

**The Mediating Processes within Social Learning:
Women's Food and Water Security Practices
in the Rural Eastern Cape**

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by
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ABSTRACT

The focus of this study was to explore the implicit and explicit mediating processes within the social learning of women's food and water security practices in the rural Eastern Cape, South Africa. The study was undertaken in response to a growing problem of learning resources being decontextualised and therefore being of little relevance or use to the everyday practices of the people they were developed for. The central thesis of this study is that if the mediating processes that shape practice and learning are understood then these practices and learning can be better supported. One of the main foci of this study therefore is the concept of mediation and the importance of understanding the implicit and explicit mediating processes that shape learning and practice within the context of rainwater harvesting and food gardening practices of rural women. The study interprets these as social learning processes after the work of Lev Vygotsky and post-Vygotskian learning and activity development research, which recognises that all learning is socially mediated. This study also attempts to show that ontological factors also shape social learning processes via structural mediations (which are often also socially structured over time in history).

Working within the broad framework of change oriented social learning, education for sustainability and the southern African water and food nexus the study is focused around two central research questions: 1) What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security in rural communities? And 2) How can a question-based learning resource extend the learning practices in this context?

Drawing on three sensitising concepts of dialectics, reflexivity and agency, the study worked with Cultural Historical Activity Theory (CHAT), underpinned by critical realism, to reveal how the learning of rainwater and food gardening practitioners is constrained and enabled by mediating processes. The theory of mediation provided a useful theoretical lens with which to examine data generated. A case study approach was used in two sites in the rural Eastern Cape. The first was Cata village in the Amathole district and the second was a peri-urban settlement called Glenconnor in the Cacadu district. Each case study is constituted within a networked activity system. The study also used a narrative inquiry approach in order to bring

to life the case studies, activity systems and some of the dynamics of social learning within the study. The methodological tools of document analysis, observations, in-depth interviews and focus group discussions were used to explore the implicit and explicit mediating processes that shape research participants' rainwater harvesting and food gardening practices and their learning. Inductive, abductive and retroductive modes of inference were used to analyse data in and across case studies.

One of the first findings of this study is that learning is embedded in and emergent from context in that it is mediated by implicit and explicit processes within each context. This makes such learning social, in the sense of social used by Vygotsky. The second finding showed that implicit and explicit mediation processes are constantly interacting in a dialectical process whether people are conscious of this interplay or not. This is an important dynamic to understand when trying to bring about societal transformation through education. Understanding the interaction between the implicit and explicit alerts researchers to the socio-cultural dynamics inherent within social learning processes and therefore informs how learning resources and educational and development programmes should be designed and implemented.

This study contributes to new knowledge in the environmental education field and the water knowledge sector. It makes a theoretical and empirical contribution to the body of knowledge concerned with socially mediated learning and situated learning approaches. The study illustrates how learning is embedded in context and also how learning emerges in relation to context via interactions between implicit and explicit mediation processes, and considers what this means for learning and development in the rural nexus of water and food security practices. This study also contributes to the growing body of post-Vygotskian social learning research in southern Africa that is being developed in the context of cultural historical activity theory as it shows the dialectical relationship that exists between implicit and explicit forms of mediation as these are embedded in, emergent from, and are externally mediated into activity systems in rural community contexts.

This study contributes to a second area of knowledge: the water sector. With a background in anthropology which sensitised the researcher to contextual factors and approaching the study through an educational lens, the data has been worked with to surface and present the nuanced mediating processes that shape the learning and knowledge around water issues.

This way of working and this focus on the socio-cultural is relatively new in the water sector in South Africa and gains significance in the light of an emergent interest in more complex social studies in the water sector which has traditionally been dominated by natural sciences and engineering. The significance of this study for rural South African women's lives is that by understanding and taking account of their history, context, struggles and experiences, their learning and practices can be better supported through more relevant learning resources and programmes.

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Dedication

This thesis is dedicated to all the women who feed and raise their families despite their (contextual) constraints.

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ACRONYMS

ANC	African National Congress
BRC	Border Rural Committee
CHAT	Cultural Historical Activity Theory
CPA	Communal Property Association
DA	Democratic Alliance
CPWP	Community Public Works Programme
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EE	Environmental Education
ELRC	Environmental Learning Research Centre
ESD	Education for Sustainable Development
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GAENP	Greater Addo Elephant National Park
GIS	Geographic Information Systems
IDP	Integrated Development Plan
IWRM	Integrated Water Resource Management
KSA	Key Strategic Area
LSRV	Lower Sundays River Valley
NGO	Non-Governmental Organisation
NDA	National Department of Agriculture
NPO	Non-Profit Organisation
NWRS	National Water Resource Strategy
PhD	Doctor of Philosophy
PRA	Participatory Rural Appraisal
PSC	Project Steering Committee
QBLR	Question-based learning resource
RDP	Reconstruction and Development Programme
SANPAD	South Africa Netherlands research Programme on Alternatives in Development
RWH	Rainwater harvesting
SRV	Sundays River Valley
SRVM	Sundays River Valley Municipality
TCOE	Trust for Community Outreach and Education
UN	United Nations
WfF	Working for Food
WHO	World Health Organisation
WRC	Water Research Commission
WUA	Water User Association

CHAPTER ONE

INTRODUCING THE STUDY

1.0 Introduction

Chapter One introduces the study, situating this PhD in the broader research project of the Water Research Commission (WRC). It considers the motivation for exploring a context-specific process of developing learning resources. This process is investigated within the context of women's water and food security practices, focusing on the concept of mediation, a concept that is core to social learning. This chapter further provides the research questions and goals and finally an overview of the structure of this thesis.

1.1 Introducing the study

In response to serious water shortages and the 1971 Water Research Act, the Water Research Commission (WRC) was established with a mandate to generate new knowledge of water and to promote purposeful research concerning South Africa's water resources (WRC, 2011). The WRC has five Key Strategic Areas (KSA) of research which include Water Resource Management, Water-linked Ecosystems, Water Use and Waste Management, Water Utilisation in Agriculture and Water-centred Knowledge. This study is situated within the fifth KSA, Water-centred Knowledge, and is the second phase of a larger project following a previous Masters study conducted by Charles Phiri (2012).

Through various research programmes it has been shown that contextual factors must be understood in order for the development of relevant research and research dissemination to take place, not only in the water sector but across other sectors (Burt & Berold, 2012; Lotz-Sisitka & Burt, 2006; Jiggins, van Slobbe & Roling, 2007). In their 2011 WRC consultancy of *Investigating Water Knowledge Flow to Communities Most at Risk*, Burt and Berold (2012) found that water research is not reaching the relevant groups, specifically communities involved in water management practices, bringing into question the relevance and accessibility of water research. Many knowledge learning resources are available but little is known about which work best and why (Burt & Berold, 2012: 1). It was found that knowledge learning resources are often not disseminated properly and are "inappropriately

technicist” (Burt & Berold, 2012: 1). This is confirmed in a 2012 study by Viljoen, Kundhlande, Baiphenthi, Esterhuyse, Botha, Anderson, & Minkley in which it was found that agricultural extension services are delivered in a “directive and modernist top down approach” where local farmers are “relatively passive recipients of this science and knowledge”(133). They further argued that “rainwater harvesting development ... needs to relate to practical training and skills transfers located in local contexts, needs and expectations” (Viljoen et al., 2012: 73). In their 2006 critical review of participation in Integrated Water Resource Management (IWRM), Lotz-Sisitka and Burt (2006: 5) also argued that in order for best practice to emerge in IWRM, careful account must be taken of contextual factors and social processes. Factors such as history, resources, knowledge, empowerment, experience, political enfranchisement, language, attitudes, individual agency and educational experience play out differently in different contexts and act as mediators of both learning, practice and participation (Lotz-Sisitka & Burt 2006: 6).

While the funding and motivation for this broader project came from the WRC, intellectually the study was housed at the Environmental Learning Research Centre (ELRC) at Rhodes University. The ELRC is concerned with teaching and research in environmental education with a focus on environmental learning, agency and societal change and the associated implications for education and training systems in South Africa (ELRC, 2014). This current study sits within a wider call for education for sustainable development and within the context of natural resource management challenges on the African continent. One of the key themes in environmental education research at the ELRC has been to develop more appropriate ways of mediating and facilitating learning for social and ecological transformation in the context of sustainability practices through social learning processes. Sustainable development and sustainability as concepts are explored in more detail in Section 2.3.1.

1.2 Purpose of the study and broad research question

The objectives of the broader WRC knowledge project of which this study is part were twofold:

(1) Identify and support the skills that are needed to mediate learning around water management practices in an Eastern Cape community. For this project, the practice of rainwater harvesting for small homestead food gardens was used as an example of a water

management practice. Cata village near Keiskammashoek and Glenconnor in the Sundays River Valley were chosen as the two case study sites. The aim was to highlight the significance of history and context in research processes concerned with exploring the development and use of learning materials and thus understand how environmental educators can foster learning in different contexts. As in this study, Lupele (2003) explored in depth how contextual, social, political and historical factors in the communities in which he worked influenced the design, development and use of learning support materials.

