The data that was generated through the facilitation of the course and support visits with interviews was sufficient for the aim of the research within the scope of a Master's degree. This study has achieved its initial aim and as such, can act as a baseline study for further research within the *Amanzi for Food* programme.

5.10. Recommendations for Future Research

The various media channels that were superficially explored in my research have been shown to play important roles in the communication channels within the agricultural sector. Due to the scope of my research, these were not explored further. However, a fellow Masters student that started after my first year is looking at community radio as a wider dissemination tool with listening clubs as a way to gauge the potential for learning about RWH&C practices (Lupele, 2015). The *Amanzi for Food* website and Facebook page are other channels that have potential to reach a wider interested audience to engage with these practices and these could be explored in greater detail in further research.

The farmer challenges that surfaced in my research present another area for possible further research. These challenges included water availability, funding, extension support expectations, involvement of youth, theft and sabotage. Only one of the challenges was directly addressed through this research – water access and availability. Information on RWH&C practices addresses this challenge. There is a need for the other challenges of the farming community to be investigated in order to develop potential solutions for these challenges that can be introduced into this community. Youth involvement is one of the bigger challenges that is facing most of South Africa. It is extremely important for young

people to be active in farming activities; most active farmers are older. I suggest that these challenges are explored in further research for deeper understanding so that they can be addressed by the agricultural sector.

5.11. Concluding Summary

In the exploration of the data with the learning definition put forward by Wenger, the interplay between the experience and the competence achieved has been explored in the above statements. Facilitation and collaboration during the ToT course to develop productive demonstration sites were key processes in the expansion of RWH&C practices in the study area.

Having reflected on my research process and the findings that were summarised in this chapter, it can be concluded that the CoP framework enables collaborative learning and problem solving in the agricultural sector. Diverse agricultural stakeholders often work in isolated structures where they are working towards similar goals to others in the agricultural landscape. These actors lack a platform where they can meet and collaborate to join resources and work towards their common goal. The learning network structure and course-led process aided participants to meet and work together while learning and collaborating around RWH&C agricultural activities.

Some dimensions of sustainability of the learning network forum have been established, such as governance of the network through the election of a committee along with the media platforms set up by the Amanzi for Food team. These have been established to encourage the continuation of the conversation around RWH&C practices in agricultural activities.

REFERENCES

Altman, M., Hart, T. G., & Jacobs, P. T. (2009). Household food security status in South Africa. *Agrekon*, *48*(4), 345–361.

Amathole District Municipality. (n.d.). Retrieved August 17, 2015, from http://www.localgovernment.co.za/districts/view/2/Amathole-District-Municipality#map

Anil, B., Tonts, M., & Siddique, K. H. M. (2015). Strengthening the performance of farming system groups: Perspectives from a Communities of Practice framework application. *International Journal of Sustainable Development & World Ecology, 22*(3), 219–230.

Backeberg, G. R., & Sanewe, A. J. (2006). The research and development strategy for water utilisation in agriculture – Responding to diverse needs of farmers in South Africa*. Irrigation and Drainage, 55*(3), 281–290.

Backeberg, G. R., & Sanewe, A. J. (2013). Systems approach to water use for food production and energy generation. In *Paper for ICID first world irrigation forum*. Turkey.

Bangay, C., & Blum, N. (2010). Education responses to climate change and quality: Two parts of the same agenda? *International Journal of Educational Development, 30*, 359-368.

Bassey, M. (1999). *Case study research in educational settings*. Buckingham: Open University Press.

Bassey, M. (2001). A solution to the problem of generalisation in educational research: Fuzzy prediction. *Oxford Review of Education, 27*(1), 5–22.

Bender, G. (2008). Exploring conceptual models for community engagement at higher education institutions in South Africa. *Perspectives in Education, 26*(1), 81–95.

Botha, M. E. (2009). Application of the guide for farmer trainers and facilitators on the revitalisation of smallholder rain fed and irrigated agriculture. *Water Research Commission Report No.* KV 221/09.

Botha, M. E. & de Lange, M. (2006). Revitalisation of smallholder rainfed and irrigated agriculture: A guide for farmer trainers and facilitators. *Water Research Commission Report No.* TT 254/1/05.

Brown, J. S. & Duguid, P. (2002). Local knowledge: Innovation in the networked age. *Management Learning, 33*(4), 427-437.

Burt, J., & Berold, R. (2012). Investigating Water Knowledge Flow to Communities. *Water Research Commission Report No*. KV 288/11.

Burt, J., Lotz-Sisitka, H., Rivers, N., Berold, R., Ntshudu, M., Wigley, T., ..., & Kruger, E. (2014). The role of knowledge in a democratic society: investigations into mediation and change-oriented learning in water management practices. *Water Research Commission Report No*. 2074/1/13.

Clandinin, D. J., Murphy, M. S., Huber, J., & Orr, A. M. (2009). Negotiating narrative inquiries: Living in a tension-filled midst. *The Journal of Educational Research*, *103*(2), 81–90.

Cousin, G., & Deepwell, F. (2005). Designs for network learning: A communities of practice perspective. *Studies in Higher Education*, *30*(1), 57–66.

Cowan, J. E., & Menchaca, M. P. (2014). Investigating value creation in a community of practice with social network analysis in a hybrid online graduate education program. *Distance Education, 35*(1), 43–74.

Cox, A. (2005). What are communities of practice? A comparative review of four seminal works. *Journal of Information Science, 31*(6), 527-540.

Danermark, B., Ekström, M., Jakobsen, L., & Karlsson, J. (2002). *Explaining society: Critical realism in the social sciences.* London: Routledge.

Daniels, H. (2002). *Vygotsky and pedagogy.* London: Routledge.

Denison, J., & Wotshela, L. (2009). Indigenous water harvesting and conservation practices: historical context, cases and implications. *Water Research Commission Report No*. TT 392/09, (April).

Edwards, A. (2011). Building common knowledge at the boundaries between professional practices: Relational agency and relational expertise in systems of distributed expertise. *International Journal of Educational Research, 50*, 33-39.

Fay, D. (2010). Cultivators in action, Siyazondla inaction? *Trends and potential in homestead cultivation in rural Mbhashe Municipality*, pp. 1–29. University of California.

Fort Cox College of Agriculture and Forestry. (2014a). History of the college. Retrieved March 20, 2015, from http://www.fortcox.ac.za/about/history.html

Fort Cox College of Agriculture and Forestry. (2014b). Mission, vision, and core values. Retrieved March 20, 2015, from http://www.fortcox.ac.za/about/mission&vision.html

Gagnon, M. L. (2011). Moving knowledge to action through dissemination and exchange. *Journal of Clinical Epidemiology, 64*(1), 25–31.

Greenberg, S. (2010). *Research Report 40: Status report on land and agricultural policy in South Africa.* Cape Town: Institute for Poverty, Land and Agrarian Studies, School of Government, UWC.

Grey, D., & Sadoff, C. W. (2007). Sink or swim? Water security for growth and development. *Water Policy, 9*(6), 545–571.

Hagmann, J., Chuma, E., & Murwira, K. (1996). Improving the output of agricultural extension and research through participatory innovation development and extension; experiences from Zimbabwe. *European Journal of Agricultural Education and Extension, 2*(4), 15–23.

Haug, R. (1999). Some leading issues in international agricultural extension, a literature review. *The Journal of Agricultural Education and Extension, 5*(4), 263–274.

Ison, R., Röling, N., & Watson, D. (2007). Challenges to science and society in the sustainable management and use of water: Investigating the role of social learning. *Environmental Science & Policy, 10*(6), 499–511.

Kidd, A., Lamers, J., Ficarelli, P., & Hoffmann, V. (2000). Privatising agricultural extension: Caveat emptor. *Journal of Rural Studies, 16*, 95–102.

King, C., & Jiggins, J. (2002). A systemic model and theory for facilitating social learning. In C. Leeuwis & R. Pyburn (Eds.), *Wheel-barrows full of frogs. Social learning in rural resource management* (pp. 85-104). Assen: Koninklijke van Gorcum.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lazarus, J. (2004). Community engagement. In *South African Higher Education in the first decade of democracy* (pp. 3–325). Pretoria: Council on Higher Education.

Le Grange, L., & Reddy, C. (2007). Learning of environment(s) and environment(s) of learning. *Southern African Journal of Environmental Education, 24*, 76–81.

Lieberman, A. (2000). Networks as learning communities: Shaping the future of teacher development. *Journal of Teacher Education, 51*(3), 221–227.

Lotz-Sisitka, H., & Burt, J. (2006). A Critical Review of Participatory Practice in Integrated Water Resource Management. *Water Research Commission Report No*. 1434/1/06.

Lotz-Sisitka, H., O'Donoghue, R., Phillips, K., Pesanayi, T. & Sisitka, L. (2013). *Deliverable: No. 2 (WRC project K5/2277); Policy Analysis and the consultation process report on initial consultations with key National Government Departments, NGOs and other stakeholders (Component B)*. Unpublished report, Environmental Learning Research Centre, Rhodes University, Grahamstown.

Lotz-Sisitka, H., O'Donoghue, R., Phillips, K., Pesanayi, T. & Sisitka, L. (2014a). *Deliverable: No. 6 (WRC project K5/2277); Report on the design of knowledge mediation processes with Agricultural colleges (Component A)*. Unpublished report, Environmental Learning Research Centre, Rhodes University, Grahamstown.

Lotz-Sisitka, H., Burt, J., Berold, R., Rivers, N., Ntshudu, M., Jenkin, T., Stanford, M., & Buzani, M. (2014b). Paper 3: 'Changing practice': Designing and testing a professional development course for water knowledge mediators who support community learning and practice. In Burt, J., Lotz-Sisitka, H., Rivers, N., Berold, R., Ntshudu, M.,

Wigley, T., ..., & Kruger, E. (2014). The role of knowledge in a democratic society: investigations into mediation and change-oriented learning in water management practices. *Water Research Commission Report No*. 2074/1/13.

Lupele, C. (2015). *A review of an emerging community of practice and its expansion on radio programming and broadcast on the topic of rainwater harvesting.* Unpublished master's proposal, Rhodes University, Grahamstown.

Manstrat. (2015). Retrieved October 19, 2015 from http://manstrat.co.za/

Maxwell, J. (1998). Designing a qualitative study. In L. Bickman & D.J. Rog (Eds.), *Handbook of applied social research methods.* (pp. 214–253). London: Sage.

Merriam, S. B. (2002). Introduction to qualitative research. In S. B. Merriam (Ed.), *Qualitative research in practice: Examples for discussion and analysis* (pp. 1–17). San Francisco: Jossey-Bass.

Morrow, S., & Gxabalashe, K. (2000). The records of the University of Fort Hare. *History in Africa 27*, 481-497.

Morrow, W. (2007). *Learning to teach in South Africa*. Pretoria: HSRC Press.

Mukute, M. (2010*). Exploring and expanding learning processes in sustainable agriculture workplace contexts.* Unpublished doctoral thesis, Rhodes University, Grahamstown.

Mukute, M., & Lotz-Sisitka, H. (2012). Working with Cultural-Historical Activity Theory and Critical Realism to investigate and expand farmer earning in Southern Africa. *Mind, Culture, and Activity, 19*(4), 342–367.

Muller, M., Schreiner, B., Smith, L., van Koppen, B., Sally, H., Aliber, M., Cousins, B., Tapela, B., van der Merwe-Botha, M., Karar, E., & Pietersen, K. (2009). *Water security in South Africa.* Development Planning Division Working Paper Series No. 12. DBSA: Midrand.

Mwenge Kahinda, J., Lillie, E. S. B., Taigbenu, A. E., Taute, M., & Boroto, R. J. (2008). Developing suitability maps for rainwater harvesting in South Africa. *Physics and Chemistry of the Earth, 33*, 788–799.

Mwenge Kahinda, J., Taigbenu, A. E., & Boroto, R. J. (2010). Domestic rainwater harvesting as an adaptation measure to climate change in South Africa. *Physics and Chemistry of the Earth, 35*, 742–751.

Mwenge Kahinda, J., & Taigbenu, A. E. (2011). Rainwater harvesting in South Africa: Challenges and opportunities. *Physics and Chemistry of the Earth, 36*, 968–976.

Nare, L., Odiyo, J. O., Francis, J., & Potgieter, N. (2011). Framework for effective community participation in water quality management in Luvuvhu Catchment of South Africa. *Physics and Chemistry of the Earth, 36,* 1063–1070.

NWRS. (2013). *National Water Resource Strategy: Water for an equitable and sustainable future*. Retrieved August 26, 2015 from https://www.dwa.gov.za/nwrs/LinkClick.aspx?fileticket=CIwWyptzLRk%3D&tabid=91&mid=496

Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D., & Taillieu, T. (2007). Social learning and water resource management. *Ecology and Society, 12*(2).

Paterson, A. (2004). Agricultural and industrial curricula for South African rural school: colonial origins and contemporary continuities. In S. McGrath, A. Badroodien, A. Kraak, & L. Unwin (Eds.), *Shifting understanding of skills in South Africa: Overcoming the historical imprint of a low skills Regime*. Cape Town: HSRC Press.

Pepper, C., & Wildy, H. (2009). Using narratives as a research strategy. *Qualitative Research Journal*, *9*(2), 18–26.

Pesanayi, T. V. (2007). *Investigating learning interactions influencing farmers' choices of cultivated food plants*. Unpublished master's thesis, Rhodes University, Grahamstown.

Pesanayi, T. V. (2009). A case of exploring learning interactions in rural farming communities or practice in Manicaland, Zimbabwe. *South African Journal of Environmental Education, 26*, 65–73.

Pesanayi, T.V., Mandikonza, C., & Kachilonda, D. (2010). Change projects" in professional learning. In J. Burt, & H. Lotz-Sisitka (Eds.), *2010 Environmental Learning Research Centre dialogue*. (pp. 36-37). Grahamstown: Rhodes University.

Phiri, C. M. (2011). *An investigation of community learning through participation in integrated water resource management practices*. Unpublished master's thesis, Rhodes University, Grahamstown.

Pijnenburg, B. (2002). Community Based Natural Resource Management as dogma. In C. Leeuwis & R. Pyburn (Eds.), *Wheel-barrows full of frogs. Social Learning in rural resource management* (pp. 289–300). Assen: Koninklijke van Gorcum.

Pollard, S., Biggs, H., & Toit, D. (2008). Towards a socio-ecological systems view of the Sand River Catchment, South Africa: An exploratory resilience analysis. *Water Research Commission Report No. TT 364/08.*

Pretty, J., & Chambers, R. (1993). Towards a learning paradigm: New professionalism and institutions for agriculture (pp. 182–202). *Discussion Paper- Institute of Development Studies, University of Sussex, United Kingdom*.

Pretty, J. (1995). Participatory learning for sustainable agriculture. *World Development*, *23*(8), 1247–1263.

Raven, G.C. (2005). *Enabling reflexivity and the development of reflexive competence within processes: A case study of an environmental education professional development course.* Unpublished doctoral thesis, Rhodes University, Grahamstown.

Reed, M. S., Evely, A. C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C., & Stringer, L. C. (2010). What is social learning? *Ecology and Society*. Retrieved June 5, 2014 from https://research-repository.st-andrews.ac.uk/handle/10023/1624

Republic of South Africa (RSA). (1998). Local Government: Municipal Structure Act (No. 117 of 1998). Cape Town: Government Gazette.

Rivers, N. (2014). *The mediating processes within social learning: women's food and water security practices in the rural Eastern Cape*. Unpublished doctoral thesis, Rhodes University, Grahamstown.

Roling, N. G., & Wagemakers, M. A. E. (1998). A new practice: Facilitating sustainable agriculture. In N. G. Roling & M. A. E. Wagemakers (Eds.), *Facilitating sustainable agriculture: Participatory learning and adaptive management in times of environmental uncertainty* (pp. 3–23). Cambridge: Cambridge University Press.

Rule, P., & John, V. (2011). *Your guide to case study research*. Pretoria: Van Schaik.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher, 27*(2), 4–13.