(2) Research and develop a question-based learning resource (QBLR) that could be used to develop the capacity of community-based mediators of water knowledge. The learning resource was developed around the above chosen rainwater harvesting practices in Cata (see Chapter Eight).

It is important to note at this point that this is not the first WRC project concerned with rainwater harvesting and the facilitation of this knowledge. A large material development and training programme called 'Water Harvesting and Conservation' was developed by Denison, Smulders, Kruger, Houghton and Botha (2011a). The first part of the learning package focused on the technical aspects of improving water availability in homesteads and fields using water harvesting techniques. The second part of the package aimed to equip fieldworkers and extension officers with the facilitation skills to transfer knowledge of water harvesting and conservation techniques to farmers and home-gardeners (Denison et al., 2011a). If they had to be compared, this current project is more closely linked to the second volume of the package, which aimed to equip facilitators with facilitation skills around participatory development processes specifically centred on rainwater harvesting and conservation (Denison, Smulders, Kruger, Houghton and Botha, 2011c). The second part of the manual sought to train extension workers to be culturally sensitive as well as to improve their communication, presentation and writing skills (Denison et al., 2011c). The main focus of this current study, however, is concerned with developing a process to build the capacity of community-based facilitators of water knowledge to understand and open up specific socio-cultural and ecological contexts. The motivation behind this, as discussed above, is that facilitators of knowledge would then be able to access current knowledge within specific contexts and mediate relevant knowledge within the communities in which they work. This current research project has simply used rainwater harvesting as a case example to investigate and develop insight into this process out of a specific context. The question-based learning

resource developed out of this current PhD study (see Chapter Eight and Appendix 1 for final version of the QBLR) is intended to encourage dialogue around any (water) practice, in this case rainwater harvesting and food gardening, rather than being an authoritative manual on rainwater harvesting techniques and facilitation.

As indicated in the project proposal and in a report on a previous review on knowledge flows within the water sector (Burt & Berold, 2012), it is important to understand the sociology of community-based water management practices, particularly how communities learn these practices. The first phase of the broader WRC project thus aimed at producing an in-depth understanding of how communities learn in the context of existing water management practices. This took the form of a Masters project by Charles Phiri (2012). Phiri (2012) chose three water management practices as the focus of his study:

1. Rainwater harvesting for domestic use (Water for Food community of practice)
2. Rainwater harvesting for irrigation (Cata Agricultural Project)
3. Eradication of alien invasive vegetation (Working for Water)

Phiri (2012) then explored how people learn around these three water management practices. Phiri's (2012: 109-110) five key findings were as follows:

1. Participation in communities of practice creates a platform for learning for community members;
2. Participatory structures for local communities have developed around a WRM practice;
- 3. A diverse range of contextual factors and structural mechanisms influence participation and learning in communities of practice;**
4. Despite external influence, most learning has been achieved through social interactions amongst communities of practice and with the practice; and
5. Learning has taken place through facilitated interventions.

This current PhD study found its entry point at the third key finding (in bold above) and involved a deeper exploration of the contextual factors and structural mechanisms mediating learning around a specific water practice. The water practice chosen for this study was Phiri's (2012) first water management practice, rainwater harvesting with plastic rainwater tanks for

small-scale domestic food gardening use. I chose to focus on rural women engaging in these practices as the relationship between women, water and food security is prevalent in the literature reviewed (Section 2.1.2). It was suggested by the WRC steering committee at the start of my research project that the study focus on rainwater harvesting using plastic rainwater tanks only as the different methods of rainwater harvesting in use are too broad to cover (a thorough definition and categorisation of rainwater harvesting is presented in Section 2.2.1). This study thus further explored A) the contextual factors affecting or mediating learning in the context of rainwater harvesting and food gardening practices, as well as B) piloted a question-based learning resource developed for the broader project. Table 1.1 below summarises the research activities of broader WRC knowledge project into which this PhD study fed. The last research activity culminated in the piloting and evaluation of a mediator’s training programme run over the course of four months.

Table 1.1: Summary of broader WRC knowledge project research activities in relation to the phases of developing a question-based resource for mediating change (Burt & Berold, 2012: 11), indicating how my research fitted in to this wider research programme

Understanding how people learn	Raising questions based on peoples’ stories	Developing and piloting a question-based learning resource	Mediator training programme
<ul style="list-style-type: none"> • Charles Phiri’s research – “How do communities learn through participating in IWRM practices?” • Review of social learning and mediation • Nina Rivers’ research – The mediating processes within social learning 	<ul style="list-style-type: none"> • Nina Rivers’ research – The mediating process within social learning 	<ul style="list-style-type: none"> • Development of question-based learning resource and catalogue • Piloting resource and catalogue – Nina Rivers’ research 	<ul style="list-style-type: none"> • Development of curriculum framework • Piloting and evaluating training programme • Piloting and evaluating WRC Mediator’s Short Course
CHAPTERS 5 and 6	CHAPTER 7	CHAPTER 8	CHAPTER 9

The following section presents the study’s research aims, questions and goals.

1.3 Structure of the study, questions and goals

The aim of this study was to investigate A) the context-specific mediating processes of women’s rainwater harvesting and food gardening practices in two rural communities, and B) how these impact on and are shaped by learning and practice. This study was conducted in

three phases: an initial exploration phase, a piloting phase and a synthesising phase. Phase One addresses the first research question, Phase Two the second research question and Phase Three synthesises the findings across Phase One and Two. Each research question was guided by a set of analytical sub-questions as shown below.

Phase One

Research question 1: What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security in rural communities?

Phase One A)

- Who is learning?

Phase One B)

- Why are they learning?
- What are they learning?
- How are they learning?
- What are the prominent mediating processes shaping their learning and practice?

Phase Two

Research question 2: How can a question-based learning resource extend the learning practices in this context?

- What are the links between the context, practice and the question-based learning resource? What is the value of developing a learning resource out of a context/in line with the mediational processes?
- How was the question-based learning resource piloted? How did people respond to it? How can it be adjusted for different contexts?
- How did the question-based learning resource extend their learning?

Phase Three

Synthesis of Phases One and Two

- How is learning embedded in context?
- How do implicit and explicit mediation processes interact?

- What are the implications of this interaction for learning and development in rural water and food security practices?

Research goals:

- (A) To investigate **what** the mediating processes are within rainwater harvesting and food gardening practices and **how** these mediate learning.
- (B) To explore **how** a question-based learning resource mediates and expands learning.
- (C) To explore **what** the implications are of the interaction between implicit and explicit mediating processes for learning and development in the nexus of rural water and food security practices.

The study was situated in two rural to peri-urban areas of the Eastern Cape in South Africa. I chose two cases: one was in an isiXhosa-speaking rural village called Cata and the other was in an Afrikaans-speaking peri-urban settlement called Glenconnor (see Section 4.4). In both cases my focus was on the implicit and explicit mediating processes that shape the learning and practice of rainwater harvesting and food gardening practices. The wider question of food and water security for women and the issue of sustainability of rainwater harvesting and food gardening practices were explored within the contextual investigation of these practices.

1.4 Brief introduction to the methodology

In order to address the research questions pr above, this study adopted the socio-cultural theory of Cultural Historical Activity Theory (CHAT) as it builds upon the notion of mediation and seeks to link real life experiences at the micro level to structural realities at a macro level (Engeström, 2000). CHAT is considered a metatheory in that it is both a theoretical framework as well as a methodology used to explore social and cultural phenomena within the context of learning. Scribner (in Roth & Lee, 2007: 191) described CHAT as “an accommodating framework – a metatheory rather than a set of neat propositions” which attests to its flexible nature. CHAT has increasingly become more popular within educational fields to explore learning and development challenges (Roth & Lee, 2007). It was thus particularly relevant for an investigation into the cultural-historical contextual factors and structural mechanisms mediating learning around water and food gardening practices. It provided me with guidance on selecting the methods, practice and

methodology for an in-depth investigation of mediating factors as well as equipped me with the explanatory, descriptive and analytical tools with which to carry out this research. A detailed account of CHAT is provided in Section 3.8. As is shown in this chapter, and as will also be discussed further in the study, I extended the CHAT activity system analysis of the women and their rainwater harvesting and food growing activity, with a more in-depth analysis of mediation offered by other social and learning theories (see Chapter Three). This was necessary to provide a depth explanation for mediation that arose in the context of the activity systems.

1.5 Synoptic overview of the chapters

There are nine chapters in this thesis. The following section provides a brief synopsis of the subsequent eight chapters:

Chapter Two presents literature reviewed within this research, situating the current study within water and food security challenges across the world and then more specifically within South Africa and the Eastern Cape. The emphasis on gender mainstreaming in the water sector and the role of women in Africa around food and water security issues is also explored. The chapter considers rainwater harvesting and food gardening as a response to national water and food security issues within the context of natural resource management as well as current policies relating to rainwater harvesting. The review ends with discussing the paradigm shift in the water sector toward looking at social learning theories for sustainable solutions to sustainable water management practices.

Chapter Three presents the ontological and epistemological theories drawn on for this study. Socio-historical and material perspectives on learning and development (briefly introduced in Chapter One) are first presented in order to situate the theories of mediation and CHAT. The theory of mediation is then discussed in more detail than was possible in Chapter One as well as the epistemological theory of Cultural Historical Activity Theory (CHAT) to illuminate current mediating processes. A relational ontology, critical realism and social realism are then presented as the philosophical ‘underlabourers’ of the study.

Chapter Four describes the methodology of the study, providing insight into the research design decisions, data collection processes as well as the different phases of analyses undertaken. This chapter gives an overview of the case study and narrative inquiry

approaches used and discusses ethical aspects of the study. It also discusses validity and trustworthiness issues and the associated measures applied during the research process.

Chapter Five presents the first case study site of Cata and its respective activity systems. A detailed history of the study site is provided as well as the contextual account of the learning and rainwater harvesting and food gardening practices that take place there. Historicising these activity systems is in line with the methodological approach of CHAT adopted by this study. The narrative accounts of each of the four research participants from Cata are also presented in this chapter, oriented toward answering the first research question with the result that within each narrative, the most prominent mediating processes within each person's account are identified.

Chapter Six presents the second case study site of Glenconnor. The interacting activity systems of this study site are presented, as well as a detailed historical and contextual account of the area in order to situate the rainwater harvesting and food gardening practices that occur there. The narrative accounts of the four primary research participants from Glenconnor are also presented in this chapter with the aim of surfacing the prominent mediating processes within each person's practice.

Chapter Seven addresses the first research question of this study in more depth. The first part of the chapter answers questions as to why people are learning rainwater harvesting and food gardening practices, what they are learning and how they are learning it. The second part of the chapter looks in detail at the implicit and explicit mediating processes that shape these practices and the learning of them.

Chapter Eight discusses the development of the question-based learning resource and its mediation 'logic' as well as describes how it was piloted in each site. This is done through the presentation of data from focus group discussions conducted in each study site. It then illustrates how the learning resource acted as an extension of the contextual mediating factors and explores how it extended participants' knowledge around rainwater harvesting and food gardening practices, thus expanding mediation processes.

Chapter Nine (the final chapter) discusses the findings of the study with reference to the literature reviewed in Chapter One through Three and the core focus of the study: contextual mediation and its expansion in social learning. It synthesises the findings gained from the two

phases of data analysis across Chapters Four, Five, Six and Seven and discusses the implications of these for the relationship between implicit and explicit forms of mediation. The second part of the chapter provides a summary of the study and presents recommendations for further research.

1.6 Conclusion

This chapter introduced and presented a rationale for the study by locating it within the WRC's Key Strategic Area Five interest of knowledge production in the context of a broader interest in social learning and relevant knowledge production and transfer. This PhD study makes a contribution to the broader research programme as the central theme of this study is the importance of understanding the mediating factors in specific contexts. The research goals, objectives and questions were presented as well as the unit of analyses and case study sites in brief. Finally, the chapter provided an overview of the structure of the thesis. The following chapter presents the international and national water and food security literature reviewed for this study as well as situates it within the Environmental Education context.

CHAPTER TWO

THE NEXUS OF FOOD AND WATER SECURITY AND SOCIAL LEARNING

2.0 Introduction

The following chapter provides the broader context in which this study is situated. The first section of the chapter (Section 2.1) briefly presents the global context of food and water security challenges, then turns to South Africa as a water scarce country. It highlights the emphasis on gender mainstreaming in the water sector as well as focuses on the Eastern Cape Province, the immediate context of the study.

Section 2.2 considers rainwater harvesting and food gardening as a response to national water and food security issues within the context of natural resource management. Attention is then drawn to the paradigm shift which took place within Intergrated Water Resource Management (IWRM) (Section 2.3) to incorporate social learning theory as an alternative to exploring solutions to sustainable water management practices (Section 2.3.2). Social learning theory is employed to emphasise the need to understand the relationship between learning and the broader structural mechanisms that either hinder or constrain this learning. How to monitor social learning is considered and several critiques of the theory are also presented (Section 2.3.4 and 2.3.5).

2.1 Water and food security challenges: the global context

Most of the current literature concerning the global water situation is awash with alarmist statistics and accounts of drought, starvation and deaths caused by various waterborne diseases (Clarke & King, 2004; Ison et al., 2007). It is easy to become desensitised to these and skim over phrases such as ‘water scarce countries’, ‘chronically short of water’ and ‘depleted water tables’. It is my aim however in the following section to sketch a broad picture of the world’s current water challenges in a way that hopefully represents the realities of what these statistics mean in the daily lives of people.

Many regions of the world are persistently short of water (Clarke & King, 2004). More than one third of the world’s population lives in water-stressed regions with this number rising (National Water Resource Strategy (NWRS), 2012: 4). Growing water scarcity threatens

global food and environmental security and it is predicted that by 2025 2.7 billion people may face water shortages (Ison et al., 2007). There are warnings of potential armed conflict breaking out over water shortages; but the sceptical claim that centuries of increasing farm production and improving returns to water and land have kept conflicts over food and water at bay (Allan, 2013).

The realities for people living with scarce water resources are sobering however. Being chronically short of water means bathing in dirty water if at all, drinking dirty water, not being able to wash dishes or clothes, walking long distances to collect water, having one's livestock die of thirst, not having enough water to grow crops and having to give limited financial resources to water vendors (Clarke & King, 2004: 19). In 2004 the World Health Organisation (WHO) reported that nearly 200 people die every hour of every day of every year from unsafe water, hygiene and sanitation (Clarke & King 2004: 47). According to the 2012 National Water Resource Strategy (NWRS) report 3.6 billion people die each year from water-related diseases with 98 per cent of water-related deaths occurring in the developing world (NWRS, 2012: 4).

Due to lack of access to clean water, waterborne diseases occur more frequently throughout the African continent (Konadu-Agyemang & Panford, 2006: 20). These authors link broader global economic structures to declining health in Africa such as the effects of International Monetary Fund (IMF) and World Bank policies and regulations which impose excessive charges for basic services such as clean water. They state that along with declining income levels there is an increased use of water containing harmful bacteria, leading to higher incidences of illnesses such as malaria, typhoid fever, bilharzia and tuberculosis (Konadu-Agyemang & Panford 2006: 20).

Food security the world over is fundamentally linked to water security (Allan, 2013). Food security, as defined by the 1996 World Food Summit, exists “at the individual, household, national, regional, and global levels when all people, at all times, have physical, social, and nutritious food to meet their dietary needs and food preferences for a healthy and active life” (WHO, 2013: 1). According to 2012 statistics, almost 870 million people were chronically undernourished, the majority of which live in developing countries (Food and Agriculture Organisation (FAO), 2012). 2013 statistics estimate that 26 per cent of the world's children are stunted, 2 billion people suffer from micronutrient deficiencies and 1.4 billion people are

overweight, with 500 million being obese (FAO, 2013: 1). Progress in reducing hunger since the 1990s was achieved but levelled off around 2007-2008 with the world economic recession, leading to price spikes in food items and other economic shocks (FAO, 2012).

Lack of access to food and the availability thereof are the two main factors identified as contributing to food insecurity (Schönfeldt, Hall & Bester, 2013). Although some households would be considered food secure as they have enough food to satisfy hunger, these households are often nutrient deficient due to monotonous diets (Schönfeldt et al., 2013). They are thus nutritionally insecure. There has thus been a paradigm shift in the global focus from food security to food and nutrition security, with governments focusing on meeting all the nutritional needs of their growing population in addition to alleviating hunger (Schönfeldt et al., 2013). One of the 2012 FAO recommendations was that global economic and agricultural growth should be 'nutrition-sensitive' where growth translates into the poor being able to diversify their diets, have access to safe drinking water and sanitation, have access to health services and be better educated regarding adequate nutrition and child care practices (FAO, 2012).

The regions of the world with the largest food deficits also have the largest water scarcity problems, which is indicative of the link between water resources and food (Rockström, 2003: 77). The majority of water consumed by individuals or countries is embedded in their food consumption (Allan, 2013). For example, food-water consumption accounts for 90 per cent of water consumption in most economies while non-food water consumption (water used at home and in jobs) accounts for 10 per cent (Allan, 2013: 3). Africa and many other developing nations are facing the world's largest food security challenges (Rockström, 2003: 77). Recent statistics show however that developing countries in Asia and Latin America have achieved a decline in their undernourished populations which puts them on track in terms of achieving the Millennium Developing Goals to reduce hunger by half by 2015 (FAO, 2012). In Africa however, the number of undernourished has increased from 17 to 27 per cent over the last 20 years (Schönfeldt et al., 2013: 227). According to some experts Africa is the only continent that cannot feed itself despite the fact that it has some of the most fertile soil in the world (Konadu-Agyemang & Panford, 2006: 14). Broader political, economic and ecological contexts for Africa in relation to 'developed nations' must of course be taken into consideration. Globalisation and global trading systems often do not serve African interests (Allan, 2013). For example, although as a continent Africa contributes

relatively little to climate change, it has been hardest hit by its impact (African Commission, 2009). Scarcity of water and volatile rainfall are some of the effects Africans experience which negatively affect their livelihoods, especially those in rural areas (African Commission, 2009). Over the past decades there have been devastating famines in Somalia, Ethiopia, and more recently in Malawi, Zambia and Zimbabwe due in part to political factors but also to ecological ones such as climate change (Konadu-Agyemang and Panford, 2006: 14). Despite these obstacles some authors argue that while most countries in Africa import their food, they have enough resources such as green soil (water in the root zone of the soil that can produce crops) that if invested and developed properly, can turn Africa into a major exporter of food (Allan, 2013).