Smith, D. (2001). *Norbert Elias and modern social theory*. London: Sage.

Snyder, W.M., & Wenger, E. (2010). Our world as a learning system: A communities of practice approach. In C. Blackmore (Ed.), *Social learning systems and communities of practice* (pp. 107-124). London: Springer.

South African Weather Service. (2015). *Seasonal Climate Watch December 2015 to April 2016.* Pretoria: South African Weather Service.

StatsSA. (2011). Statistics by Place, Local Municipality. Retrieved August 12, 2015, from http://www.statssa.gov.za/?page_id=993&id=nkonkobe-municipality

StatsSA. (2015). *General household survey 2014*. Pretoria: Statistics South Africa.

Taylor, N. (1999). Curriculum 2005: Finding a balance between school and everyday knowledges. In N. Taylor & P. Vinjevold (Eds.), *Getting learning right: Report of the President's Education Initiative Research Project* (pp. 105–130). Braamfontein: Joint Education Trust.

University of Fort Hare. (2014). Weather data for weather station Alice. Alice: University of Fort Hare.

Van Zyl, P. (2014). The impact of extension suite online on extension in South Africa. Extension Suite Online Monthly Newsletter, 59 (October).

Viala, E. (2008). Water for food, water for life a comprehensive assessment of water management in agriculture. *Irrigation and Drainage Systems, 22*(1), 127–129.

Viljoen, M. f., Kundhlande, G., Baiphethi, M. N., Esterhuyse, P., Botha, J. J., Anderson, J. J., & Minkley, G. A. (2012). An assessment of the social and economic acceptability of rainwater harvesting and conservation practices in selected per-urban and rural communities. *Water Research Commission Report No. 1648/1/12*.

Wals, A. (2007). Learning in a changing world and changing in a learning world: Reflexively fumbling towards sustainability. *Southern African Journal of Environmental Education*, *24*, 35–45.

Wals, A., van der Hoeven, N., & Blanken, H. (2009). *The acoustics of social learning: Designing learning processes that contribute to a more sustainable world*. Netherlands: Wageningen Academic Publishers.

Water Research Commission. (2015). Retrieved November 10, 2015, from http://www.wrc.org.za/Pages/AboutUs_Mission.aspx

Wenger, E. (1998a). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

Wenger, E. (1998b). Communities of practice: Learning as a social system. *Systems Thinker*, *9*(5).

Wenger, E. (2000). Communities of practice and social learning systems. *Organization, 7*(2), 225–246.

Wenger, E., & Snyder, W. (2000). Communities of practice: The organizational frontier. *Harvard Business Review*, *78*(1), 139–146.

Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice*. Boston: Harvard Business School Press.

Wenger, E. (2006). Communities of practice definition. Retrieved from http://www.ewenger.com/theory/index.htm

Wenger, E. (2010). Communities of practice and social learning systems: the career of a concept. In C. Blackmore (Ed.), *Social learning systems and communities of practice* (pp.179–198). London: Springer.

Wenger, E., Trayner, B., & de Laat, M. (2011). *Promoting and assessing value creation in communities and networks: A conceptual framework*. Netherlands: Ruud de Moor Centrum.

Wenger-Trayner, E., & Wenger-Trayner, B. (2015). Learning in a landscape of practice: A framework. In E. Wenger-Trayner, M. Fenton-O'Creevy, S. Hutchinson, C. Kubiak, & B. Wenger-Trayner (Eds.), *Learning in Landscapes of Practice: Boundaries, Identity, and Knowledgeability in Practice-based Learning*. New York: Routledge.

Westaway, A. (2012). Rural poverty in the Eastern Cape Province: Legacy of apartheid or consequence of contemporary segregationism? *Development Southern Africa*, 29(1), 115–125.

Winkler, H. (Ed). (2007). *Long term mitigation scenarios: Technical report.* Prepared by the Energy Research Centre for the Department of Environmental Affairs and Tourism. Pretoria, October.

Worth, S. (2012). *Agricultural extension in South Africa: Status Quo Report: Discussion document.* Cape Town.

Yin, R. K. (2009). *Case study research: Design and methods (4th ed.).* London: Sage.

'Navigation Tool' to access information in the Water Research Commission (WRC) Materials

Introduction

This 'tool' is designed to help access the critical information relating to Rainwater Harvesting and Conservation (RWH&C) in the 2 key materials:

WH&C – Water Harvesting and Conservation (Volume 2, part 1)

AWHGS – Agricultural Water Use in Homestead Gardening Systems (Volume 2, Parts 1, 2 and 3)

3 Forms of Information

This information can be found in three (3) forms in the materials:

- As Handouts **(H)**
- As Case Studies or Stories **(CS)**
- As information in the Text **(T)**

4 Kinds of Activity or Practice

The Tool is arranged around four (4) different kinds of Activity or Practice associated with RWH&C:

1. **General Activities Applicable to and Underpinning Many of the Key Practices**
2. **Collecting, Reducing Loss and Holding Rainwater**
3. **Storing Rainwater**
4. **Using Rainwater for Irrigating Crops**

Definition of levels ascribed to the other factors

***Low**:

- Technologies – basic gardening equipment;
- Skills and understandings – as required for basic gardening;
- Cost R0 – R1000;
- Maintenance – none or one or two days a year, simple repairs

****Medium**:

- Technologies – simple testing or measuring kits, tanks, pipes;
- Skills and understandings – as required for small-scale business;
- Cost R1000 – R10,000;
- Maintenance – regular but infrequent checking/repair, 7 – 10 days/year, technical repairs.

*****High**:

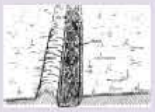
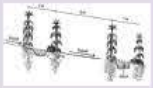
- Technologies – specialised equipment (tractors, mechanical pumps, laboratories etc.);
- Skills and understandings – as required for professional specialists;
- Cost >R10, 000;
- Maintenance – essential regular and frequent checking and repair, up to 50 days/year, complex technical repairs

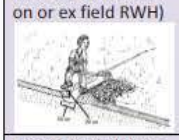
Much of the information in this Tool is adapted from the Overview of WHC Methods (pages 13 – 18) in Water Harvesting and Conservation, Volume 2 Part 1, Technical Manual and Former Handouts

General Activities Applicable to and Underpinning Many of the Key Practices				
Practice (and other names)	**Type and Scale (1,2 or 3)**	**Main Purpose and Description**	**Other Factors**	**WRC Materials: Text (T), Case Studies (CS), Handouts (H)**
Constructing and using 'A-frame'	Preparatory Activity 1 and 2	To set levels and help mark out contours Constructing a simple tool for assessing levels	*Low technology, local materials, low level skills and understandings, low cost, low maintenance	WH&C (**T**: Pp115-121 & **H**), AWHGS (**CS**: Vol.2, Part1, P2-83 and **H**: Vol.2, Part2, Chap.5,H1, P5)
Constructing and using a 'line-level'	Preparatory Activity 1 and 2	To set levels and help mark out contours Constructing a simple tool for assessing levels	*Low technology, local materials, low level skills and understandings, low cost, low maintenance	WH&C (**T**: Pp116,122-123 & **H**), AWHGS (**CS**: Vol.2, Part1, P2-83)
Identifying soil types	Preparatory Activity, All	To identify soils appropriate for different RWH&C practices Fairly simple methods for assessing soil types	Low to **medium technology, some specialised materials/equipment, low to medium skills and understandings	WH&C (**T**: Pp79-108 & **H**),AWHGS (**T**: Vol.2,Part3, Pp.6-3 to 6-10),
Calculating slope	Preparatory Activity, All	To calculate the slope of the land Simple method for calculation of slopes	Low to medium technology, some specialised materials/equipment, medium skills and understandings	WH&C (**T**: Pp113-118 & **H**), AWHGS (**T**: Vol.2,Part2, Pp5-38 to 5-42),
Establishing precipitation (rainfall) amounts	Preparatory Activity, All	To calculate the amount of rain falling on the land. Fairly simple methods for rainfall calculations	Low to medium technology, some specialised materials/equipment, medium skills and understandings	WH&C (**T**: Pp31-33), AWHGS (**T**: Vol2.Part1, P1-23),
Calculating storage requirements	Preparatory Activity, All	To estimate how much rainwater storage is needed. Quite detailed calculations of storage volume needs	Medium skills and understandings	WH&C (**T**: Pp158-160 & 163), AWHGS (**T**: Vol 2 Part 2, Pp 5-80 &5-81)
Calculating irrigation (watering) requirements	Preparatory Activity, All	Estimation of crop water needs Quite complex calculations for estimating water needs	Medium to ***high skills and understandings	WH&C (**T**: Pp161-162), AWHGS (**T**: Vol.2,Part2, Pp 5-70 to 5-79)

Collecting, Reducing Loss and Holding Rainwater				
Practice (and other names)	**Type and Scale (1,2 or 3)**	**Main Purpose and Description**	**Other Factors**	**WRC Materials: Text (T), Case Studies (CS), Handouts (H)**
Saaidamme (Wadi floodwater system, flood spate) 	Harvest, conserve and use. Floodwater harvesting. (3)	Involves the diversion of floodwater from non-permanent rivers into a series of flat basins which are used for cropping. Diverted water from the flooding river is channelled into the fields and completely submerges the land for 1 to 3 days, where it fully saturates the soil.	Medium to high technology, medium skills and understandings, medium to high cost (depending on scale), medium maintenance	WH&C (**T**: Pp 169-170, **CS**: P7)
Dome Water Harvesting (Rock Catchment) 	Harvest, on a large (macro) scale for diversion to where the water is needed (3, possibly 2)	Used to intercept and direct rainwater runoff from impermeable rock domes into a reservoir, or directly to a field where the water is stored in the soil. The method provides valuable drinking water in arid areas. Can be very effective for agricultural use where rock surfaces are located close to agricultural lands.	Low to medium technology, low to medium skills and understandings, low to medium cost, medium maintenance	WH&C (**T**: Pp167-168)
Ploegvore (pitting) 	Harvest, conserve and use. Can be done by hand on a small scale for crops. (1 and 2)	Involves creating numerous small, well-formed pits or "imprints" in the soil that collect rainwater runoff, seed, sediment and plant litter. This provides a relatively sheltered microclimate in which seed and seedlings can grow.	Medium to high technology, medium skills and understandings, medium to high cost, low maintenance	WH&C (**T**: P166)

Roofwater Harvesting 	**Harvest** Mainly used for domestic supply. Surplus can be used in home gardens. (1)	Collecting water from roofs for household and garden use is widely practiced across South Africa. Tanks and containers of all types – from brick reservoirs to makeshift drums and buckets – are a common sight in urban and rural areas.	Low to medium technology, low to medium skills and understandings, medium cost, medium maintenance	WH&C (**T**: Pp156-165), AWHGS (**T**: Vol.2, Part2,Pp5-83 to 5-90 and **H**: Vol.2,Part2, Chap.5,H1, Pp9-11),
Greywater Harvesting (Recycling, re-use)	**Harvest** Includes the water used for bathing, washing, cleaning, cooking and rinsing. Used in home gardens. (1)	The practice of using non-toilet wastewater produced in a household to water the root zone of the soil. Usually requires some kind of filtering process.	Low technology, low to medium skills and understandings, low cost, low maintenance	WH&C (**T**: Pp154-155 & **H, CS:** Pp2-6), AWHGS (**T**:Vol2,Part1,Pp4-60 & 4-61)
Fertility pits (banana circles, circular swale) 	**Harvest, conserve and use.** Micro-system which can be a soakaway around buildings – toabsorb greywater or surface rainwater. (1)	Enables runoff water to be captured and conserved in 1m deep pits that are filled with organic matter such as compost or manure. The organic matter increases the fertility of the soil and minimises the loss of water from evaporation.	Low technology, low skills and understandings, low cost, low maintenance	WH&C (**T**: Pp124, 151-152 &**H**), AWHGS (**CS**: Vol2,Part2, P5-22),
Terraces (Benches) 	**Harvest, conserve and use.** Micro-system used on steeper slopes (1 and 2)	Used in home gardens and smallholder fields. Mainly used in steeper-sloping areas for cropping and orchards. A level strip of soil built along the contour of a slope and supported by an earth or stone bund, or rows of old tyres filled with soil. Terraces create flat planting areas and stabilize slopes which would otherwise be too steep for crop production.	Low to medium technology, medium skills and understandings, low to medium cost (mostly labour), medium maintenance	WH&C (**T**: Pp148-150 & **H, CS:** Pp2-6), AWHGS (**CS**: Vol2,Part2, P5-22)

Stone Bunds (stone lines, stone banks, contour banks) 	**Harvest, conserve and use.** The contour ridges collect water from adjacent slopes. (2, possibly 3)	Rows of tightly packed stones built along contour lines. Used to improve grazing land. Slow down, filter and spread out runoff water. Increase infiltration and reduce soil erosion. Sediment is slowly captured on the upper sides, forming natural terraces.	Low to medium technology, medium skills and understandings, low to medium cost (mostly labour), medium maintenance	WH&C (**T**: Pp 140-142 & **H**)
Swales (Bunds, contour ridges, berm 'n basin, contour ditches) 	**Harvest, conserve and use.** Often used with diversion furrows and mulching. (1 and 2)	An earth bank constructed along the contour with a furrow on the up-slope side – this is filled with dry leaves, compost and soil. The top of the earth bank is levelled off to allow planting. The swale intercepts runoff, spreads it out and helps it infiltrate deep into the ground. Used in home-gardens and smallholder fields. Widely used within permaculture systems. Good groundwater recharge.	Low to medium technology, medium skills and understandings, low to medium cost (mostly labour), medium maintenance	WH&C (**T**: Pp145-146 &**H**), AWHGS (**CS**: Vol2, Part2,P5-25 and H: Vol.2,Part2, Chap.5,H1, Pp6-7),
Tied Ridges (In-field RWH, cross-ridges) 	**Harvest, conserve and use.** Can be used with diversion furrows and mulching. (1 and 2, possibly 3)	Built along the contour at 3 m spacings. Crops are planted on either side of the ridge. Runoff from the unplanted area is caught in the furrow and infiltrates into the root zone. Used in home gardens and on smallholder fields; when mechanised, used on a large commercial scale. The system has been fine-tuned to South African conditions, and is called "in-field RWH" in local publications.	Low to medium technology, medium skills and understandings, low to medium cost (mostly labour), medium maintenance	WH&C (**T**: Pp 143-144 &**H**),

Gelesha / Infiltration (Ripping)	Harvest, conserve and use. Preparing the ground (All)	Practice of turning the ground ready to receive the rain before planting.	Low to medium technology, low skills and understandings, low to medium cost (depending on scale), low maintenance	WH&C (**T**: P18)
Diversion Furrows (run-on ditches, run-on or ex field RWH) 	Harvest. Diversion of runoff water onto cropland. Brings water from an external catchment to the field. (All)	Directs rainwater runoff from gullies, grasslands or hard surfaces (such as paths or roads) to a cropped area or to a storage tank. This increases the water available to the plants. Used for fieldcrops and in gardens. Additional water diverted directly to soils and crops. Additional water stored in underground tanks for later watering.	Low to medium technology, medium skills and understandings, low to medium cost (mostly labour), medium maintenance	WH&C (**T**: Pp 132-133 &**H**),
Trench Beds (Deep trenching, fertility trenches) 	Harvest, conserve and use. Trench beds are usually connected to diversion furrows, which collect water from adjacent areas and direct it to the trenches. (1)	Trench beds are 1 m wide and 2 m long. They are dug to 1 m deep then packed with dry grass/leaves, compost, manure and soil. Used in food-gardens. Create highly fertile soils which can absorb and store water. Provide an immediately usable planting bed even on shallow or poor soils. Often used with diversion furrows and mulching.	Low technology, low skills and understandings, low cost, low maintenance	WH&C (**T**: Pp124, 134-139 &**H**), AWHGS (**CS**:Vol.2, Part1,Pp28&29, 2-80 and **T**:Vol.2.Part3, Pp6-59 to 6-63)
Mulching 	Conserve and use, Water conservation method. (1 and 2)	The practice of spreading organic material like compost, straw, manure, dry leaves, grass clippings or wood chips onto the surface of the soil. Can be used on all crops and orchards, not pastures Improves plant growth. Reduces evaporation from the soil surface. Improves soil temperature. Limits weed growth and makes watering easier by protecting the soil.	Low technology (unless plastic sheet mulching), low to medium skills and understanding, low cost, low maintenance	WH&C (**T**: Pp124, 137-138 & **H**), AWHGS (**T**: Vol.2,Part3, Pp6-34 & 6-35),