Global trends in water and food security issues are especially evident in the South African context of increasing water scarcity and unpredictable weather patterns. The following section situates the discussion of water and food security challenges in the narrower context of South Africa.

2.1.1 Water and food security challenges: South African context

South Africa is the 30th driest country in the world and has less water per person than other countries considered much drier such as Namibia and Botswana (NWRS, 2012: 5). As a result South Africa's water resources are defined as "scarce and extremely limited" (NWRS 2004:15). These limited water resources are also entrenched in a history of inequalities in land and water distribution (Mwenge-Kahinda, Sejamoholo, Taigbenu, Boroto, Lillie, Taute, & Cousins, 2008) A large portion of the population is poor or vulnerable to poverty and the historical effects of apartheid are still marked in terms of access to resources such as safe drinking water (see Chapters Five and Six) (Kahinda et al., 2008: 1; Cleaver, 2011). The previous Water Act under apartheid linked access to water with land ownership (known as riparian rights), depriving the landless of water resources (NWRS, 2004: 19). This legacy is one of the major causes of the current inequity in water use amongst the country's population groups (NWRS, 2004: 19). Situations also occur where people lack access to potable water which is largely due to a lack of infrastructure and funding for its provision and operation. In 1998 South Africa passed the National Water Act which proclaimed water as a public good and aimed at equality and sustainability (Burt, Berold & Rivers, 2011). The South African government has set as one of its targets to provide all families with 25 litres of clean water per person per day from a standpipe no further than 200m away from the homestead

(Hemson, 2002: 3). This has not been achieved to date however and in general, the standard of service is low.

In 2012 the Department of Water Affairs (DWA) reported that South Africa has “a well-developed infrastructure” with 2 528 registered dams which are water supply related (NWRS, 2012: 6). Despite this report, in many parts of the country water users have either reached or are fast approaching the point at which all financially viable freshwater resources are fully utilised (NWRS, 2012: 6). Another point to note is that despite the report claiming that South Africa has “well-developed infrastructure”, many local and district municipalities struggle to supply sufficient and consistent water to their areas due to old infrastructure that has not been maintained and is unable to support growing populations (Cacadu, 2009/10: 23). Rural populations and the poor and marginalised usually experience water scarcity more intensely due to under-developed rural areas and areas such as the former homelands (NWRS, 2012: 6; Hemson, 2002). This is due to the fact that after the fall of apartheid the government focused its energies and financial capital on urban development, leaving poorer and more rural areas with inadequate infrastructure (Kahinda et al., 2008; van Koppen, 2000). Neglected rural areas are thus one of the reasons that sustainable solutions (such as harvesting rainwater) for supplying the rural poor with water are so pertinent.

In terms of food security, at a national level South Africa as a whole is considered food secure (Schönfeldt et al., 2013). When looking at households on the ground however, many South African families are not food or nutrient secure (Schönfeldt et al., 2013; Steyn, Abercrombie & Labadarios, 2001). In 2001 the majority of South Africans ate primarily maize, followed by wheat, vegetables, milk, potatoes and sugar. A survey conducted in 2001 indicated three aspects of changing food consumption patterns of South Africans since the 1980s. The first was that South Africans were eating more animal and vegetable products; secondly, that there was an increase in food diversification in different parts of the country. Thirdly, staple foods changed in aggregate food supplies. The 2001 survey concluded that, despite these trends, large sectors of the South African population were food insecure (Steyn et al., 2001).

This food insecurity is linked to levels of poverty and unemployment. Despite major developments in South Africa in the past decade, it is still one of the countries with the highest inequality indices in the world. In 2009, the most recent indicator for South Africa,

the country's GINI index (used to measure inequality) was at 63 where 0 means perfect equality and 100 is perfect inequality (World Bank, 2013). South Africa has also experienced a major increase in food prices due to inflation and the world economic recession; this has put stress on poorer South African households to not only feed themselves but to also make healthy food choices (Schönfeldt et al., 2013). Studies conducted by NGOs and research institutes have thus shown that nutritional status for South Africans has been far from optimal for many years (Schönfeldt et al., 2013).

Making up 30 per cent of South Africa's population, the poorest spend nearly 40 per cent of their income on food (Schönfeldt et al., 2013: 229). As a result, those with low socio-economic status are often the most severely affected by malnutrition, including over- and under-nutrition, as well as being the most vulnerable to food price increases. As well as being food insecure, many South African households are also nutrient insecure in terms of lacking important vitamins and minerals due to unvaried diets. In 2012, South Africa released food-based dietary guidelines, stipulating that people should eat a daily diet that is varied (Schönfeldt et al., 2013). As discussed above however, due to poverty and unemployment, varied diets are often out of reach for the majority of South Africa's population where most money is spent on staple foods such as maize porridge with little added variety (Schönfeldt et al., 2013). Where financial limitations curtail dietary options, these guidelines have little relevance.

2.1.2 Gender mainstreaming in IWRM

No discussion around global and South African water and food security challenges is complete without including the gendered nature of these challenges. As introduced in Chapter One this study includes a gendered aspect to it in order to acknowledge and speak to calls from the wider international sustainable development community to uplift women's rights in relation to land, food and water security (Davison, 1988; Wanyeki, 2003; United Nations (UN), 2006; African Commission, 2009; Jacobs, 2010)¹. In 1998 the Ministry of Agriculture

¹ It is important to note here that this study is aware that introducing a gendered aspect does not automatically translate into portraying women as victims of patriarchal systems. Often in development and development studies, 'gender' is taken to mean 'women' where 'women' are seen as a stereotypical group, often victims of injustice at the hands of oppositional and problematic 'men' (Cornwall, 1998). Feminists from developing countries warn against interpretations of their lives filled with pure drudgery and oppression (Bryceson, 1995; Ekejiuba, 1995; Sachs, 1996). In reality, men are also often marginalised and excluded in development as well. A broadening of what is understood by gender relations is therefore needed and researchers and practitioners must reflect on their preconceived biases and take account of the complexities of people's lived experiences (Cornwall, 1998; Ekejiuba, 1995).

and Land Affairs in South Africa first flagged women who headed households as the most vulnerable groups in terms of water and food security in South Africa (NDA, 1998). In Africa and most of the developing world, women, as wives, mothers and daughters, are often the primary providers of social services such as water, food and health care and can be regarded as the basic survival strategists of the household and community (Panford & Konadu-Agyemang, 2006; Hemson, 2002; Davison, 1988; Gender & Water Alliance (GWA), 2003; Wanyeki, 2003; Jacobs, 2010). In rural Africa women can spend up to five hours per day collecting water and in 2007 it was estimated that 40 billion mostly woman-hours per year are spent on collecting water in sub-Saharan Africa (Ray, 2007: 428). As a testament to women's close ties to water in South Africa and to the value attributed to them in terms of their ability for labour, during marital negotiations of bride price or *lobola*, women are referred to as *sego sa metsi*, or a gourd of water (Loate, Molose, Motlounge, Munnik, Wilson & Zuma 2012: 5). When old enough, the burden of water collection often falls to young girls who, in some instances, must attend to this before attending school (Clarke & King, 2004).

In 1992 at the International Conference on Water and the Environment held in Dublin, Ireland, four guiding principles around water management and sustainable development were acknowledged (see Figure 2.1 below).

Dublin Principles	
I	Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
II	Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels
III	Women play a central part in the provision, management and safeguarding of water
IV	Water has an economic value in all its competing uses and should be recognised as an economic good

Figure 2.1: 1992 Dublin Principles (van Beek, 2009:72)

Principle Three recognised the pivotal role women play in the provision, management and safe guarding of water (Steele, Jeenes, Jacobs & Dyobiso, 2005: 11; Ray, 2007; GWA, 2003; Hemson, 2002). In 2002 the United Nations Millennium Development Goals (MDGs) also

acknowledged the important role of women in working towards sustainable development, greater gender equality and access to health and education (Ray, 2007; African Commission, 2009). As part of the participatory and locally-focused approach to IWRM and the acknowledgement of women as producers of food and providers of water for their households, gender has thus become mainstreamed² in all sectors of society, including the water and agricultural sector (Ray, 2007; GWA, 2003).

Participation of women in water planning and decision-making was thus placed at the forefront of development policies and interventions in South Africa and the rest of the world. It was argued that any development projects that did not take into account the participation of women were likely to fail (Hemson, 2002). It is however problematic to link the sustainability of projects with women's participation as there are many other factors that contribute to project failure or success such as project management and funding, for example (Guijt & Shah, 1998; Viljoen et al., 2012). There was also very little agreed upon in terms of what concrete participation means (Hemson, 2002). In the 1990s Participatory Rural Appraisal (PRA) was put forward and understood participation to mean 'empowerment' (Crawley, 1998). This understanding of participation was based on the ideas of Paulo Freire in the 1970s and argued that participation should be a process of 'awareness-training' and 'conscientisation' of people to the problems they face in their practices and their structural causes (Crawley, 1998). For Tilbury (2007) participation locates learners at the centre of the active participatory experience with learning, facilitation and decision-making being taken up by the learners themselves. This notion of participation can be seen playing out in the lives of research participants from Cata Village in this study through their interactions with the Water for Food movement who have adopted similar practices (Section 5.4.3).

Within the South African context, the Department of Water Affairs and Forestry (renamed Department of Water Affairs (DWA)) called for visible representation of women in water projects in the 1997 Gender Policy (Monyai, 2002). The White Paper on Water and Sanitation set out that 30 per cent of the positions on water committees should be held by women (Hemson, 2002: 6). While there have been a number of positive outcomes relating to gender mainstreaming in the water and agricultural sectors in South Africa, challenges such

² Gender mainstreaming refers to the understanding that gender is not specific to a particular sector but is integral to all aspects of life and should therefore be integrated into all research and interventions (Ray, 2007: 425).

as gender not being given a higher priority in policy making and implementation, weak gender management systems, limited institutional support for this mainstreaming and weak monitoring and evaluation stand in the way of gender equality being realised in these sectors (DWAF, 2006).

The call for increased democratic and equal participation has been problematic at a community level as well, especially within the rural areas, as women on water committees and boards often occupy subordinate positions and have low levels of verbal participation in decision-making (Sachs, 1996; Sarin, 1998; Momsen, 2010). Cornwall (1998) warned, however, against the assumptions often made in participatory development programmes that if women are not verbally open, they hold no decision-making powers; human relationships are often much more complex than what appears on the surface. While acknowledging the complexities of gender relations, studies concerned with the factors inhibiting women's participation in agricultural development projects have shown that sex stereotyping, the sexual division of labour, low educational levels, the internalisation of patriarchal views held by women of themselves, women's limited claim on resources and the lack of support from both women and men of female leaders all contributed to their subordinate positions (Whitehead & Bloom, 1992; Sachs, 1996; Shah, 1998). The majority of women on water committees had lower educational levels than men, often leading women to assume less active roles (Hemson, 2002). As will be discussed in more detail in Chapter Seven however, low educational levels do not always translate into lower levels of participation (Viljoen et al., 2012). Women made up for their lower educational levels with older age and greater experience as there were often more older women than men on committees and they would then be afforded the respect given to older people in traditional societies (Hemson, 2002). Accounting for other factors, such as gerontocracy³ in some communities, are the kind of contextual factors that Cornwall (1998) argued for in her call for sensitivity to the politics of difference.

A second finding from studies of women's participation on water committees is that many women in rural areas held the traditional belief that men were superior to women (Hemson, 2002). Some women argued that "women must agree with what men do; men still feel superior, though they do consider women's views; women can give suggestions, but may not

³ A state, society, or group governed by elderly people (Compact Oxford English Dictionary, 2006: 422).

make major decisions; men should have the last word” (Hemson, 2002: 13). The internalisation of this inferiority was most marked in decision-making or the lack thereof in women’s participation. It has been shown that women often defer major decisions to men and encourage their male counterparts to deal with external agencies, pointing to the fact that many women are not exercising the new authority given them within gender mainstreamed policies (Sarin, 1998; Guijt & Shah, 1998; Hemson, 2002). The inclusion of women in development projects has sometimes been called tokenism therefore, with women exercising little actual authority (Guijt & Shah, 1998; Hemson, 2002).

Despite low education levels and disempowering attitudes, studies have shown that women gain much from participating in all-women groups and groups headed by women. Women felt comfortable to speak out and felt supported by their fellow peers (Hemson, 2002). They thus overcame their notions of inferiority because they did not have to perform in front of men. Reports also show that women felt they gained new knowledge, were empowered by attending meetings and grew in self-confidence when given opportunities in leadership. It was also shown that the majority of South African men do support the idea of women’s participation, with some arguing that “men cannot decide for women anymore” (Hemson, 2002: 19). There were however some who still insisted on male entitlement commenting, “We live by our customs” (Hemson, 2002: 19). Hemson (2002) concluded that despite gender mainstreaming within the South African water sector, women still have the responsibility for domestic water supply but without the authority to ensure its effective and continuous delivery or quality.

As a solution to this contradiction, all-women committees have been proposed as well as the suggestion that water be redefined as a domestic issue (Hemson, 2002). Women have the right to participate in projects which profoundly affect their lives, and their participation can potentially be the success or failure of such projects. Hemson (2002) argued that in order for the increased participation of rural South African women, customary barriers have to be overcome which will hopefully lead to greater civil society and more democratic order.

As this study focuses on the learning and practices of rainwater harvesting and food gardening among *rural* women in South Africa it is important to make explicit what is understood by the terms ‘rural’ and ‘women’ within a South African context.

Within scholarly work the concept of what it means to be 'rural' has changed over the years with the advent of industrialisation and capitalisation. Rural life has usually been synonymous with agriculture and farming communities (Sachs, 1996). In the global North, many authors have argued that the concept of 'rural' has become theoretically untenable in light of declining agricultural activities in these areas. Whatmore (1993: 607) disagreed however and argued instead that rurality is "centered on the forcefulness of the idea and experience of rurality in social and political struggles over identity and environment rather than on territorial definition of rural as a category of social space". In her view then the label of 'rural' is linked to identity formation. In the global South, however, such as in countries in Africa, South America and Asia, the rural category is less problematic as a large proportion of people still live, work and engage in agricultural activities in rural areas. However, it has been found that in these areas fewer rural households rely on agriculture as their sole means of livelihood. Sachs (1996) argued that rurality often transcends rural boundaries as people from rural localities move between rural and urban spaces, carrying their experiences and identities with them. Sachs (1996) also argued that rural women's perspectives and experiences are distinctive from those of urban women's and addressed four key areas of interest in understanding rural women's lives: their relationships to the natural world; the various forms of patriarchal relations in rural localities; how global economic restructuring affects rural women; and the strategies women employ to shape their lives.

Many authors argue that the relationship between women and land, especially for those who live in rural areas, affects the political economy of their lives as producers and procreators and these roles in turn affect their access to land (Davison, 1988). Many rural women engage in agricultural practices as their primary life activity as providers of food, water and fuel for their households (Sachs, 1996; Ekejiuba, 1995). Whereas more Westernised or urban people are often removed from the source of their subsistence (the land), rural women usually spend many hours of their day collecting firewood from forests, water from rivers and streams and tending plants and animals in fields. Feminist critiques of science also point to the fact that rural women in the global South, for example, have a diverse knowledge of different seed varieties for growing and know how to adapt them to different ecological conditions (Sachs, 1996). They are thus intimately engaged with and hold valuable knowledge about their local environments. Eco-feminist movements emphasise the connection between women and the environment but have also been criticised for essentialising women and this connection.

In many parts of the world patriarchal systems still dominate the relations between women and men and in rural localities and thus the relations between women and access to land (Loate et al., 2012; Sachs, 1996; Davison, 1988). Land in Africa, and South Africa specifically, is still largely owned by men who in turn make agricultural and business decisions and control women's labour on this land (Loate et al., 2012; Davison, 1988; Sachs, 1996; Wanyeki, 2003). In many traditional communities in South Africa, a woman's worth is still determined by her ability to perform household chores such as child bearing, fetching water and collecting firewood (Loate et al., 2012). Although these patriarchal family structures do confine rural women, women are by no means powerless, finding ways to survive, benefit and act as catalysts for social change within their local communities (Sachs, 1996; Ekejiuba, 1995). In the past, women were not supported by policies or credit in terms of agricultural practices but this has been slowly changing as non governmental organisations (NGOs) target more women for development and outreach projects. Agrarian and domestic discourses concerned with rural families legitimise the subordination of women by romanticising rural women's lives. On the other hand however, many Western feminist theories have depicted women, in particular in developing countries, as oppressed victims.

A third factor to consider when trying to understand the experiences of rural women is the impact of global restructuring on their lives. Debt crises in the 1980s and 90s forced developing nations to cut back on spending on public health, education and welfare which often placed increased burdens on rural women to support their families (Sachs, 1996). In terms of women's relationship to their local environments, global structural shifts in the economy often changes this relationship due to urban-rural migration, different work and livelihood strategies (Sachs, 1996). Structural changes in agricultural production that undermine the viability of family farms also change the gender division of labour and thus set in motion shifts in the patriarchal control of women's lives (Sachs, 1996). Taking account of larger global structures on rural women's lives is a multi-layered and complex task. As discussed above larger global shifts in the water and agricultural sectors have either constrained or enabled rural South African women's rainwater harvesting and food gardening activities. The contextual factors that impact upon their practices are attended to in more details in Chapters Five, Six and Seven.