Storing Rainwater				
Practice (and other names)	**Type and Scale (1,2 or 3)**	**Main Purpose and Description**	**Other Factors**	**WRC Materials: Text (T), Case Studies (CS), Handouts (H)**
Dams	Harvest and store Simple storage of runoff in purpose-built ponds. (3 and 2)	Generally fairly large-scale storage ponds from which water can be taken for either crops irrigation or used directly for livestock	Medium technology, specialised equipment, medium skills and understandings, medium to high cost (depending on scale)	WH&C (**T**: P18), AWHGS (Vol.2,Part2, **CS**: P5-85 and **H**: Vol.2, Part2, Chap.5,H1, P11)
Matamo/ipitsi (homestead ponds)	Harvest and store. Simple ponds for homestead gardens (1, possibly 2)	Small-scale storage ponds to catch and store surface run-off. Water used for irrigation or livestock.	Low technology, basic equipment, low skills and understandings, low cost, low maintenance	WH&C (**T**: P18, **CS:** Pp2-6), AWHGS (**H**: Vol.2, Part2, Chap.5,H1, P11)
Underground tanks	Store. Tanks located underground to store surface run-off (1, possibly 2)	Relatively small-scale water storage for irrigating small to medium cropping areas.	Medium technology, specialised materials and equipment, medium skills and understandings, medium cost, medium maintenance	AWHGS (**T**: Vol.2,Part2, Pp5-84 and **H**: Vol.2, Part2, Chap.5,H1, Pp11-12),
Roof Tanks	Store. Tanks usually above ground to store roof run-off.	Relatively small-scale water storage for domestic use or irrigating small to medium cropping areas.	Medium technology, medium skills and understandings, medium cost	WH&C (**T**: P158), AWHGS(**T**: Vol.2,Part2, P5-84 and **H**: Vol.2, Part2, Chap.5,H1, Pp9-11), **V**: DVD1

Irrigation Practices				
Practice (and other names)	**Type and Scale (1, 2 and 3)**	**Main Purpose and Description**	**Other Factors**	**WRC Materials: Text (T), Case Studies (CS), Handouts (H)**
Drip/trickle Irrigation	Low water-use, highly focussed irrigation (All)	Water-saving. Delivers water directly to the plants, most useful for orchards and other long-term crops, but can be used for vegetables.	Low to medium technology, medium skills and understandings, medium cost, medium to high maintenance	AWHGS (Vol.2,Part2, **T**: P5-95, **CS**:Pp5-97 to 5-102 and **H**: Chap.5, H2,Pp3-5)
Buried pipes	Low water-use, reduced evaporation (1 and 2)	Water saving. Delivers water to crop roots. Mainly used in small-medium scale vegetable production	Low to medium technology, medium skills and understandings, medium cost, medium to high maintenance	AWHGS(**T**&**H**: Vol.2,Part2, Chap.5, H2,P6)
'Spaghetti lines'	Low water-use. (1 and 2)	Water-saving. Small pipes taking the water from a central pipe to the plants. For orchards or vegetables	Low to medium technology, medium skills and understandings, medium cost, medium maintenance	AWHGS(**T**&**H**: Vol.2,Part2, Chap.5, H2,P7)
Sponge lines and string lines	Low water-use. (1 and 2)	Water-saving. A trickle irrigation system, using sponge or sting in the holes in the pipes to reduce water flow.	Low to medium technology, medium skills and understandings, medium cost, medium maintenance	AWHGS(**T**&**H**: Vol.2,Part2, Chap.5, H2,Pp7-8)

Training of Trainers Course Orientation

Learning Together to Harvest, Conserve and Use Rainwater for Growing Food

"If you want to go fast walk alone, but if you want to go far walk with others"
African Proverb

1. Background

1.1 'Sweet water' (amanzi amnandi) for food production

The farmer knows that water is important for watering their food crops and livestock. They also know that without water, their farming practice collapses. The mother in the rural area knows even more that water must be made available in the home every morning, day and evening in order to cook the food for the children and family, and to replenish the drinking and bath water. She is prepared to walk long distances to fetch 'sweet water' when nearby sources dwindle. (This reality is increasingly demanding more effort on the urban dwellers as well as taps either cease to deliver water, or discharge un-drinkable water).

Unfortunately water sources continue to decline in quality and quantity for various reasons ranging from decreasing rainfall; springs, wells and wetlands degrading, drying out or getting saltier; dams, rivers and streams silting and increasing pollution among others. Development programmes in rural areas have tried to bring water to the communal space or homestead but usually this is not adequate for the garden and farm plot.

The culture of agriculture still sustains many rural families whose food requirements cannot be entirely left to the supermarkets, and whose livelihoods depend on income from farming. It is based on freedom to choose and know what to plant, what to eat, what to feed growing children to ensure nutrition and avoid stunted growth. But these agri-cultures are under threat especially from water scarcity, a very important issue in South Africa. Homestead gardening and small-scale food production freedoms are seriously compromised when agricultural water is either inadequate or non-existent. Rainwater harvesting provides hope through careful capacity development that is jointly owned by trainers, curriculum/course developers, farmers and researchers. These roles can be temporarily inter-changeable where certain specialised knowledge application is needed. A farmer can thus be a resource for demonstrating water harvesting practices needed by a trainer or extension officer.

We cannot claim that Rainwater Harvesting and Conservation (RWH&C) can solve all the problems faced by farmers, but it can certainly make a major contribution to increasing food production at all scales of farming operation.

1.2 Capacity building for rainwater harvesting through Learning Networks

So what can farmers do when water is scarce and they still need to produce food to eat and to sell? What is the role of the extension officer, farmer trainer, development worker and researcher and how can the service they offer be more relevant to the farmer's water needs? How can agricultural college and faculty curricula and trainers respond to such needs? Why is the knowledge that each of these actors brings important for successful provision of water for food?

The *Amanzi for Food* capacity development programme is an innovative set of training, networking and resource materials mediation actions that seek to:

- **Connect people and organisations** in their intersecting workspaces to share their knowledge and experiences on rainwater harvesting. Acknowledging the knowledge and value of others is recognition that a person is what they are because of the contribution of other people in shaping their lives (*Umuntu ngumuntu ngabantu);*
- **Enhance the practice and training of rainwater harvesting** to improve food production and nutrition;
- **Provide learning resources and mediation methods** for learning and practicing rainwater harvesting;
- **Support establishment, use and maintenance of sustainable water harvesting demonstration activities and sites** that are owned and maintained by their users;
- **Explore and use opportunities for curriculum and course development and innovation;**
- **Reward** those who complete the course and its tasks with a **University-accredited certificate of competency.**

A training-supported Learning Network approach provides network members with the opportunity to learn about RWH&C and grow together. A key aspect of the capacity development process is the Training of Trainers (ToT) Course.

1.3 The Training of Trainers Course

This Training of Trainers (ToT) Course is a key component of the Water Research Commission (WRC) Project K5/2277: **Action oriented strategy for knowledge dissemination and training for skills development of water use in homestead food gardening and rain water harvesting for cropland food production.**

This project is implemented by the Rhodes University Environmental Learning Research Centre (ELRC) and the course is designed to support those involved in agricultural training and education, in both the formal (University, College and High School) and informal

(agricultural extension services, NGOs and others) sectors to integrate training on Rainwater Harvesting and Conservation (RWH&C) into their training practices.

The main focus of the project is on supporting the use of RWH&C materials developed in earlier WRC projects, in particular:

- ***'Water Harvesting and Conservation (WH&C)'*** (Jonathan Denison, Heidi Smuttern, Elna Kruger, Hlubi Ndingi, Marius Botha, WRC, 2011), from WRC Project No: K5/1776
- ***'Agricultural Water Use in Homestead Gardening Systems (AWHGS)'*** (CM Stimie, E Kruger, M de Lange, CT Crosby, WRC 2010), from WRC Project No: K5/1575/4

The Course is funded through the WRC Project, and further support is provided by many partners involved in the Learning Networks.

2. Two Training Streams and Two Rhodes University Certificates

The Course, although run as a single training process, will have 2 Streams; one for the formal educators, and the other for the informal trainers. Both groups will share the learning experiences in the contact sessions and apply these to their own areas of work. In this way they will also be able to share their own experiences and ideas with each other.

The course provides the opportunity for participants to achieve Rhodes University Certificates:

For Stream 1 (formal education sector): *'Amanzi for Food' Training of Trainers Certificate of Competence in Curriculum Innovation and Changing Practice*– 12 Credits at NQF Level 6

For Stream 2 (informal training sector): *'Amanzi for Food' Training of Trainers Certificate of Competence in Environmental Learning and Changing Practice*– 12 Credits at NQF Level 5

In order to achieve these certificates participants will be required to successfully complete tasks/ assignments, appropriate to their context and the level of certification.

The Course will provide the main focus for the Learning Network meetings, although not all members of the Learning Networks may wish to undertake the Course.

3. The Training of Trainers Process

3.1 The Shape of the Course

The process follows five (5) phases, as identified in Figure 1, below. Each phase will comprise a one or two-day workshop which will be guided by a Course Module, followed by tasks/assignments for participants to complete before the next workshop. These assignments will be appropriate to each partner's context, mode of operation, and description of the qualification towards which they are working (see above), and will be assessed according to specific assessment criteria designed for this purpose under the Rhodes University short course policy and procedures.

A further component of the process will involve the course participants in the development of an 'Amanzi for Food' website, which, through their involvement, will ensure that the site is relevant to their needs and accessible to them, and by extension for others in their situation. The idea is to feature the activities and inputs of the course participants on this website, both during the contact sessions and when undertaking their tasks/assignments. These activities and inputs will be shared through a range of media, including Facebook dialogues, Whatsapp, blogging, and still photos and audio and video recording of the Learning Network Meetings and demonstration site development.

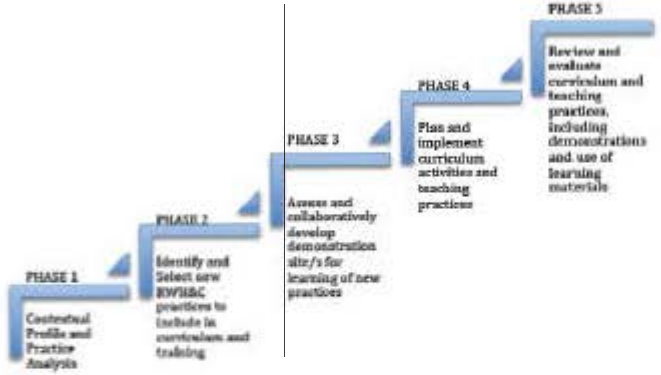


Figure 1: 5 Phases of the Training of Trainers Course

3.2 Timeframe

The timeframe over which the training process will be implemented will probably require between 8 - 10 months to complete. This will include a contact session (Learning Network Meeting) once every one to two (2) months. This is also in accordance with the Rhodes University short course policy for a 12 credit course framework.

3.3 Guidelines for the Training of the Trainers Course

The guiding principle for the Training of the Trainers Course is that of 'work together work away', in which the partners in the Learning Network, under the guidance of the course tutors will discuss the issues associated with the focus of each phase (see below), and then use the outcomes of these discussions, and their learning from them, back to their work context and undertake tasks/assignments.

The Course orientation is strongly informed by the 'Spiral Model for In-Service Professional Development' (Figure 2).

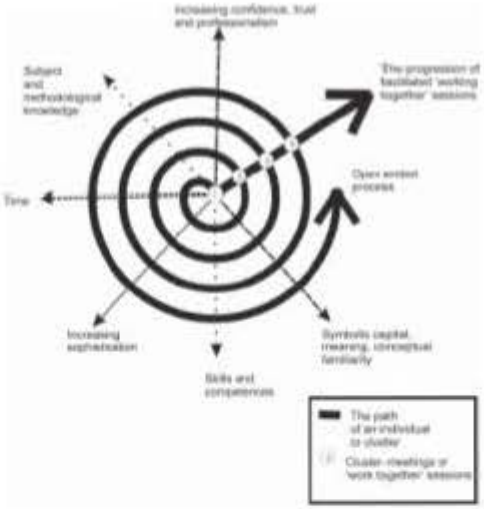


Figure 2: Spiral Model for In-Service Professional Development: Originally developed by Janse van Rensburg (1999) and Lotz (1999) and later framed and further researched by Du Toit and Squazzin (2000) working with Janse van Rensburg & Lotz (2000).

3.4 The Five Phases/Modules

Phase 1, Module 1 – Contextual Profile and Practice Analysis

The focus of this phase will be on an analysis of who is doing what in relation to providing farmer support, and in particular what RWH&C practices (if any) are being promoted and implemented. The analysis will also include a survey of what materials and information are being used in support of practice, and in general where and how course participants access the information they need.

A further component of the analysis will be to determine the nature of any existing relationships between the various partners in the Learning Network.

Task/Assignment – Each course participant will be required to complete a written analysis of their current practice in relation to RWH&C, identifying the partners with whom they are working on this, the practices with which they are involved, and the information and sources of the information they are using to support the practices. If, as is possible, they are not involved in any way in RWH&C, but are interested in becoming involved, they will be required to identify their particular areas of interest, potential partners, and the kinds of information they will require to support them and their partners in this activity.

Phase 1/Module 1: Summary

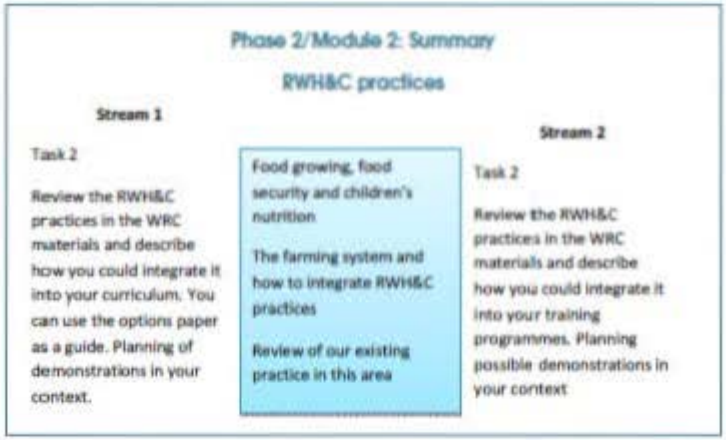
Amanzi for Food

Stream 1		Stream 2
Universities, Colleges ... Task 1: A review of your existing curriculum to identify and describe the farming systems you are promoting and how these are including RWH&C practices or not and/or how this can be done	Food growing, food security and children's nutrition The farming system and how to integrate RWH&C practices Review of our existing practice in this area	**Farmer training providers...** Task 1: A review of your existing practice and context to identify the farming systems you work with and how RWH&C is currently practiced in your context and/or how this can be done

Phase 2, Module 2 – Identification and Selection of new RWH&C Practices to Include in Curriculum and Training

In this phase the course participants, building on the analysis from Phase 1 will identify the potential for the introduction of new RWH&C practices into their activities and/or curricula and training programmes. For these new practices they will identify for whom they might be appropriate, and what role each participant would have in supporting the implementation of the practices. The participants will be supported in developing their ideas for integration of the appropriate information and materials into their education curricula or training programmes.

Task/Assignment – Course participants will be required to, with support from the tutors, develop curriculum or training programme content appropriate for the practice(s) which they have identified.