In this study I worked in both rural (in the conventional sense of the term) and peri-urban areas. The study thus adopts a middle ground between very rural areas and places closer to

urban centres. Ironically, services usually associated with less rural and more peri-urban areas such as electricity and piped water were present in ‘rural’ areas while people were still fighting for such services in the peri-urban areas in my study sites. A fuller contextual understanding of both sites is provided in Chapters Five and Six which also present the profiles of the women the study worked with, considering their relationships to their natural environments, how patriarchal relations play out in their daily lives and the strategies they adopt to shape their lives. Although it is good to want to encourage systems based on equality within societies, practitioners and researchers must be aware that gender can often be elided with western notions of sexual difference. Gender is culturally specific and constructed and lived out in many different ways. Being sensitive to this brings facilitators of rainwater harvesting and food gardening practices that much closer to working effectively for change.

2.1.3 Water and food security challenges in the Eastern Cape

As will become apparent in the contextual chapters that follow (Chapters Five and Six), the Eastern Cape (the province where this study is located) is faced with a myriad of socio-economic and ecological challenges from pervasive poverty to unemployment and health risks. In 2011 there were 6.6 million people living in the Eastern Cape (Statistics South Africa, 2011a). 16.6 per cent of people in the Eastern Cape had piped water inside their yards and 18.6 per cent in the province had piped tap water on a community stand no further than 200m away from their dwellings (Statistics South Africa, 2011b). In 2011 the Eastern Cape ranked the highest out of all the provinces with 22.2 per cent of the population having no access to piped water (Statistics South Africa, 2011b).

The Eastern Cape Province has many of the most impoverished, poorly resourced communities in South Africa (Umthathi, 2011). This is because the Eastern Cape contained two of the former Bantustans⁴, the Transkei and Ciskei, which has resulted in this province being markedly poorer than other provinces (Westaway, 2012). According to 2011 statistics, 30.8 per cent of the Eastern Cape’s population was unemployed leaving it with the second

⁴ Bantustans or ‘black homelands’ were territories set aside by the apartheid government for black South Africans from the 1940s onwards. The purpose of these territories was to make these areas ethnically homogeneous in order to create ‘autonomous’ nation states for South Africa's different black ethnic groups. Ten Bantustans were established in South Africa with four of them declared independent from South Africa – Transkei, Bophuthatswana, Venda and Ciskei. Living conditions were poor and few local employment opportunities existed in these areas. With the end of the apartheid regime in 1994, the Bantustans were dismantled and their territories reincorporated into the Republic of South Africa (Westaway, 2008).

highest unemployment rate of the provinces (Statistics South Africa, 2011c). In terms of income composition, poorer households in rural areas rely heavily on social grants as opposed to wages (Westaway, 2012: 116). Unemployment in the former Bantustans can also be understood as a long-term condition in that the typical life trajectory of a resident of these areas consists of being educated only up to Grade 10 if that, sinking into permanent unemployment and dying between the ages of 50 and 60 (Westaway, 2012: 117). Adams (in Westaway, 2012: 117) described the average resident of the former Bantustans as a “permanently marginalised outsider”.

As discussed above the average rural household in the Eastern Cape often has few employed members, which makes Cata Village (Section 1.4.1 and Chapter Five) a unique case as many households in this village do at least have one wage earner (Westaway, 2012: 117). In 2011 the average annual household income for the Eastern Cape was a little above R60 000 (ZAR) or \$5 657.40 (USD) (Statistics South Africa, 2011d). Recent studies and interviews with research participants show that out-migration is still a central livelihood strategy in these rural areas with people in the Sundays River Valley (SRV) for example, moving into large industrial urban areas such as Port Elizabeth and Uitenhage and people in Cata seeking jobs in East London and other urban areas.

Most households in the rural Eastern Cape are characterised by pervasive poverty, low levels of economic activity, a shortage of employment opportunities and a high level of dependency on government social grants (Westaway, 2012: 117). Rural households therefore spend most of their monthly income on food. According to 2006 figures food insecurity was rising with the quantity and variety of foods eaten, in decline (see Section 2.2.4) (Westaway, 2012: 117). In 2009, agriculture, the apparent mainstay of rural families, accounted for only 1 per cent of rural households’ income (Westaway, 2012: 117).

In 2011 only 19.8 per cent of the Eastern Cape population had a Grade 12 education with 10.5 per cent having no schooling (Statistics South Africa, 2011e). Although service delivery in the Eastern Cape has improved since 1996, it is still the province that lags behind the rest in this regard. Only 44.9 per cent of households have access to piped water inside the dwelling/yard in the Eastern Cape (Statistics South Africa, 2011d). In terms of sanitation, 52 per cent of households rely on unventilated pit latrines and 34 per cent have no toilet facilities at all (Westaway, 2012: 118). Service delivery issues such as these also affect the dignity of

people. For example, when I visited people at their homes and needed to use their ablution facilities, they were often embarrassed and hesitant for me to use them. In sum, people living in the former Ciskei and Transkei live below the poverty line, most households rely on social grants with remittances, employment and agriculture contributing a negligible amount, and the provision of education, health, water and sanitation services and infrastructure has been seriously inadequate (Westaway, 2012: 118).

This then is the context in which food and water security challenges are found in the rural Eastern Cape. In light of declining food security and inadequate water services delivery there is thus a demand for learning processes that support sustainable rainwater harvesting and food gardening practices amongst the rural poor, especially with a focus on women. In 2011 it was reported that 49.6 per cent of women were heads of households in the Eastern Cape and that females in South Africa were more impoverished than males in South Africa with a poverty headcount of 58.6 per cent as compared to 54.9 per cent for males (Statistics South Africa, 2011f). Rural poor women's food security enhancement is therefore well recognised as a critical area for emancipatory practices and vulnerability reduction (Ray, 2007; Monyai, 2002; Hart, 2010). Responses to these water and food security challenges are discussed below in Section 2.2.

2.2 Rainwater harvesting as a response to South Africa's water challenges

With increasing variabilities in rainfall and temperatures in South Africa, alternatives to water resources were sought (Mwenge-Kahinda, Taigbenu & Boroto, 2010). The standard response to water challenges in South Africa has usually been supply oriented with dams being built to meet ever-increasing water needs (Mwenge-Kahinda et al., 2008). These measures however are proving to be unsustainable as well as unable to keep up with present water needs. Recent studies have listed rainwater harvesting as one of the main adaptation measures for climate change in South Africa (Mwenge-Kahinda et al., 2010). Rainwater harvesting is an alternative method to supply households with water as well as beyond that into small-scale farming practices (Mwenge-Kahinda et al., 2008: 1; Woyessa, Pretorius, Hensley, van Rensburg & van Heerden, 2006; Mvula Trust, 2012; Denison & Wotshela, 2009; Denison et al., 2011a). It has been argued that rainwater harvesting offers an alternative for South Africa to meet the Millennium Development Goals of halving the proportion of people without sustainable access to safe drinking water by 2015 (Mwenge-Kahinda et al.,

2008). Rainwater harvesting also has the potential to contribute to food security for the rural poor, specifically women, through small-scale rain-fed agricultural systems.

2.2.1 Rainwater harvesting: A working definition for South Africa

Before discussing the potentials of rainwater harvesting for the South African context it is important to establish a working definition of the term. Defining rainwater harvesting has proved to be problematic as many different terms are used with inconsistencies existing between them (Denison & Wotshela, 2009; Denison et al., 2011a). This is problematic as it becomes difficult to hold constructive and systematic conversations around issues of rainwater harvesting. It is thus important to have a common language and meaning for rainwater harvesting in South Africa (Denison et al., 2011a). The following is by no means an exhaustive discussion around the issue of terminology but it does outline definitions in current use and presents a proposed standardised definition and classifications for rainwater harvesting in South Africa.

Generally the term ‘rainwater harvesting’ can be described as “the concentration, collection, storage, and use of rainwater runoff for both domestic and agricultural purposes” (Mwenge-Kahinda et al., 2008: 4). Other definitions are more specific, focusing on collection methods, surfaces and uses. One definition describes rainwater harvesting as “a range of techniques used for collecting, storing and conserving rainfall and surface runoff in arid and semi-arid regions” (Boers & Ben-Asher in Mutekwa & Kusangaya, 2006: 437). Another definition argues that rainwater harvesting “refers to the concentration and entrapment of rainwater runoff from a catchment. A catchment is any discrete area draining into a common system and thus can be a roof, a threshing floor or a mountain watershed. Similarly, the means of rainwater storage can range from a bucket to a large dam” (Houston, 2001: 1). The International Water Management Institution (IWMI) defines rainwater harvesting as “the collection and/or concentration of runoff water for productive purposes. It includes all methods of concentrating, diverting, collecting, storing, utilising and managing runoff for productive uses” (Denison & Wotshela, 2009: 4). Water can be collected from “natural drainage lines, ground surfaces, roofs for domestic uses, stock and crop watering” (IWMI, 2003 in Denison & Wotshela, 2009: 4). Still another definition argues that rainwater harvesting can be defined as

the process of concentrating rainfall as runoff from a larger catchment area to be used in a smaller target area. This process may occur naturally or artificially. The collected

runoff water is either directly applied to an adjacent agricultural field (i.e. stored in the soil-root zone) or stored in some type of on-farm storage facility for domestic use and as supplemental irrigation of crops. (Oweis, Hachum, & Kijne, 1999: 2)

It is thus evident that there are varied definitions of rainwater harvesting which cause confusion. Although this current study is not concerned with the technicalities of rainwater harvesting it is important to be clear regarding the definition and categorisation of methods to identify and situate the rainwater harvesting methods of the research participants in this study.