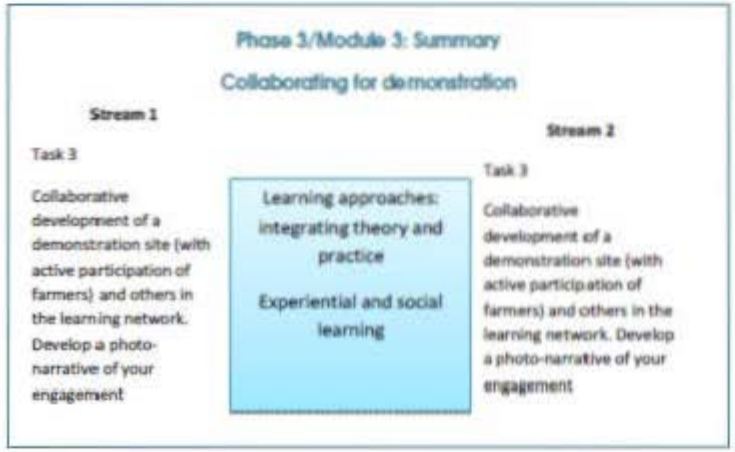
Phase 3, Module 3 – Assess and Collaboratively Develop Demonstration Site(s) for Learning of New Practices

The first activity in this phase will be the identification of any existing demonstration sites within the area covered by each Learning Network. These will be assessed for their appropriateness (in terms of the practices they demonstrate), accessibility, and the quality of experience they can provide, and where necessary how these can be improved. Practices for which new demonstration sites are needed will then be agreed, and possible locations identified, whether on college grounds or on farmers' land. Plans will then be drawn up and agreed for the development of these, with specific emphasis on how the WRC materials can

be used. Efforts will be made to link up with and expand existing demonstration sites that exist in the education and training facilities and/or on local farming sites.

This Module will also focus on different learning approaches that are appropriate for the teaching and learning of RWH&C practices with different audiences.

Task/Assignment – Course participants will collaborate in the improvement of existing sites and/or in the development of new sites, and document the process, and their involvement, in detail. They will be supported in capturing the process in video, still photography and audio recordings (for radio use). These processes will be shared on the 'Amanzi for Food' website for further use / discussion in relation to the WRC materials and their use.

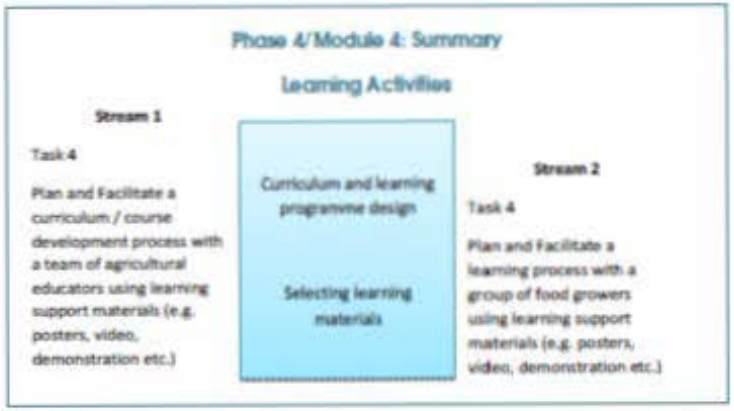


Phase 4, Module 4 – Plan and Implement Curriculum Activities and Teaching Practices

In this phase, the initial ideas developed in Phase 2 for integration of RWH&C information and materials into education curricula and training programmes will be taken further. The content will have been developed as Task/Assignment 2 by the course participants, and they will now develop clear plans for implementation of these new RWH&C education and training processes, using also the demonstration sites that they would have developed within the Learning Network. The formal education participants (Stream 1) will locate their plans within the broader curriculum processes and accreditation frameworks of their institutions. Participants in the informal sector (Stream 2) will plan for implementation of their RWH&C training processes.

Task/Assignment – Course participants will finalise their plans, and, where possible, embark on their implementation. They will document the implementation processes and the

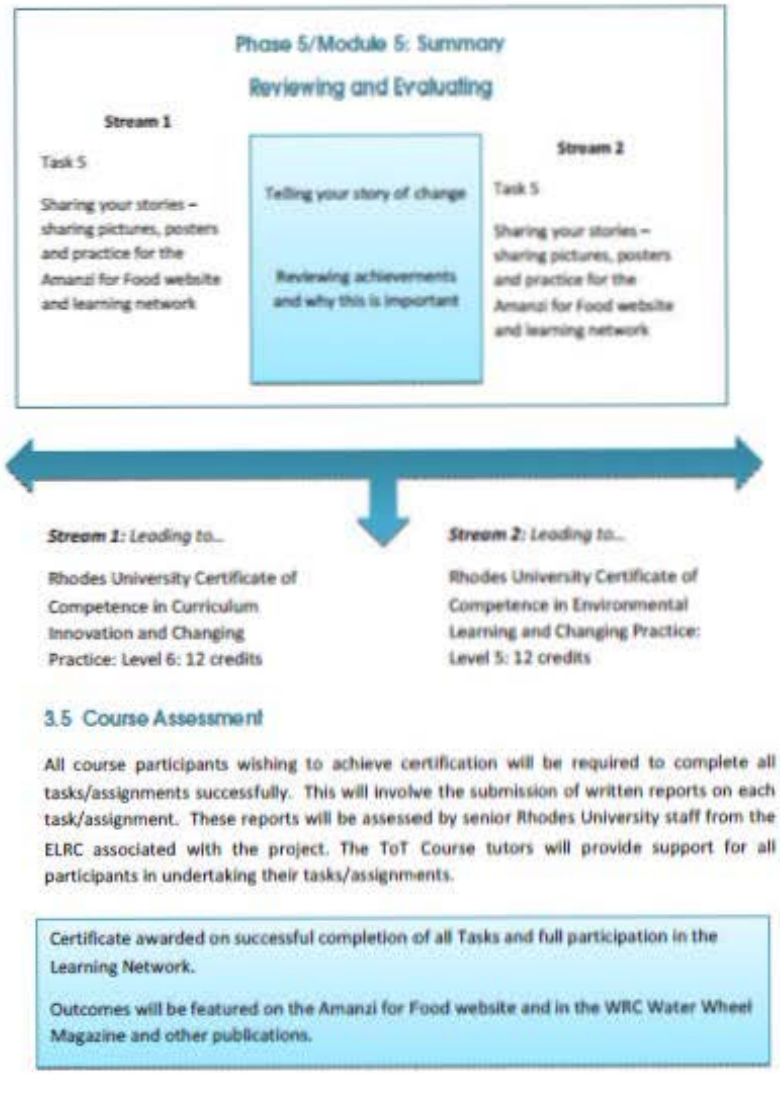
outcomes of these. This may not be immediately possible in the formal education sectors (Stream 1), unless they have opted for developing short courses, and here the participants will ensure the integration of their RWH&C information and materials into the broader institutional curricula. In such cases they will document the process of such integration. In formal education contexts, the proposals for approval by faculty boards and/or curriculum authorities will be used as evidence of learning and change, along with the validity of the potential submission and approvals processes.



Phase 5, Module 5 – Review and Evaluate Curriculum and Teaching Practices, including Demonstrations and Use of Learning Materials

This phase will focus on the evaluation of both the integration processes and the implementation of education and training in RWH&C by the partners. The course participants will be supported in developing their understanding of evaluation of education and training processes, including of the uses of the learning materials and other information, and the outcomes and impacts.

Task/Assignment – Course participants will be conduct and produce a comprehensive evaluation of their education or training programme, using the methods and tools developed during the final workshop.



3.5 Course Assessment

All course participants wishing to achieve certification will be required to complete all tasks/assignments successfully. This will involve the submission of written reports on each task/assignment. These reports will be assessed by senior Rhodes University staff from the ELRC associated with the project. The ToT Course tutors will provide support for all participants in undertaking their tasks/assignments.

Certificate awarded on successful completion of all Tasks and full participation in the Learning Network.

Outcomes will be featured on the Amanzi for Food website and in the WRC Water Wheel Magazine and other publications.

4. Learning and Teaching Information and Materials

Most of the learning and teaching materials used throughout the Course, will be based on the WRC materials developed under previous projects. These will be augmented by materials developed by the ELRC specifically to support the learning in the Course, and by additional materials developed through the course process. These will include posters and videos of the specific RWH&C practices with which course participants are involved, as educators or trainers and/or as practitioners. Relevant information and materials from other sources will also be used where appropriate.

Course participants will be provided with hard (printed) copies and/or electronic versions of the main materials, including the key WRC materials. As the 'Amanzi for Food' website develops in parallel to the ToT Course, these materials will be made available on the site, together with all newly developed materials.

4.1 Focus on two main sets of WRC Materials

The Course will focus on the use of the 2 main sets of WRC materials:

- ***Water Harvesting and Conservation (WH&C)***
- ***Agricultural Water Use in Homestead Gardening Systems (AWHGS)***

Aspect	Water Harvesting and Conservation	Agricultural Water Use in Homestead Garden Systems
Ultimate beneficiaries	Small-scale and emerging commercial farmers engaged in crop/land (vegetable) production	Homestead level subsistence farmers/gardeners
Principal users (facilitators of the materials)	Agricultural College lecturers, accredited training providers	Extension officers, Non-governmental organisations (NGOs) and community-based organisations (CBOs)
Uses of the materials	Either in their entirety or selection of different components	Either in their entirety or selection of different components according to context and need
Educational sector	Formal – FET, particularly agricultural colleges, possibly HET	Informal currently. Potential for integration into agricultural college curricula, and adoption by DoA (AET Strategy) and DWA (for IWRM training), also TUT short courses
Educational Level	New NQF Level 5/6	No level specified
Development and piloting	High-level technical and facilitation team, Consultative Development, drawing on existing sources. One pilot, no indication of refinements as a result of this	Broad-based high level technical and facilitation team, Participatory Process, drawing on existing sources, practitioner expertise, consultations and observations. Two pilot, extensive refinements as a result
Content	Very water focussed, with one chapter on soils, and two on WHC (Planning and Methods)	Very broad – all aspects of small-scale vegetable production. One chapter on Garden and Homestead Water Management, a second on Soil and Water

Table1: Comparison of WH&C and AWHGS Materials

The demonstration sites, and the documentation and recording of their development and use will also add to the store of information available to course participants, and, through the website, to anyone interested in RWH&C practices.

As the ToT Course evolves, participants will be encouraged both to use whatever information and materials are available, on the website or elsewhere, and also to contribute to the development of new materials that could be useful for them in their context, and for others in similar contexts.

5. Language of the Course

As the Course will be run at NQF Levels 5 and 6, the materials and the facilitation will be primarily in English. There will however always be the opportunity for translation of key ideas into other official languages.

There is also the issue of the specific language and the terms used in discussions about RWH&C. As with all specialist areas of study, there are often words used that are not always well understood by people not involved in those areas. For example, in this 'Orientation' (guidance) the word 'practices' is used in different places to describe what we do in terms of the technical methods we use to harvest, store and use water (RWH&C practices), and also in the methods (teaching practices) we use to teach people. Care will be taken both in the module texts and by the tutors to explain the meaning of any words that may not be familiar.

Also, although their use will be avoided where possible, it will sometimes be necessary to use 'acronyms' (the initial letters of a phrase or title), such as RWH&C (Rainwater Harvesting and Conservation), in order to save space and too much repetition of long titles. Care again will be taken to make sure that everyone is comfortable with the use of the more common acronyms.

Welcome to the Amanzi for Food Training of Trainers Course!

Appendix 3- Guiding Questions for Focus Group Discussions

The College first visit plan

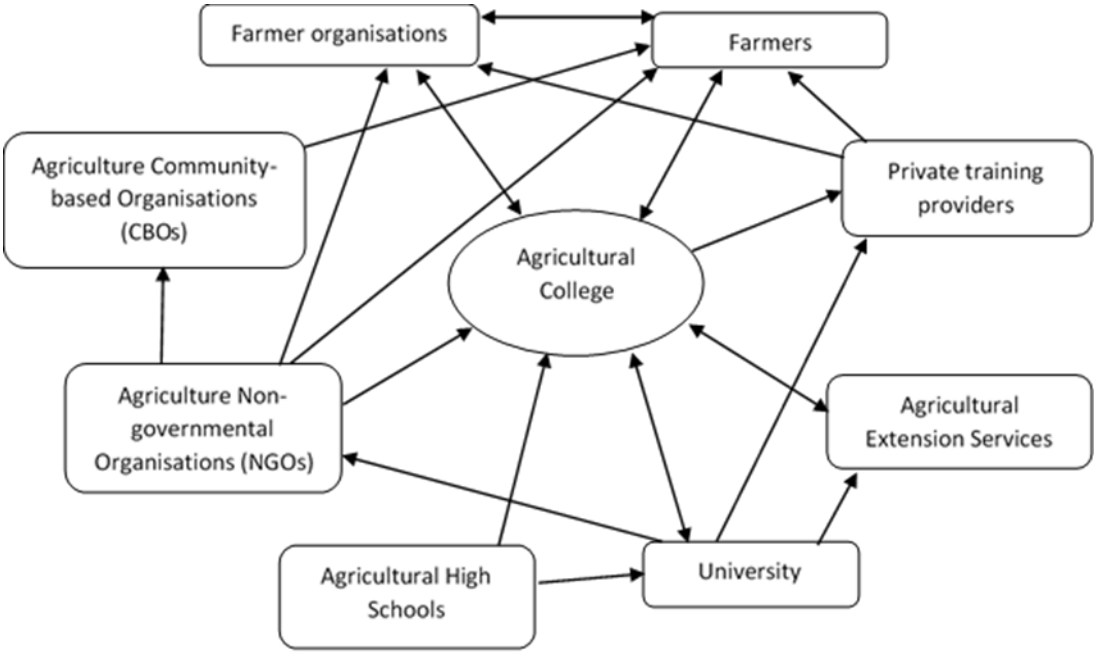
Amanzi for food

K5-2277

The colleges will be contacted to arrange the meeting and the 'concept paper for college-based learning networks 'and the 'options paper' will be sent to them again.

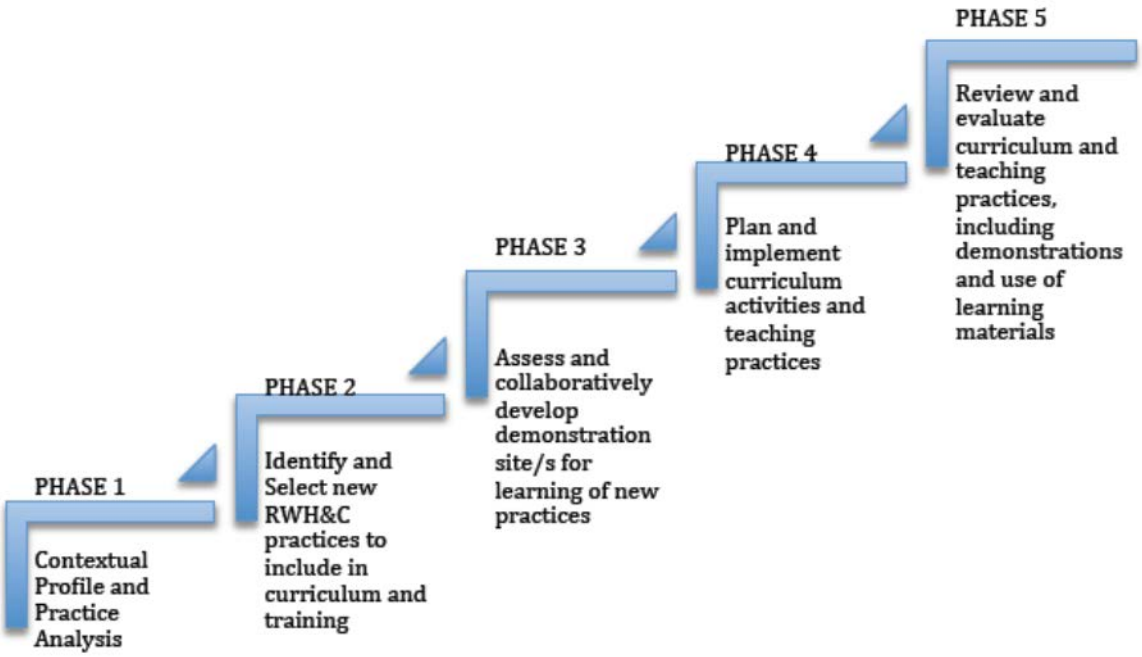
We will introduce ourselves along with the concept of the project to explain what we will focus on and how we are approaching the project. The open discussion will have the three focus topics mentioned below as the key points to the discussion for the first visit.

- **Learning network profile:** It will be helpful to show them the 'concept paper for college-based learning networks' and work through it if they haven't read it yet. Certain questions will guide the discussion:
    - Who do you have professional interactions or relationships with? Please explain who the different learning network partners are? (Names of organisations and the contact people within them?)
    - What are these relationships focused around?
    - Could you draw up your network partners on a diagram?



- We will be enquiring **what stimulates curriculum change in the agricultural colleges**. This is where we will walk through the 'options paper' to explain the way the new material could be integrated into the curriculum. Additionally, we will explain that we will support them through the implementation process. A few questions we may use to guide the discussion:
  - Is there a demand for new information or materials and if so where does it come from?
  - What stimulates curriculum change in the college?
  - How do you go about changing or adding new material into the curriculum?
- We will enquire **where the colleges get new information or materials** to integrate into the curriculum or courses when there has been a change. The questions we will use to guide the discussion:
  - Where would you access new information?
  - What difficulties do you have in accessing or finding the information that you need?
  - What communication and information preferences and access do you have or use?
  - What media channels do you engage with or are you exposed to around agricultural practices? E.g. Radio station, magazines etc.

- We will discuss whether any of their modules or courses include **RWH and conservation practices** in them. And if so what **materials** are the using?
- We can also walk through the 5 Phase process below in the summary of the Learning Process Framework for the Learning Network.



Appendix 4- First Learning Network Meeting Agenda

First Learning Network

Meeting Agenda

12 August 2014, 9am-2pm.

9am- Arrival and registration.

- Welcome.
- Self-Introductions.
- Objectives of meeting.
- Introducing the WRC AOS Project and its uniqueness.
- The learning networks approach and a Group activity:
    - Understanding existing connections and disconnections between network members.
    - Information flows in and beyond those networks: what, how, when and why?
    - Who else should be in network / these meetings?
    - Name the Network.

10.30am- Tea

- Reflecting on existing RWH practices, demonstration sites, experiences and expertise.
- Range of core practices / methods covered by WRC: which ones are appropriate for this context and who is interested?
- Capacity needs assessment:

    - What capacity building needs exist regarding RWH&C.
    - To enable practices.
    - To enable curriculum and training.
    - Who is interested to join? ➔ Complete registration form today.
- Expectations of the project.
- Way forward:
    - Roles.
    - Multi-level changing practice ToT Course (optional).
- Next meeting (Module 1 Training and Learning): date, venue and host.

1pm- Lunch

2pm- End

Appendix 5- Amanzi for Food Introduction Flyer

If you are interested in becoming part of this project and would like more information, please contact:

Ukuba unomdla wokubayinxalenye yale projekti kwaye ufuna ulwazi oluphangeleyo nceda qhangamshelana naba balandelayo:

Mr Tichaona Pesanayi
T 082 412 2129,
E tich@wessa.co.za
E tichpesanayi@yahoo.com

Ms Kim Carlyon
T 083 655 4281,
E kim.n.carlyon@gmail.com

amanzi FOR FOOD

Sharing knowledge on the use and conservation of water for food production

WATER RESEARCH COMMISSION

RHODES UNIVERSITY
Where leaders learn

'Amanzi for Food' yi projekti ekhokelwa licandelo leze ndalo nenkcubeko kwi yunivesiti yase Rhodes lezokuphanda ngamanzi (Water Research Commission).

Umthamo wamanzi athembekileyo ayimfuneko ekukhuliseni kokutya. "Amanzi bubomi" kwaye njengabasebenzisi be 50% yamanzi akhoyo e Mzantsi Afrika, ezolimo zinoxanduva olukhulu lokuqinisekisa ukusetyenziswa ngokufanelekileyo kwalendalo inqabileyo.

U mzantsi Afrika u lilizwe elinamanzi anqongopheleyo, njengoko zonke inkalo nzamanzi ezikhoyo zisetyenzisiwe. Olunqongophalo lwamanzi lusenokuba ngamandla njengoko imo yezulu itsalela ekunqongopheleni kwemvula ngakumbi embindini nase ntshona yelizwe.

Owona mcamango 'Amanzi for Food' kukuxhasa wonke umntu okwezolimo kubandakanya ama fama, abancedisi bezolimo, izikolo zezolimo kwakunye nemibutho yasekuhlaleni yezolimo, ukuze bafunde kunye ngolimo nendlela ezohlukeneyo zokuvuna, ukugcina, nokusebenzisa amanzi emvula ngokwemfuno zabo, ukuphuhlisa imveliso yokutya.

Abaphandi ngamanzi basebenze nabantu abanizi ukuqokelela ulwazi nokwenza izixhobo zokusebenzisa amanzi emvula ukuvelisa ukutya. I prokekti 'Amanzi for Food' izakusebenzisa olulwazi nezizixhobo noludwe lwezihlobo ukukhuthaza ukusetyenziswa kwezindlela ngokubanzi.

Enye yee ndawo I projekti ezakusebenza kuyo yingingqi encendwa yi Fort Cox isikolo sezolimo. Sinethemba lokusebenzisana naye wonke umntu osebenza ngophuhliso lwezolimo noveliso lokutya kulengingqi.

Amanzi for Food is a project lead by the Environmental Learning Research Centre at Rhodes University, for the Water Research Commission.

A reliable supply of good quality water is essential to growing food. 'Water is Life', and as the user of 50% of South Africa's available water, agriculture has a major responsibility to ensure the most efficient use of this most precious of resources.

South Africa is a water scarce country with all the available water resources already being used. This situation is likely to become even more serious as climate change leads to less rainfall, especially in the central and western areas of the country.

The basic idea behind Amanzi for Food is to support everyone in the agricultural sector including farmers, extension services, agricultural training institutions, and agricultural NGOs and CBOs, to learn together about and implement different ways of harvesting, storing, and using rainwater according to their needs, to improve food production.

The Water Research Commission has worked with many people to gather information and develop materials on different methods of using rainwater for food production. The Amanzi for Food project will be working with this information and these materials with a range of partners to encourage much wider use of these methods.

One of the areas the project will be working in is the area served by Fort Cox Agricultural College. We hope to work with everyone involved in agricultural development and food production in this area.

Appendix 6- Example of Evaluation Questions at the end of Module 1 Session

Question 1: **What did you get out of this course module?**

Question 2: **What did you contribute to this course module?**

Question 3: **What was most valuable for you in this module?**

Question 4: **Why was it most valuable to you?**

Question 5: **What do you recommend to be included in the future modules?**

Appendix 7- Example of a Module Training Report from Module One

Amanzi for Food Module One
Training Report
to stakeholders in Nkonkobe local municipality of Amathole District

Date of Training Course Module 1: 16 September 2014

Venue: Phandulwazi Agricultural High School

Course participants of 'Imvothu Bubomi' Learning Network in the Nkonkobe Local Municipality area

Amanzi for Food facilitation team:
Prof Rob O'Donoghue
Prof Heila Lotz-Sisitka
Kim Carlyon
Lawrence Sisitka
Tichaona Pesanayi

Date of report: 17 September 2014

Abbreviations and acronyms

AWHGS	Agricultural Water Use in Homestead Gardening Systems
DRDAR	Department of Rural Development and Agrarian Reform
RWH&C	Rain Water Harvesting and Conservation
UFH	University of Fort Hare
WRC	Water Research Commission

Acknowledgements

The course was developed by the *Amanzi for Food* team at Rhodes University following direction from the following organisations, which are gratefully acknowledged:

- Stakeholders from the participating community, including
    - Fort Cox Agricultural College (and associated Rural Development Centre),
    - University of Fort Hare (UFH)
    - Alice Farmers' Association
    - eDikeni Water Users Association
    - DRDAR Extension Services at Alice and Middledrift
    - DRDAR Provincial Extension and Advisory Services
- Water Research Commission (WRC) Reference Group for the umbrella project (K5/2275)
- Rhodes University

Executive summary

This report provides the main outcomes and outputs of the training of module one of five modules of the *Amanzi for Food* Training of Trainers Course done on 16 September 2014. The main outcome is the bringing together of a diversity of farming stakeholders in the Nkonkobe Local Municipality area to engage constructively, exchange experiences and ideas, and work together in identifying existing and potential rainwater harvesting and conservation (RWH&C) practices to increase food production and productivity at various scales and farming systems in their learning network. Topics covered include reviewing of farming systems, reviewing of existing RWH&C practices and those documented by the Water Research Commission (WRC), consideration of the importance of RWH&C at various scales and addressing farmers' aspirations. Children's nutrition was highlighted as a primary concern for ensuring increased household food productivity and security that can be enhanced by RWH&C. The 32 participants were made up of agricultural educators / trainers / lecturers from the local

University of Fort Hare, Fort Cox Agricultural College and associated Rural Development Centre and Phandulwazi Agricultural High School; Farmers representing the Alice Farmers' Association, the eDikeni Water Users Association, Cooperatives and individual farmers; Extension Officers from Alice and Middledrift; Technicians from Dohne Research Station among others. Of these 28 committed to completing the course aiming for attaining accredited certification at NQF Level 6 offered by Rhodes University. Much interest was demonstrated by the Department of Rural Development and Agrarian Reform through sending many representatives to the training course and the preceding learning network meeting. The participants indicated the dire need for RWH&C in their area and were very eager to learn through exchange and assignments. The next phase of the training was set for 16 October 2014.

1.0 INTRODUCTION AND BACKGROUND

This report gives an overview of outcomes achieved and actions agreed upon, and detailed processes from the training of module one of five for the "Imvothu Bubomi' Learning Network in the Nkonkobe Local Municipality area in Eastern Cape. The venue, Phandulwazi Agricultural High School, and date, was selected by the Learning Network at their first meeting on 12 August 2014 held at Fort Cox Agricultural College. Course attendance and participation were very good. Thirty-two participants attended the course module 1 session, of whom 28 committed to complete the course and 4 were visitors. The full list of participants is provided in Appendix 2.

The report is organised into ten sections as shown in the contents, ending with an appendix.

2.0 MAIN OUTCOMES, OUTPUTS AND MODULE OBJECTIVES

The main outcomes of the training of Module One are as follows:

2.1 A diversity of key agricultural training and farming stakeholders in the Nkonkobe Local Municipality are better connected and equipped to review curricula, training programmes and farming systems/practices with respect to RWH&C integration, to make informed choices and to plan for improved low-cost and appropriate water provision and delivery for enhanced food production.

2.1.1 Output: A cadre of 32 participants gained knowledge and skills for identifying rainwater harvesting practices being practiced in their areas, those documented in WRC publications, and those appropriate information for making the right choices.

2.1.2 The participants were drawn from most stakeholder groups and were distributed as follows:

Table 1 Participants analysis

Total participants	**32 (12 Female, 20 Male)**	
No. pursuing / not pursuing certification	28 pursuing certification	4 attending not for certificate
Number of College/University lecturers	4 (3 Fort Cox: 2 F, 1 M; 1 UFH: Male)	
Number of farmers	11	
Number of Extension Officers (including 1 Control/Head)	5 (2 Alice + 3 Middledrift)	
	3 female	2 male
Number of Research Technicians	2 (1 female, 1 male)	
No. of Agric High School Agric teachers	2 (1 female, 0 male)	
Agriculture students	2 (1 female, 1 male)	
Other (Department of Agriculture)	7	
Streams	Stream 1 = 12	Stream 2 = 16
Number from NGOs	0	

2.1.3 Participants were exposed to a hands-on demonstration activity, and to training and learning support materials (posters, WRC RWH&C texts, videos) for teaching and training water harvesting and water delivery.

Plate 1 Course participants engage with a hands-on demonstration model facilitated by Prof Rob O'Donoghue of Rhodes University

2.2 Systems were put in place to facilitate accreditation of interested participants.

The Module One training objectives were:

i. To mobilise and engage participants from a diverse range of stakeholders to participate in RWH&C learning in a 'learning network community of RWH&C for food production' practice, using a co-funding/contribution model;
ii. To draw on participants' knowledge and use WRC materials as resources for learning RWH&C practices;
iii. To clarify course processes and mentor support mechanisms leading to NQF Level 6 accredited certification and align with accreditation requirements including full attendance (contact time) and assignments;
iv. To identify participants committed to completing the course with certification and confirm their registration with the Rhodes University Short Course registration system;
v. To adequately cover content on the role and potential of rainwater harvesting in food growing, food security and children's nutrition, farming systems and how to integrate RWH&C practices, and review of existing curricula and farming practices in the area (see summary in Box 1 below).

Phase 1/Module 1: Summary

Amanzi for Food

Stream 1

Universities, Colleges …

Task 1:

A review of your existing curriculum to identify and describe the farming systems you are promoting and how these are including RWH&C practices or not and/or how this can be done

Food growing, food security and children's nutrition

The farming system and how to integrate RWH&C practices

Review of our existing practice in this area

Box 1 Summary of Module 1 course content and tasks

3.0 PROCEEDINGS OF TRAINING WORKSHOP

3.1 Course Orientation

The training started with an orientation to the course led by Tichaona Pesanayi, where the Amanzi for Food capacity development programme's rationale and aims were discussed. The two sets of materials were shared with everyone. The facilitation team did not have enough copies of WH&C for everyone and the AWHGS's did not all have the Volume 2 CD inside. Efforts were being made to obtain more of the WH&C from the WRC and also some hardcopy versions of AWHGS Volume 2. The two streams were explained and it was established that everyone was clear of which stream they would be registered for. The five Modules that make up the course were discussed and the various phases or modules were explained.

3.2 The reasons behind *Amanzi for Food*.

This session emphasised the role of water and specifically water harvesting in assuring human nutrition. The national and global movement for Food Security gives priority to children's nutrition as a high concern and indicator of general human nutrition in today's society as well as the ever growing population.

- **Farming systems discussion**

The approach to this discussion was through group work based on pre-defined guiding questions but allowing for critical thinking and open engagement.

The following farming systems were identified as operating in the Nkonkobe local municipal area where most of the participants were coming from:

i. **Fodder production**
ii. **Livestock**

Livestock were classified into sub-categories as follows:

General livestock system and scale of implementation in area	**Sub-categories**	**Scale at which farming system is operating**
	Piggery	➢ Homestead ➢ Community projects
Intensive livestock farming: - Commercial: planted pasture →mechanised irrigation	Poultry	➢ Homestead ➢ Community projects

Natural grazing →slurry dam irrigation		
Semi-intensive livestock farming - Natural veld or planted pasture	Red meat: ➢ Cattle ➢ Sheep ➢ Goats	➢ Emerging farmers
Extensive livestock farming: ➢ Communal and emerging farmers (feed for own animals) ➢ Rain-fed due to limited resources	Dairy:	
	Donkeys	➢ Homestead
	Horses	➢ Homestead

iii. Vegetable production

This was happening in two ways through:

- Homestead gardeners
- Community garden projects

iv. Field crops

Farmers in Nkonkobe were involved with growing field crops either at the

- Homestead, or as
- Emerging farmers

Some of the field crops include maize and potatoes.

v. Fruit

Commercial citrus production was highlighted as the main fruit farming system.

vi. Bee-keeping

The discussion on farming systems went ahead to recognise the above

3.3 Rainwater Harvesting and Conservation (RWH&C) Practices in Farming Processes and Systems. Using the Navigation Tool.

It was discussed that RWH&C practices are not isolated activities. Some of the key practices were discussed and a navigation tool was introduced to help with identifying and recognising RWH&C practices being used in the (Nkonkobe municipal) area and where they are documented in the WRC materials.

The next discussion and activity were thus to use the navigation tool to identify the practices that are being used in the area and by whom.