Denison and Wotshela (2009), two authors with much experience in rainwater harvesting in South Africa, have developed a working definition of rainwater harvesting as well as a standardised categorisation for the South African context. These authors favour the Oweis et al. (1999) definition for its usefulness for the South African context in that people in rural South Africa harvest rainwater for both domestic and agricultural purposes. This definition however does not make clear the distinction of rainwater harvesting from two other agricultural practices which have similar soil-water implications which are soil-conservation and supplementary-irrigation (Denison & Wotshela, 2009: 5). Although there is an overlap, rainwater harvesting has a distinct character differing from both these practices. Soil-conservation is defined as trying to reduce water runoff through practices that “successfully increase the infiltration capacity of the soil, increase the contact time, and/or reduce surface sealing” (Woyessa et al. in Denison & Wotshela, 2009: 5). The emphasis here is on retaining water which is already in the soil as opposed to collecting it. An example of supplementary irrigation is a farmer who has an irrigation dam as an on-farm storage facility to supplement the irrigation of crops; this falls out of the boundaries of what is meant by rainwater harvesting for this study. Denison, Smulders, Kruger, Houghton & Botha (2011b: 10) thus defined rainwater harvesting as intercepting and capturing rainwater, slowing the water down, channelling the water to where it is needed and storing the water, either a) directly in the soil, or b) in tanks or storage containers. Rainwater harvesting for domestic and small-scale gardening practices was the focus of this current study, with storage centred on plastic water tanks and small cement reservoirs. Having established a working definition, it is now useful to explore how to categorise the different rainwater harvesting systems.

Categorisation of rainwater harvesting: A South African description

There is general agreement in South African literature of the elements of a rainwater harvesting system but naming these elements varies. Agreement on the main elements of rainwater harvesting systems can be seen in the following:

Gould (in Denison & Wotshola, 2009: 16) focused on water for domestic (rather than agricultural) use and provided the following rainwater harvesting system categorisation:

- a) Type of catchment surface (e.g. roof, ground or rock surface)
- b) Type of storage tank (sub-surface, ferrocement, concrete, plastic, earth)
- c) Purpose of the system (domestic, livestock, irrigation).

The Water for Food Movement used a similar but more inclusive categorisation in the water resources and uses and responded more directly to the ‘multiple water use paradigm’ (Denison & Wotshola, 2009: 16). The WfF Movement categorised rainwater harvesting as:

a) Water collection:

- Grey water collection (collecting used water from the house)
- *In situ* rainwater collection (catching the rain where it falls and preventing it from flowing away/running off)
- External storm water run-off collection (from adjacent fields, roads or roofs)

b) Water storage:

- In the soil profile
- In structures, like above and below-ground water tanks
- In groundwater, through recharge of groundwater

c) Water use or application:

- Directly from the soil profile
- Through irrigation, i.e. by applying water to the plants from storage.

Mwenge-Kahinda et al. (2008: 5) argued that rainwater harvesting techniques have the following components: a catchment area, a storage facility, a targeted area of use and the

non-physical management component. They offered three different types of classification based on catchment area used which include:

- Domestic Rainwater harvesting (DRWH),
- Infield Rainwater harvesting (IRWH) and
- Ex-field Rainwater harvesting (XRWH). (Mwenge-Kahinda et al., 2008: 6-8)

Denison et al. (2011a) problematised this classification however in that infield rainwater harvesting is often referred to as ‘micro-catchment rainwater harvesting’ in the international standards used by organisations such as the Food and Agriculture Organisation (FAO). There are many different infield rainwater harvesting or ‘micro- rainwater harvesting’ systems such as swales, tied ridges, berm and basin, pitting and trench beds (Denison et al., 2011a). Ex-field rainwater harvesting also widely called ‘macro-catchment rainwater harvesting’ in most literature. As an illustration of inconsistencies within the same organisation around rainwater harvesting terminology, see the example below where the same term ‘in-field’ method is used to describe two different things in two different WRC publications:

- Mwenge-Kahinda et al., 2008: A group of about 20 methods that fall under the widely used term ‘micro-RWH’
- Botha et al., 2003: A specific application of one of these methods (tied-ridges at 3 m spacing within limited soil and rainfall parameters) (Denison et al., 2011a: 45)

This is merely one example of how a clash in terminology causes confusion. In an attempt at clarity and to align South African terminology with those of international norms, Denison and Wotshela (2009) offered the following categorisation based on international norms set out by Oweis et al. (2004) and the FAO (2003) (see Figure 2.2 below). They adapt a categorisation that can describe a system using three simple descriptors: scale, reservoir type or man-made construction (if any) and soil-water storage type (if any) (Denison & Wotshela, 2009: 18).

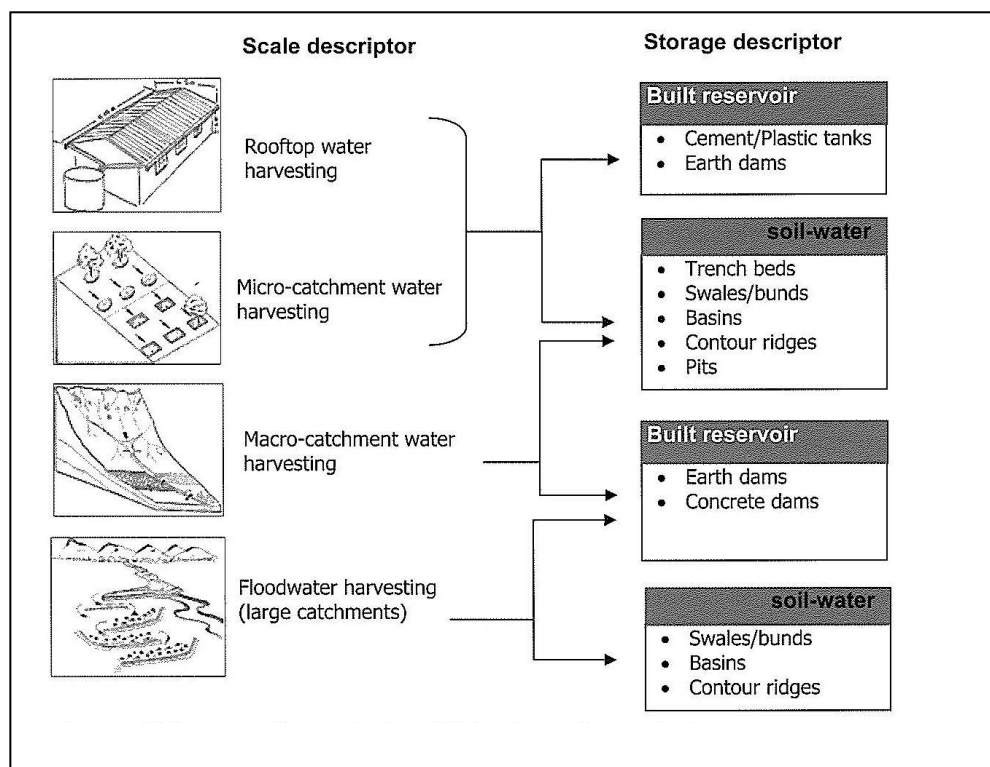


Figure 2.2: Proposed categorisation of water harvesting methods diagram
(Denison & Wotshela, 2009: 18)

2.2.2 Indigenous and contemporary methods of rainwater harvesting

Rainwater harvesting is merely a general descriptive term and there are many different methods of rainwater harvesting, far more than the roof-top collection with storage in cement, zinc or plastic tanks often associated with rainwater harvesting. Although what follows is not an exhaustive list, several indigenous, indigenised and contemporary rainwater harvesting techniques in South Africa have been identified and described (Denison & Wotshela, 2009; Viljoen et al., 2012). In terms of indigenous rainwater harvesting techniques *gelesha* remains a soil preparation practice used in the Eastern Cape and KwaZulu-Natal that ensures falling rain or frost is captured in tilled soil (Denison & Wotshela, 2009: 19). Stone terracing is another method used in KwaZulu-Natal geared toward soil preservation and water-flow management (Denison & Wotshela, 2009: 23). Homestead ponds that were dug by hand are another indigenous rainwater harvesting method used specifically in the Free State and the Eastern Cape provinces (Denison & Wotshela, 2009: 26). The construction of contour ridges is another rainwater harvesting technique used in South Africa which seems to be a soil conservation method more than a rainwater harvesting method but the contours of the ridges

provide catchment areas for rain (Denison & Wotshela, 2009: 30). *Saaidammes* or ‘planting dams’ are effectively flat, shallow dams used in the dry desert landscapes of South Africa. Flood waters from mountains are diverted with structures into these low-lying dams. *Klipplaate en vanggate* is the Afrikaans term for ‘paved-rock and catch pits’ and is a rainwater harvesting method originating from the Western Cape where naturally hardened impermeable surfaces are cleaned and rainwater is channelled over this into an underground tank (Denison & Wotshela, 2009: 34).