Plate 2 Group work on identifying RWH&C practices in the WRC materials using a navigation tool

RWH&C Practice currently being used	**By who**	**Group name**
Gelesha	Homestead and emerging farmers	Tyhume Water Harvesters
Mulching	Homestead	Manzi Mvula (plastic=commercial)
Roof water harvesting	Homestead & Commercial	Phandamanzi
Fertility Pit	Homestead	

Grey Water Harvesting	Homestead	Group Orange
Terraces	Emerging & Commercial	
Dams and ponds	Communal farms, field	Group Orange
Diversion Furrows	Field and livestock producers	

Plate 3 A representative of Group 'Tyhume Water harvesters' ([redacted] a farmer) opening up discussion with a presentation of his group's work

The recommended practices that this network looks at are:

- Dams- storm water
- Roof Water Harvesting- challenges of funds
- Mulching
- Ploegvore/pitting
- Fertility Pits
- Tied Ridges/ Madanyana
- Gelesha

There was an extended discussion that developed around an interest in **Mulching**. The focus was on whether mulching was actually being done and on emerging research on mulching. Ideas of *Izala* and *Uthuthu* were discussed.

Some of the advantages of mulching were discussed as:

- reduces compaction and erosion
- has multiple functions which include encouragement of micro-bioactivity, water conservation, reduces runoff, encourages weed control. These multiple functions were linked to systems thinking.

Practicalities of mulching were also considered. The lack of adequate organic matter for mulching (dry mulch and compost) was observed which led to identification of alternatives such as plastic mulch usually associated with irrigation systems (where sections of plastic are left open to allow lateral movement); and conservation farming.

There was a brief discussion around emerging research on the effects of ultraviolet (UV) and infrared radiation on evaporation.

3.4 Farming Scales, Farmers' Aspirations and other Factors

Due to time constraints after lunch, there was an open discussion (5) where a few people shared their experiences with respect to whom they work with in the field. Prof O'Donoghue led the discussion to get a list of the most important practices that the participants would like to learn about at specified scales:

Umzi:

- Roof water harvesting
- Fertility Pits and Trench Beds
- Mulching

Field:

- Tied Ridges / madanyana
- Diversion Furrows
- Gelesha

Farm:

- Flood dams
- Pitting/mulching

The underpinning knowledge and skills were discussed in detail and everyone seemed to understand what was meant here.

3.5 Selection of practices and supporting information

The next Activity (2) started with splitting the above important practices into the four groups where they discussed amongst themselves the essential knowledge and skills that is needed for the practices to be implemented. Due to time constraints, the groups did a small feedback session from this discussion and it seemed all groups were able to identify the essential knowledge and skills needed.

3.6 Finding Information

Kim Carlyon took participants through a session of how to find information on RHW&C practices. All participants had a good idea of how to use the navigation tool, and no one had any major problems with the module's contents.

Plate 4 Participants working in pairs to clarify RWH&C practices

3.7 Key issues raised for follow-up

During the course of the discussions participants raised some key issues for follow-up discussions, which will be included in the next course session either because that is where they have programmed or due to time needed to cover them. These included:

- feasibility of RWH&C practices in terms of cost, scale and combinations; and
- Conducting soil tests with respect to RWH&C.

4.0 WAY FORWARD

The date for Module 2 training was decided on as Thursday, the 16th October 2014 at Fort Cox Agricultural College. The training will start at 9am till 4pm with tea and lunch breaks.

4.1 Assignments

The facilitators explained the assignments for each of the two streams to the participants in a group but these were not given in depth discussion time due to inadequate time at the end. There were no questions raised regarding the assignments. It was highlighted that they are due before or on the 16th of October 2014.

5.0 CONCLUSION

The objectives of the training session for module 1 were met satisfactorily based on the coverage of the programme content, reflexivity with respect to participants' learning needs and judging from the participants' evaluation of the course session. The main area of improvement is time management especially with regard to meeting starting time.

From the evaluation:

- Many of the participants expressed that they learnt about new RWH&C practices, most of which they had never heard of before. Participants were grateful for the opportunity of getting together in the Learning Network and learning from each other.
- Participants stated that they contributed by sharing their knowledge and experience on various farming practices in the class and group discussions.
- Participants found the module valuable because of all the new RWH&C practices they learnt about and when sharing experiences and knowledge with cross section of farming community stakeholders.
- Participants found the module valuable because farmers should know about more RWH&C practices to use water to produce food and there is a space to share information between the different people in the agricultural sector.
- The participants provided some recommendations, which are expressed in the next section.

6.0 RECOMMENDATIONS

These recommendations are proposed actions directed at participants, reflection from facilitation and to the WRC. Recommendations from participants are to have more information on RWH&C discussed and also irrigation matters. A more practical approach to the course was recommended where the participants could visit sites where these practices are in practice. The participants expressed a preference for shorter assignments. One participant felt they needed a session on curriculum review/development in order to be able to tackle the Stream 1 Assignment 1. There was concern that there are not enough WRC

materials to work with, many of the participants would like hardcopy AWHGS texts to work with and enough RWH&C texts so that everyone could have one.

Below is a summary of recommendations specific for each of the groups listed:

- To Participants

Participants are encouraged to **manage their time better** and be more organised so that they arrive on time for the course session in the future. Despite a generally high degree of participation, they are also encouraged to be more comfortable with asking the facilitators **questions** about certain issues that they may have problems with like their assignments.

- To Amanzi for Food facilitators

Despite significant time lost at the beginning due to participants arriving late, facilitators will need to be **reflexive and manage time accordingly**. More time needs to be allocated to discuss the assignments where people engage with the task at hand and ask questions. Participants feel that they may benefit more from **practical experiences**. The facilitators have undertaken to take measures to support engagement with the assignments beyond the training session where need has been expressed or observed, and will include more practical experiences in the sessions.

- To WRC

There should be enough **RWH&C text materials** made available and accessible to the project so that each participant can have one set each. Some of the farmers and association members do not have access to a computer so they will not be able to access AWHGS Volume Two where the text lies for many of the RWH&C practices that people are interested in. This will start to be a problem later on in the course as they will need to access these materials to complete their assignments.

REPORT APPENDICES

appendix 1 Training Course Programme

Start time: 0830h for 0900h

- **Course Orientation**
- **The reasons behind *Amanzi for Food*.**
- **Rainwater Harvesting and Conservation (RWH&C) Practices in Farming Processes and Systems. Using the Navigation Tool.**
- **Farming Scales, Farmers' Aspirations and other Factors**
- **Selection of practices and supporting information**

- **Finding Information**
- **Way Forward**
- **Assignments**

End 1600h

appendix 2 Participants list

Omitted due to anonymity

appendix 3 Participants' Course Evaluation

Question 1: **What did you get out of this course module?**

- How to conserve & harvest water for irrigating your homestead/ field and farm
- The knowledge of different ways of harvesting water for food production
- I got to know the practices used in conserving water where they work best and how they should be used.
- Learning about different water harvesting methods.
- I get from the course module to what is going on in the world.
- Sharing of current practices on RWH & C some of which it was the first time to know, e.g. Gelesha.
- I have learned a whole lot of new RWH&C practices, rather new to my knowledge.
- I get knowledge to this course.
- I learned about walking together, you go far (learned a lot)
- The extension officers do not explain to farmers about the practices used to conserve moisture, e.g. talking about mulching to farmers.
- I learnt that the RWH&C practices are interlinked as such no practice is independent and lastly there are pros and cons for each practice.
- I have learnt a lot of things regarding farming and how to become one of the successful farmers.
- I have obtained a valid information about the various skills when one is dealing with practical implementation of working with in relation with water, soil and various methods of using-productively.
- Different practices for collecting, reducing loss and holding RWH, their advantages and disadvantages towards crops.
- Water harvesting is a skill for better production.
- Different types of water harvesting and discussions on its practicality.
- I learn more and how important about agriculture.
- Knowledge and skills on how to keep/conserve water.
- I got information or more knowledge about different types of methods to collect water.
- I get more things, more information that I have practice at my area.
- Understanding of different water harvesting practices and conservation practices that I will share with others.
- Learnt more about mulching and its advantages and disadvantages.
- Was informed about the different methods of WG&C at different farm scales.
- Interacting with people from different fields (backgrounds) of agriculture, RWH&C techniques that are used in various farming systems.
- Use of navigation tool and identification of existing RWH&C practices.

- Basket of RWH&C practices that are currently being used in my area. It was also important to learn those practices that could be implemented.
- I gained a lot of knowledge about the different practices in water harvesting and conservation.
- Learnt new RWH techniques, got to know people.

Question 2: **What did you contribute to this course module?**

- Add value in mulching and fertility pits.
- Identifying and describing those practices that I know and where they can possible be applicable.
- I contributed mostly when I was doing the group discussions.
- Little knowledge/ suggestions.
- I contribute my knowledge.
- Ideas in group discussions, e.g. mulching at umzi and its practically clarifying group task, asking questions on practicality of grey water harvested for food production.
- The emphasis on the quality of the grey water used “to be research”.
- My contribute is to share my knowledge to each other.
- Presentation, contribution on task for group it knowledge and skill working together practical.
- Sharing the experiences of technics that are being practiced at my villages.
- I contributed by facilitating during the presentations that were done by groups.
- All the things and shared my knowledge about farming.
- It is to share my ideas together with colleagues in various ways of using the soil in drought periods of annums.
- Information that was not known by other people.
- My contribution is to make sure that we choose the best way of water harvesting.
- On which types/practices are used in my area, which I think will be the best to be used for water harvesting.
- I did not contribute.
- In discussions and inputs.
- Knowledge and skills needed to implement the practice= pitting.
- I will do or practice in my area.
- Participating, engagement with group on different activities that we were given for assessment.
- Group discussions by giving knowledge on environmental and social factors that might affect implementation of some techniques of RWH (challenges).
- Cost factors that should be considered when implementing certain practices (e.g. purifying water from grey water harvesting).
- Actively participate in discussions and contribute in group activities.
- Identifies existing RWH techniques and their relevant use and who or where it could be used.
- Group discussions where I shared knowledge on the planting pits (pitting).
- Knowledge about the different practices in water harvesting and conservation.
- My knowledge of the RWH techniques that I know.

Question 3: **What was most valuable for you in this module?**

- Everything because I am a crop specialist, in training farmers and youth for homestead, field and farmers.
- Which practices to use at different farming system.
- Knowledge of different practices used in water conservation.
- Learning about different RWH practices.
- The value is to compare the time of rainfall and drought.
- Sharing experiences, knowledge with cross section of farming community workers and farmers.
- RWH&C does not work separately with soil conservation.
- To practices different type between homestead, field and farm.
- The network various topics tackled with information.
- Emphasising on the old farming practices that are not utilised for conserving rain water.
- The knowledge and the skill that is needed from a person who intends to practice or implement a certain RWH practice.
- Was the knowledge about homestead, fields and farms.

- The importance of water and its use in economical ways and methods.
- Getting information and knowledge that I was not aware of.
- Mulching was the mostly important thing they talk about of which I think it can be good for farmers.
- Water harvesting = disadvantages and advantages of mulching.
- I learn more about mulching.
- How to conserve water, other methods were not known to me.
- As a teacher I think the whole course is valuable to me.
- Gelesha
- Water is life and in any methods and practices should be kept and conserved.
- The incorporation of different practices for their effectiveness of RWH&C.
- Was more interested in terraced.
- The entire course was valuable to me but the different RWH&C practices were most valuable.
- Identifying the practices that were used to use in doing demonstrations.
- Learnt a lot on the background of gelesha and also the need to combine the various RWH practices especially for dry environments such as this.
- After a long time I got to be a learner again.
- Knowledge sharing and networking.

Question 4: **Why was it most valuable to you?**

- Because my farmers have to know all the techniques of conserving the water for their crops.
- For now I will know which ones to use at certain farming systems.
- This course has broadened my knowledge so far and still will.
- I never practiced them; they were not common in my area I grew up at. So I am getting different ideas.
- Is to communicate with all people.
- Diverse knowledge is realised.
- It emphasizes on the integrated resource use in agriculture.
- Is to see things are change and how water is important.
- The RWH&C is very important for a farmer in order to produce food.
- Because of engaging to available practices that are costing no money but farmer involvement and dedication.
- For the farmer to achieve good and accurate outcomes.
- To provide skills and knowledge.
- Is to understand the importance or types of water resources and their use- in economic ways and methods.
- Because I have gained something that I will be using later to help other people.
- With mulching I believe that I am going to have a big change on my food production.
- Using of different practices at the same time. E.g. gelesha and fertility pit and terrace- mulching and madanyana so that it can be more sustainable (using different practices at the same time in one area.)
- Because we are in dry lands so it can do better for me.
- There are things that I am not exposed to.
- Learning things in my field. I.e. teaching agriculture.
- Because is the most that my area do.
- To gain knowledge, learn different activities and the skills for implementation.
- Assist in overcoming some challenges in one another (overlapping).
- Conserve water for crops/plants and preventing soil erosion.
- It gave me an understanding of the interconnection between various practices and farming systems.
- So as to give a direction of what it is to be done going forward.
- I feel it could be the missing link (contribution of practices, for successful implementation of RWH).
- The knowledge from my classmates grew me and I know more.
- To my knowledge.

Question 5: **What do you recommend to be included in the future modules?**

- Water conservation in permaculture and more RWH&C practices.
- Practical or demonstrations

- So for me it is still going fine.
- Assignments with at least few number of pages.
- I recommend this to add to curriculum of the school.
- Time especially the last task for today was rushed through.
- Irrigation matters “methods that aid in conserving RWH&C. e.g. Tail water reuse. Irrigation scheduling.
- I got a lot to this module, I am sure in future we come out with more knowledge.
- So far it’s good to me.
- None so far as farmers will utilise the available resources.
- Visit to the fields where we can practice or have the opportunity to view practices we are talking about.
- How to put these knowledge and skills into work and photographic examples or clips.
- To add more such as nutrient importance and soil acids affecting the soil age conditions.
- Nothing so far.
- The practical of this.
- Clear classification other all water harvesting, visit to areas where it is practiced.
- I am interested in livestock so I would love to end livestock next module.
- Have enough materials.
- Because we remove ourself about what happened in our history.
- The relationship of water in connection or with linkage with other farming factors.
- Rainfall patterns (distribution) in connection with harvesting techniques at demo site and infiltrability of soil.
- We should also focus on the factors that might make certain practices to be rejected or not to work.
- Nothing at the moment.
- Nothing
- The component of curriculum development was not covered which I felt could have been valuable for the Stream 1 Assignment 1.
- Presenter was quite good and worked well together. I felt the togetherness. Enough materials is needed though so all of us can get.
- All seems to be in order.

appendix 4 Reflexive analysis of methodology and approaches to workshop facilitation and learning

- Time: participants’ arrival was tardy; they need to try to make a better effort in organising transport etc. before the day.
- The assignments need to be explained in depth.
- There was some repetition in the discussions over the day, there needs to be an improvement here in the module text, the ‘discussion’ vs ‘focus group activity’ needs to be looked at.
- Practical vs theory: there needs to be more of a balance here, therefore a more practical approach needs to be adopted on the course.
- There needs to be more of a participant-led discussions and sections, these did start in Module 1 but due to time, we had to cut them short.

Appendix 8- Interview Schedule

Interview Instrument to guide semi-structured interviews with participants

For all interviewed network partners

1. What is your relationship with the agricultural college?
2. Who do you interact with regard to agricultural practices?
3. What media based sources do you engage with to find out about other agricultural practices? (eg. Magazines, radio stations or web-based etc.)
4. What kind of information would you find useful in your agricultural activities?
5. In what form would you like to receive this information?
6. What difficulties do you have in accessing or finding the information that you need?

For extension advisors

1. Will you please tell me about the organizational structure in Extension in SA and here in your office?
2. What is the extension officer to farmer ratio within the context of villages?
3. What percentage of people are farming in these villages?
4. Do you work with commodity groups or individual farmers?
5. How often to interact with same farmer groups.
6. How do you plan your work? In terms of responding to farmer demands and province demands.
7. Describe your typical day?
8. Transport situation?
9. Where do you find the agricultural information that you use in your extension work?
10. How do you pass on information to practitioners that will use it? What materials, media or activities do you use to do this?
11. Out of your experience, what is the preferred form of information transfer, what do people respond to the most?
12. How do you support the farmers?
13. What are your aspirations in your job? What are the gaps that stop you from doing that? Probe that gap…
14. What are the challenges that face you on a daily basis?

For the farmers

1. What are your challenges in your farming practices?
2. And your aspirations?
3. Where do you get your information on agricultural practices that you use and for potential new practices?
4. Would you be interested in finding out more information on water management and conservation?
5. Have you come across different rainwater harvesting and conservation practices? If so, where?

Appendix 9- Questionnaire

Questionnaire for Imvothu Bubomi Learning Network participants for Kim Weaver's research.

Name:
Organisation:

1. What are your reasons for participating in the network or course?

2. How has participation in these learning network interactions benefitted you in your work?

3. Have you been in contact with other network members or participants outside of these Amanzi for Food meetings?

   -If so, was it for professional reasons and how did you communicate with each other? E.g. via phone call or email etc.

4. Have your interactions with other network members had any influence on your work that you do?

   -If so, have any activities, outputs or visits come from these interactions?

5. Have these network interactions had any value to you?

Appendix 10- Capacity Development Document

AMANZI FOR FOOD CAPACITY DEVELOPMENT OUTCOMES

Important is the fact that this approach to capacity and competence development has allowed trainers and farmers to:

a) Enhance their own knowledge of RWH&C using the WRC materials,

b) Integrate this knowledge with locally available productive demonstration sites to ensure that theory and practice is integrated into their actual farming activities or training, and

c) Learn from this to ensure that an integrated approach to RWH&C is adopted for their farming activities or training,

d) Undertake actual development work (eg. Extension) based on their expanded knowledge and experience, and

e) Expand their use of WRC materials for the development work (extension) and support (advisory role)

f) Implement a more networked approach that enhances their farming activities and development work, especially in a local pro-poor context and framework

The model is therefore a reflexive, community-engaged model of capacity development. Through this, trainers and farmers are capacitated to design farming and development on enhanced knowledge, practice and networking around RWH&C.

Participant A (NAME : ; INSTITUTION AND POSTION:)	
➢ Enhanced knowledge of RWH&C	
➢ Integration of knowledge into development of productive demonstration sites	
➢ Actual contribution to development of productive demonstration sites for teaching and learning	
➢ Changes made to farming/training practice	
➢ Expanded community interaction	
➢ Links with other knowledge partners	
➢ How WRC RWH&C materials were used	

Participant A (NAME : [redacted], **Farmer: Perksdale, Middldrift**)	
➢ Enhanced knowledge of RWH&C	➢ The farmer's knowledge and appreciation of the significance of RWH&C was enhanced as shown by his responses and discussion in the assignments. The course reinforced his understanding of gelesha as seen in assignment 2.
➢ Integration of knowledge into development of productive demonstration sites	➢ There is evidence of integration of his knowledge of RWH&C into the development of productive RWH&C demonstration sites as shown in his site plan in his assignments.
➢ Actual contribution to development of productive demonstration sites for teaching and learning	➢ *There has been no actual contribution just yet as the demonstration site has not been implemented yet. But there is the plan for it to be implemented along with 2 others and other surrounding farmers may be interested and learn from the site.* ➢ [redacted] *and his wife is also part of a farmer co-operative.*
➢ Changes made to farming practice	➢ He has implemented tied ridges into his field and will be and has been using gelesha for many years in the area. There is also the plan for having amadanyana in his fields and to practice mulching
➢ Expanded community interaction	➢ The farmer has a small team joining him in the demo site implementation and him and his wife a part of a farmer co-op. ➢ He also has a close relationship with a lecturer from fort Cox College so this lecturer has brought students to his field to see the demonstrations.
➢ Links with other knowledge partners	➢ The farmer is linked to Middledrift DRDAR extension officers, Fort Cox College, other farmers in their co-op and from other areas.
➢ How WRC RWH&C materials were used	➢ The materials are well used is his assignments and he knows how to use the navigation tool. ➢ He mentions the use of hand outs and videos being a way of sharing the information, along with the Amanzi for Food teaching gardens, meetings, drawing etc.. These are given as the methods used to share information: *"The farmers use the methods of holding meeting…"* and *"Demonstrations using the WRC Amanzi for Food teaching garden producing of vegetables, viewing of videos in the team talk get together."* ([redacted], Assignment 4, P.3.)

Participant A (NAME : [redacted], **Farmer: Keiskammahoek)**	
➢ Enhanced knowledge of RWH&C	➢ The farmer's knowledge and appreciation of the significance of RWH&C was enhanced as seen in her responses and discussion in the assignments.

➢ Integration of knowledge into development of productive demonstration sites	➢ The demo site shows that there has been an integration of RWH&C practices into her garden. During Module 5 contact session. She shared: "…*it* (water) *is coming to my furrows that I make there and the water is going there…"* Infield RWH&C (Amadanyana) and mulching are also evident in the demo site.
➢ Actual contribution to development of productive demonstration sites for teaching and learning	➢ The land is hers and so the main resources were contributed by her and time into the planning and implementing of the site. ➢ Her actual contribution was also that of an implementer and initiator for the demo site.  Mrs [redacted] on the far right with extension, College lecturer and other farmers (10.03.2015).
➢ Changes made to farming practice	➢ She became more aware of the water use in her farming activities, she went out in the rain to see where the water goes and added furrows to her garden. Infield water harvesting and mulching is practiced on the demo site.
➢ Expanded community interaction	➢ The farmer is part of a farmer co-op group with whom she meets on regular bases. ➢ She has a close relationship with a lecturer from Fort Cox College and with her respective extension officer who visit her and the demo site. This extension officer was not originally a member of the learning network but now he has used the WRC materials and seen the Amanzi for Food resources. ➢ She has included in her assignment that having a Facebook page will keep people updated on RWH&C so a discussion can start around it with a wider group: *"We can have this information to the farmers by trying to get more copy and have weekly meeting where we discuss on issues resolving this water harvesting issues and to create a Facebook page that will keep on updating about rain water harvesting."*
➢ Links with other knowledge partners	➢ The farmer is linked to KKH DRDAR extension officers, Fort Cox College, Dohne Research Institute, other farmers in her co-op and from other areas.
➢ How WRC RWH&C materials were used	➢ The materials were used to compare different RWH&C techniques by the lecturer that helped plan the site and the materials were used to calculate distances between tied ridges/amadanyana etc.

Participant A (NAME : [redacted], **Extension officer & controller: Middldrift**)	
➢ Enhanced knowledge of RWH&C	➢ The extension officer's knowledge and acknowledgement of RWH&C was enhanced as shown by his responses and discussion in the assignments. The course reinforced his understanding of these practices and what is appropriate for what level of farming: *"These are chosen for I view them to best fit the different farmer's needs and circumstances in the various areas of operations, varying from home gardens/backyard gardens, community gardens (Zenzele) and fields (amasimi) and their levels*." [redacted], Assignment 4, P.2.)
➢ Integration of knowledge into development of productive demonstration sites	➢ There is evidence of integration of RWH&C into the development of the demonstration sites as shown in his site plan in his assignments, especially by the practices that he selected as of interest and to be included in this site: "*RWH&C practices that will be included will be tied ridges, mulching, diversion furrows, gelesha, roof water harvesting, fertility pits and pitting(ploegvore) each of these practices has its advantages and is best used in certain circumstances*" [redacted], Assignment 4, P.2.)
➢ Actual contribution to development of productive demonstration sites for teaching and learning	➢ *There has been no actual contribution just yet as the demonstration site has not been implemented due to technical and financial constraints. But in the plan, his contribution would be in the social facilitation of the project: "*to ensure that the project is known and the project members that is the youth of ward 16 in Middledrift are guided to select themselves and with their roles in the project being clearly stated to them." He would also play an advisory role in the implementation of the site.
➢ Changes made to training practice	➢ The advisory role he plays in his community and workplace allows him to inform and show people about RWH&C practices.
➢ Expanded community interaction	➢ The officer will share with the wider group of extension officers and then they will all share with their respective wards that they work with. He will focus on sharing this with the crop growers he works with.
➢ Links with other knowledge partners	➢ He is linked to other extension officers in his office as he is the controller and from other offices in the area. Fort Cox College through various projects and in this network. Municipal development agencies. Researchers from Dohne Research Institute and farmers.
➢ How WRC RWH&C materials were used	➢ The materials are well used is his assignments with content and ideas of how they will be used: "*The learning content from the WRC materials to be used are handouts, going through the case studies or going through sharing stories of success and using the information in the form of text, reading it and explaining it to the audience in the endeavours to get them understand and follow the content entailed in both these materials*" ([redacted] Assignement 4, P.2.)

Participant A (NAME : [redacted],: **NEDA, Alice**)	
➢ Enhanced knowledge of RWH&C	➢ His assignments are comprehensive and he seems to have a sound understanding of the RWH&C practices. ➢ He emphasises: "*The RWH technique from runoff needs to be promoted vigorously so as to increase the water available for food production."* ([redacted], Assignment 4, P.7.)
➢ Integration of knowledge into development of productive demonstration sites	➢ There is evidence of integration of his knowledge of RWH&C into the plan of the demonstration site as shown in the plans in his assignments. His understanding and thinking of the various practices is seen in his assignments especially assignment 4. His agricultural skills are seen in his thinking and explanations.
➢ Actual contribution to development of productive demonstration sites for teaching and learning	➢ *There has been no actual contribution just yet as the demonstration site has not been implemented yet. But there is the plan for it to be implemented at the site.* ➢ *His use of the site as a training space and a place where community members would be able to look and engage with the practices is an important contribution to the plan.*
➢ Changes made to training practice	➢ The demo site plan is good and includes many changes to his training. ➢ He has had involvement with other farmers who practice roof rainwater harvesting which he has documented.
➢ Expanded community interaction	➢ He has made connections and engages with College lecturers, University lecturers, extension officers and farmers. ➢ He has had interactions with Lloyd village demo site team and helped in the implementation of that site.
➢ Links with other knowledge partners	➢ He has links to the university ([redacted]) , the college (lecturers involved in IB network),DRDAR extension (Middledrift and Alice) and farmers. Outside of the learning network, he has connections to NGOs in the area and various different market partners too.
➢ How WRC RWH&C materials were used	➢ The materials are well used is his assignments. ➢ Hand outs and posters are seen as the most accessible forms of materials that he identifies.

Appendix 11- Example of Field Visit Notes

11 May. — Support Visit to Lloyd village Implementation of Demo site.

Arrive at 8.30/9 where farmers start arriving with their tools (spades, picks & shovels). The plan is shared among all – this plan was finalised when Jonathan Denison visited on the 15th Feb 2015.

The group of participants split into 2 groups – one working on line levels to work out slope & where the diversion furrows would be put., the other group use A-frame technique. The WRC resources were used to facilitate & guide the groups. The AFF team documented the process of ~~making~~ constructing/using the line level & A-frame, then implementing the diversion furrows & ponds – to make "how to" posters & "how to" videos.

People present: farmers
Extension officers & interns (DRDAR)
NEDA staff & interns.
Community members
UFH lecturers
RU ELRC team members (AFF)

The facilitators & farmers were given the handouts to guid the process. An Aframe & line level were made first to measure and mark out ~~four~~ contours for the diversion furrows be at a slight and to the contour. 4 Furrows were m with UFH's tractor & subsequently cleaned out & extend to the ponds that were being dug. – The ponds (3x once dug to ± ½ a metre had a lining put in for the water to be held there. Participants all got involved dependi on their physical ability – By the end of the 2 morni there were only 2 ponds that need to be completed – the when done by the next week as an extension officer report

Appendix 12- Table of Data Generated

Date	Who and where	Type of Data	Number of People	Reference
10.06.2014	Fort Cox College	Focus group discussion & observations	4 WRC researchers , 4 FCC staff	• FG1 (focus group 1)
10.06.2014	University of Fort Hare	Focus group discussion & observations	2 UFH staff & 4 WRC researchers	• FG2 (focus group 2)
15.07.2014	• Fort Cox College- Rural Development Centre • Middledrift Extension Office (DRDAR) • World Vision (NGO)	Focus group discussion & Observations	2 WRC researchers, 5 FCC/RDC Staff, Extension officers, 1 Secretary	• FG3 (focus group 3) • FG4 (focus group 4) • FVN (field visit notes)
23.07.2014	• University of Fort Hare • Middledrift Agricultural Show	Focus group discussion & observations Discussions and Observations	2 UFH Staff & 2 WRC researchers	• FG5 (focus group 5) • FVN (field visit notes)
12.08.2014	First Learning Network meeting- Fort Cox College	Observations, attendance register, feedback & expectations	29 Network members & 3 WRC researchers	• LNR1 (learning network report 1- expectations) • LNR2 (learning network report 2- feedback)
04.09.2014	• Phandulwazi AHS • Alice Extenstion Office (DRDAR)	Discussion & observations	1 Principal, 1 teacher and 2 WRC researchers & 1 extension officer	• FVN (field visit notes) • FVN (field visit notes
16.09.2014	Learning Network Module 1- Phandulwazi AHS	Observations, attendance register, feedback & expectations	33 network members & 3 WRC researchers	• MTR1 (module training report 1)
16.10.2014	Learning Network Module2- Fort Cox College	Observations, attendance register, feedback & expectations	21 network members & 3 WRC researchers	• MTR2 (module training report 2)
04.11.2014	Support & follow up visit	Observation & Interviews	2 at UFH, 1 at NEDA and 1 at FCC	• FVN (field visit notes)
29.01.2015	• Keiskammahoek Dairy Trust • NEDA	Interview & observations	1 Farmer & 1 NEDA staff & 4 WRC researchers	• If1 (interview farmer 1) • FVN
30.01.2015	Alice Extension Office (DRDAR)	Interview & observations	1 extension officer & 3 WRC researchers	• Ieo1 (interview extension officer 1)
03.02.2014	Learning Network Module 3- Keiskammahoek, seven stars dairy trust	Report, observations, attendance register, feedback & expectations	18 network members & 3 WRC researchers	• MTR3 (module training report 3)

06.02.2015	• Lloyd Village Co-Op • Perksdale farmer	Interview & observations	2 farmer & 2 WRC researchers & 1 translator	• If2 (interview farmer 2) • If3 (Interview farmer 3)
18.02.2015	Support and follow up Visit	Interview & observations	3 sites- Lloyd village, NEDA MD site and FCC site. 5 WRC researchers	• FVN (field visit notes)
06.03.2015	• Forte Fm Community Radio visit • KKh Demo site visit	Focus group discussion Observations	1 radio manager& 1 farmer & 3 WRC researchers	• FG6 (focus group 6) • FVN (field visit notes)
06.03.2015	Middledrift Extension office (DRDAR)- • T2 • T2	Interviews	2 extension officer	• Ieo2 (interview extension officer 2) • Ieo3 (interview extension officer 3)
16.03.2015	Demo Site Support Visit	Discussions and Observations		• FVN (field visit notes)
17.03.2015	Learning Network Module 4- Dohne Research Institute	Report, observations, attendance register, activities & LM story		• MTR4 (module training report 4)
07.04.2015	Alice Extension Office (DRDAR) Intern	Interview	1 extension intern & 2 WRC researchers	• Ieo4 (interview extension officer 4)
07.04.2015 14.04.2015	Farmer visits	Interview & observations	1 farmer & 2 WRC researchers	• If4 (interview farmer 4)
29.04.2015	Learning Network Module 5- Fort Cox College	Report, observations, attendance register, activities & LM story & Value questionnaires		• MTR5 (module training report 5) • Q (questionnaire ?)
11 and 12.05.2015	Demo site support visit (Lloyd village)	Discussions and observations		• FVN (field visit notes
06/07.2015	Capacity development document	Report, assessing assignments	4vnetwork members	• CDD
09/10.2015	Text messages from a farmer	Text messages	1 farmer & 1 WRC researcher	• SMSf
IBWA group	Imvothu Bubomi WhatsApp group	Text messages	9 network members & 4 WRC researchers	• IBWA group
1.10.2015	Learning network strategy meeting	Focus group discussion and outcomes		• LNSMR (learning network strategy meeting report)

Appendix 13- Example of Analytical Memorandum

Analytical memo 2- Learning

Sub-themes	Evidence/Quotes	Source
Group interactions	Objective of course- "To mobilise and engage participants from a diverse range of stakeholders to participate in RWH&C learning in a 'learning network community of RWH&C for food production' practice, using a co-funding/contribution model."	MTR1, P.3.
	Participants had an in-depth discussion around mulching where they shared their experience and knowledge with one another.	MTR1, P. 7.
	In one of the feedback notes: "Mulching was the mostly important thing they talk about of which I think it can be good for farmers."	MTR1, P. 13, Under Question 3.
	Farmers shared that they "have learnt how to control water and how to use water properly without wasting it."	MTR2, P. 7.
	Participant's feedback reflects that new knowledge was being learnt in the module session, new RWH&C practices and the different sources of information were recognised. Eg: "I didn't have information about gelesha but now that I attended this course I have information on how to use water properly."	MTR2, P. 14-15.
	From participants feedback: "Learnt about how important it is to understand and implement different participatory approaches when interacting with clients in order to earn success in planned activity or to find consumer/client based needs."	MTR2, P.15.
	In module 3 contact session, participants identified the importance of the demo sites and started planning the sites.	MTR3, P.7.
	In module 5 a reflection session took place around the importance of RWH&C practices and the facilitator posed the question of what are some of the benefits of these practices and how can they contribute towards food security? Some responses were: soil erosion control, source of clean water, improving soil quality and moisture, reducing costs of production and ploughing, strengthening the community in working together, improving vegetable production and extending the growing season and the water can be used for livestock.	MTR5, P.3.
	What he learnt at another workshop: "I got something that I draw there. What he had there and you can put it another way also. He made a dam with the plastic, a very nice dam and store his water there. He has got a small pump there, that old system, a hand pump. He has a hand pipe that old man and small holes in those pipes. The wholes are right on his plants, drip irrigation."	If2, P7, lines 4-6.
	Talking about what he learnt from the course: "…this is the gelesha system where they water gathered here and went in. I put these contours so that dongas don't come quickly here and the water will stop there."	If4a, P.3, lines 13-14
	Talking about combination planting from sessions: "I know from the lectures that you plant something if you got a problem with insects then you plant something that will repel others so then I thought of okay they are so silly and letting their animals in so I planted sorghum"	If4b, P. 1, lines27-29.

	"…after I have met this programme and I was chatting to the Ma, how are we going to harvest the water so that we can irrigate the crops? And then they said that there is this furrow so we will be using this furrow so that you can take the water to the dams." And "you notice other ways harvest water, like thinking about the way that they can only plough the crops here cause there is no water so you can just get the other knowledge that you can harvest water in other ways."	Ieo3, P. 7, lines 3-5. P.7, lines 7-9.
	"Amanzi for Food has assisted me a lot because there are some methods and systems that amanzi for Food did teach us. Like I had never heard of the trench beds and others. Some I knew like the gelesha but most were very new to me. And I am also practicing some like the contour bunds and those, I am practicing at home in my garden."	Ieo4, P.4, lines 24-26
	From Questionnaires with educators: "I have gained a lot on the practical part of RWH&C" "Learn/gain knowledge and skills in RWH&C."	 Qe1 Qe2
	From Questionnaires with trainers/extension officers: "Opportunities that exist to address poverty and food security" "Improves interaction skills."	 Qt1 Qeo1
	From Questionnaires with researchers: "I learnt more about practices of RWH&C and benefited through information sharing." "Gain in-depth knowledge about RWH&C practices and techniques."	 Qr1 Qr2
Communicating/ learning platforms	From a focus group activity: Educators and Researchers learn best through the internet, training course materials, experimental projects and research. Trainers learn best from previous studies/lectures, experimentation, on-site observations, experience (involvement in practical activity) and reading literature. Farmers share with others through meeting in forums or associations, phone calls (sometimes to radio shows), agricultural shows and Facebook and Twitter.	MTR2, P.5 P.6. P.7.
	Module 4 training had a sessions where the Amanzi for Food website was introduced to the participants. A discussion was had around this and it was shared that farmers don't go to extension officers to access the internet, however NEDA has a small computer room where people can access internet. A session on radio was held too where they shared that participants often listen to the radio although religion, music, news and sport were the most popular. Agricultural shows are only listened to when the time is convenient.	MTR4, Pp. 5-6
	Sharing knowledge on RWH&C through: Internet (Facebook and websites), books, learning networks/meetings, radio, workshops, demo sites and hand outs.	MTR5, P. 5.

	"I learn a lot from these workshops. Like last week in Queenstown." Talking about radio and agric shows: "…those things help, you can go to the show. The show says I am doing it wrong and I must do it like this. Or I must get this, you see there are different goats, some are better than others and more money." Talking about magazines: "Yes, sometimes Farmers Weekly and all those. I have got them"	If2, P.6. lines 23-24 P.8, lines 30-31. P. 9, line 12.
	"…the only learner ship that I had with them is the one with you, the water harvesting one. The other information they give me is the agricultural show as usual." Talking about the radio: "Yes but not per se for the agricultural radio station but I listen to the radio. Umhlobo wenene, on Tuesday mornings they talk about all the agricultural stuff." And "It is kind of motivating, and it's a kind of a learner ship also. Like people have made what they want to do in the industry and they go there and talk of how they started there things and then you can capture from there and you can learn from those people and from their experiences." And "They advise as well, they also bring the extension officers to give advice about the farming on what we should do and how should you do your farming." And about Forte FM's agricultural show/slot: "Not yet. They don't have." "No I don't use internet. I used to use the internet that time I was at Fort Cox, But after that I really didn't use that. Internet is really good because you learn things for example that if you want to know about maize production then you go there and find information. You want something you don't know, maybe you have just seen or thought of something then you ask them."	If3, P.1, lines 20-21. P.1, lines 25-26. P.2, lines 2-4. P.2, lines 8-10 P.2, line21. P.3, lines 3-6.
	He listens to the radio and sometimes has the farmer's weekly.	If4a, Pp. 3 (27)-4(1).
	"We have also various stakeholders that we are working with for instance grains, they have got some study groups and also Fort Hare, and they have livestock sessions." "Some of the farmers they are buying the Farmers Weekly for themselves"	Ieo2, P.4, lines 6-7. P. 8. Line 38.
	"For myself I do the demonstration, but sometimes if want to be able to tell them then I can organise specialised people."	Ieo3, P.1, lines 27-28.
	"…there is our own in the internet, there is an agriculture extension on the internet. SO if you don't know you check there but most of the time I ask for my colleagues…"	Ieo3, Pp. 4(35)-5(1)
	"I study agricultural books and then I go to the internet..." "There is extension suite that is for extension officers, I am not registered but I have asked for permission from one of the officers for their details and then I go on with that to search more." "They read and use high school text books from their children, from the radios- the agricultural programme and also Umhlobo Wenene- but it is early in the morning but some can listen and others don't." "Even the farmers they look at SABC 2's programme that is the living lands- that programme is very helpful."	Ieo4, P.2, line 26 P.3, lines 3-4. P.3, lines 12-13 P.3, line 16

	From Questionnaires the network members communicate with one another with phone calls and emails.	Questionnaires.
Social capital/good relations	Farmer talking about educators involvement in demos site. Extension officer and educator involved in demo site.	If1, P.1, line 18. Demo site Obs.
	"Okay so if I don't know something, then there is maybe other people in the office and I check the information from them…"	Ieo3, P. 4, lines34-35.
Intergenerational knowledge	"What I can say is that farming is in my blood because my father was somebody who liked to plough gardens and so on but on the small scale. After that my old man he got a piece of land, at the time the people call it a morgen. It's not hectares like now" "So the old man learned me there, to plough, that time us using cows." "I get information too of how to plant and all that. From this old man and my father from time back but I also got the knowledge to do something. I have the background from that." "My last born, my daughter she is (into farming). I have learned her lots of things at my garden at home."	If2, P.8, lines1-3. If2, P.8, line 5. P. 8, lines 26-27 P.9, line17.
	"I mix myself with experiences people, you see…"	If3, P.1, line 6.
	Discussing how many people in his family are involved in agriculture in some way. "I started agriculture at school and I passed my matric there at this school. I studied Landbou which is agriculture. From Primary to JC. And then practically from my family." And pointing to his extension officer added: "Here is my contact and maybe my daughter and sister but they are not very strong about the crops, they are doing agriculture economics so it is different. I then sometimes talk to their colleugues. But mostly I sit and think of what I am going to do because I was taught at school how to do it."	If4a, P. 3, line 11. P.3, lines 16-17. P.3, lines 19-21.
	"…the officers here help us to learn with the farmers." And "Well I grew up doing farming at home and then even in high school I was more active in agriculture."	Ieo4, P.1, line 5. P.4, line 5.
Boundary crossing	Extension officer from outside network joining demo site team and using resources to help implement RWH&C practices onto site.	Demo site Obs.
Interacting with resources	In module 1 contact session, participants were given resources and the navigation tool. In the session, participants selected practices that would be of importance to the network members due to resources and skills needed along with the relevance to the geographical area and farming type/scale.	MTR1, Pp. 6-7.
	Story of the farmer implementing RWH&C practices into her garden: "…that I make something so that this water go to the garden so I do these things from this picture (shows book). So I look at my garden and see all this water." And "I am making Matanyana…"	If1, P.1. Line 3-5. Line 18.

	Talking about using the WRC materials: “I am using for my garden but not yet with other farmers. So I am starting with myself.”	Ieo4, P.5, line 8.

Appendix 14-Consent Form

I, ... (name and surname), understand that I am being asked to participate in a research study conducted by Kim Weaver of Rhodes University. This research will follow a process that has been described to you in the discussion you will or have taken part in. She will observe, ask you to fill out a questionnaire or interview you in your own time and space. The study is looking at the relationships among the learning network partners and the communication and social learning processes that occur here, also the value you find in the learning network. The information gained will be expressed and shared back to you so that you can check the transcriptions of our discussions to validate that it accurately represents what was discussed. The specific focus of this study is to map the learning network partners and the communication and social learning processes that occur within the network as well as the value people find in belonging to a network. The study will also focus on understanding how food producers at three different scales access and use information with regards to farming practices.

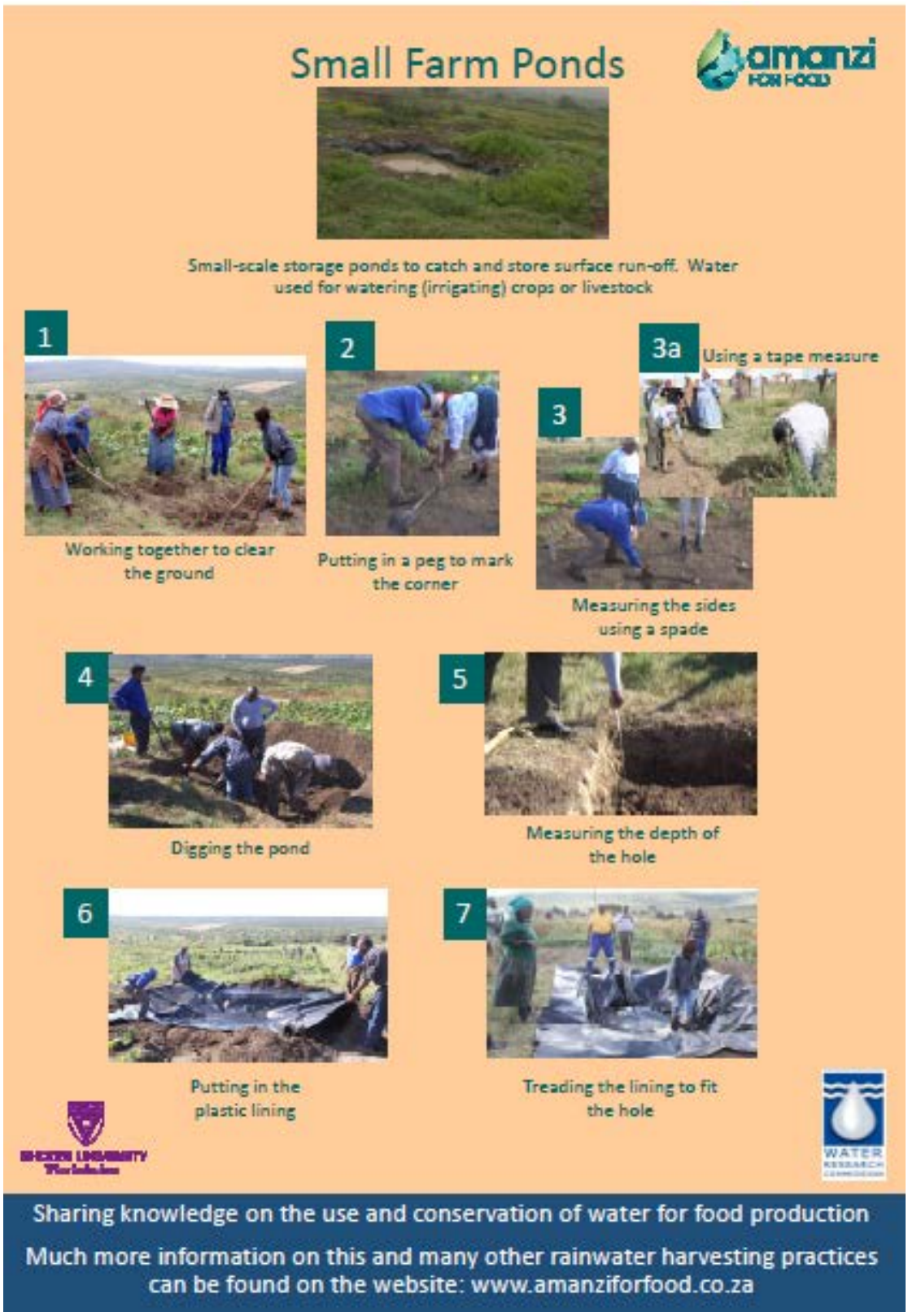
I am aware of the expected outcomes and benefits from this study as well as the Water Research Commission research programme, Amanzi for Food. The programme's purpose is to develop a knowledge dissemination strategy to encourage efficient and effective water use for food production through engaging with growers, disseminating knowledge and providing training opportunities.

I understand that my participation in this study is entirely voluntary and that I may withdraw from this study at any time should I wish to do so.

The study has been explained to me and I have agreed to participate. To ask any questions about the study or my involvement, contact Mrs. Kim Weaver at +27 83 655 4281 or kim.n.carlyon@gmail.com/kimweaversa@gmail.com.

Signature: Date:

Appendix 15- Example of a Poster on Ponds in English and isiXhosa



Amachibi Amancinci Asefama

Amacibi amancinnci enzelwe ukuqokelela amanzi nokugcina amanzi abaleka emhlabeni.
La manzi asetyenziselwa ukunkcenkceshela izilimo okanye ukuseza imfuyo

1

Sisebenza kunye ekucoceni umhlaba

2

Ukufaka ipali encinci siphawula ikhonto

Usebenzisa iteypu meja

3a

3

Ukukhangela ukulingana kwamacala usebenzisa umhlakulo (imitha e-1)

4

Ukwemba ichibi

5

Ukukhangela ubungakanani bobunzulu bomngxuma

6

Ukwendlala iplastiki

7

Ukunyathela umondlalo weplastiki ukuze ungene kakukhle emngxunyeni

Ukwabelana ngolwazi lwendlela yokulondoloza nokusebenzisa amanzi ukuze kuveliswe ukutya

Ukuze ufumane inkcazelo engakumbi kunye nokunye okuninzi malunga nokuqokelela amanzi emvula ngena kule webhusayiti :www.amanziforfood.co.za