In terms of contemporary methods of rainwater harvesting, in-field rainwater harvesting was proposed in 2000 and designed to minimise unproductive losses due to ex-field runoff and evaporation from the soil (Viljoen et al., 2012). In-field rainwater harvesting techniques combine the benefits of water harvesting, zero-tillage and small basins to minimise runoff and maximise infiltration of water (Denison & Wotshela, 2009: 37). *Ploegvore* or ‘plough furrows’ are another contemporary rainwater harvesting method involving consecutive circular pits dug 2 to 5 metres apart; these form part of an effective rainwater harvesting technique used in South Africa to rehabilitate degraded agricultural land (Denison & Wotshela, 2009: 35). Trench bed gardening, another method widely used around South Africa, was originally developed in KwaZulu-Natal in the 1960s (Denison & Wotshela, 2009: 37; Viljoen et al., 2012). Soil is removed from the bed, organic matter placed inside and then covered with the soil again to create a terraced bed which should function to retain water (Denison & Wotshela, 2009: 37). Roof-top rainwater harvesting is a very popular method of harvesting rainwater in South Africa. Water is collected from the roofs of houses and other buildings as well as from impermeable surfaces such as courtyards or roads and stored in tanks. The three main components of roof water harvesting are the roof, gutter and storage tank, as shown below in Figure 2.3.

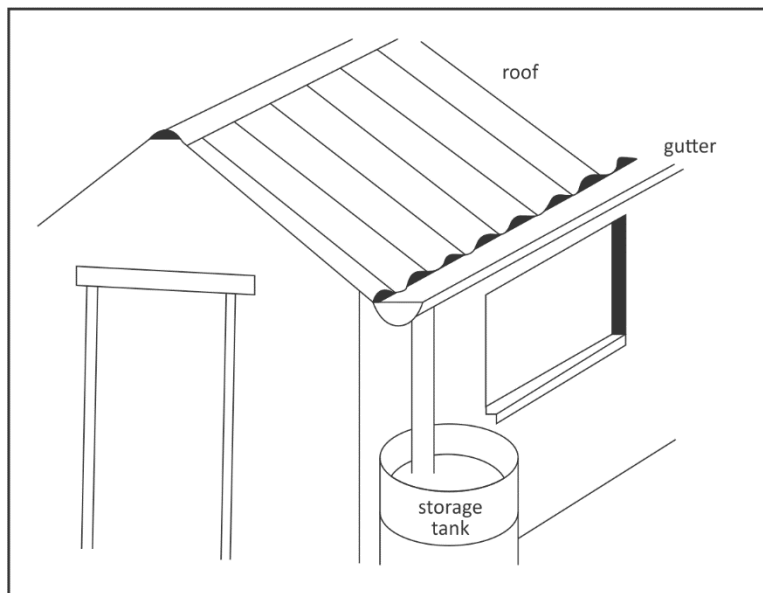


Figure 2.3: Diagrammatic representation of a roof water harvesting system (Viljoen et al., 2012: 36)

While several of the research participants in this study did practise some of these techniques (especially trench bed gardening in Cata), roof-top or ground water rainwater harvesting using plastic rainwater tanks (commonly referred to as ‘Jojo’ tanks in South Africa) or cement garden reservoirs as storage units were the methods chosen for this study as explained in Chapter One. The benefits and challenges to the adoption of rainwater harvesting methods in South Africa are considered below (Section 2.2.4-5).

2.2.3 Development of homestead food gardening as a response to food insecurity in South Africa: a brief history

Small-scale farming was flagged by the National Department of Agriculture (NDA) (presently known as the Department of Agriculture, Forestry and Fisheries (DAFF)) as a response to widespread poverty and food insecurity in South Africa in 1998 (NDA, 1998). In a report the NDA (1998: 5) stated that:

One of the encouraging developments in recent years has been the growth in support for home gardens, especially in peri-urban and urban areas, where small plots, of vegetables in particular, can contribute significantly to both livelihoods and nutritional standards.

A shift within South Africa’s agricultural sector thus began, seeking to move towards sustainability and self-sufficiency through small-scale subsistence farming (NDA, 1998; Steyn et al., 2001). Household and school food gardens have thus become popular

mechanisms taken up by communities and civic organisations around South Africa to improve nutrition and create livelihoods for both the urban and rural poor (Møller & Seti, 2004; Ncula, 2007). Where small farming states were once described as “objects of contempt” they are now being hailed as “our best chance of feeding the world” (Jacobs, 2010: 1).

Homestead food gardens are, however, laden with their own political history dating back to pre-Apartheid days (Møller & Seti, 2004; Ncula, 2007). Ncula (2007) argued that food gardening in South Africa has been shaped by Apartheid educational ideologies which subordinated black South Africans, the stereotyping of traditional gender roles, the circumstances of rural and subsistence agriculture, poverty in rural areas and by the goals of post-Apartheid development policies.

The South African schooling system from the 1930s and throughout Apartheid not only sought to entrench ideas of white European superiority and black African inferiority but also entrenched gender stereotypes by emphasising minimal literacy skills, sewing and housekeeping for girls and woodwork and gardening for boys (Ncula, 2007). Truscott (in Ncula, 2007: 14) argued that “Bantu Education was to turn African men in rural areas into hewers of wood or drawers of water and African women into scrubbers of floors, child minders and weeders of fields”. One can thus understand how politically charged the history of food gardens are in South Africa and the implications this has on the reception and attitudes of present-day youth in rural areas (see Section 7.3.9).

At present the South African government has placed emphasis on a smallholder strategy but it seems mainly rhetorical. Greenberg (2010) argued that realistically there is “insufficient financial support for the agricultural sector as a whole, with the implication that agricultural plans cannot be carried out” (Greenberg, 2010: 42). The report warns that the government should refrain from designing plans which it cannot implement due to lack of resources. The lack of financial support to implement these programmes can be seen in the lives of the research participants in this study (see Section 7.3.2). Even though South Africa’s food security is based on large scale commercial farming at present, the foundations of smallholder agriculture in South Africa exist from backyard producers to commercial farms on 100 hectares. Greenberg (2010: 42) argued further that:

The logic of a smallholder strategy must be followed beyond the farm gate, to the institutions that support agriculture, and the value chains that feed off it ... decentralisation of value-adding activities, the stimulation of local markets, and the scaling down of individual interventions and casting the net wider, based on the initiative and activities of the producers themselves, are all part of this.

Some authors argue that in order for African countries to take the lead in the green revolution, subsistence farmers need to be helped out of their current situations and given support to enter the global food market (Allan, 2013: 6). There is thus a push toward small-scale farmers moving into the commercial sector. The agricultural sector is fraught with contradictions: although the South African government would like to support smallholder agriculture it lacks the funds to implement these plans while at the same time it relies on large-scale commercial farming to feed the nation. South Africa and other African countries are also heavily influenced by powerful biotechnology corporations like Monsanto that produce and encourage countries to use Genetically Modified Organisms (GMO) seeds (T. Wigley, personal communication, November 3, 2012).

As a concept the term 'small-scale farmer' is unclear and contested. Small-scale farmers are also not a homogenous group and can include smallholder, resource poor farmers, household food security farmers, subsistence farmers, peasant farmers, land reform beneficiaries and emerging farmers (Sishuta, 2004). For this study small-scale farmers are understood as food gardeners whose primary objective is to grow food for household food security. Research shows that it is usually the older generations who practise rainwater harvesting and homestead food gardening in rural and peri-urban areas (Møller & Seti, 2004; Viljoen et al., 2012; Denison & Wotshela, 2009; Denison, 2010). Gender is also an important factor as many who practise rainwater harvesting and food gardening are older women (Backeberg, 2009; Viljoen et al., 2012). In recent studies conducted in the rural Eastern Cape it was found that successful homestead food farming was carried out by older females with little or no education, limited family labour and who were socially marginal and often at the bottom of the earning scale (Viljoen et al., 2012). It was thus recommended that "policy and practical interventions associated with homestead food farming and rainwater harvesting needs to focus on women, and particularly on older women in these rural settings" (Viljoen et al., 2012: 70). The rural development paradigm is thus geared toward gender equity (Denison, 2010; Viljoen et al., 2012).

The civil society sector has introduced another way of viewing equity within the areas of agriculture and rural development in the major shifts in thinking from the notion of ‘food security’ (because simple access to food is inadequate) to ‘food sovereignty’ (Mukute, 2010). Food sovereignty is understood as “affected people hav[ing] the right to know about and to decide on the food, agricultural and land policies that are socially and economically appropriate to their unique circumstances” (Mukute, 2010: 56). This is in line with calls from the Food and Agriculture Organisation (FAO) (2012) that insisted that increased economic growth is not sufficient for ensuring hunger reduction and that this growth must be accompanied by improved governance systems that uphold social justice. This shift in thinking away from food security and toward food sovereignty is evident in the work of local NGOs in this study where food sovereignty involves having the freedom to harvest seeds and preserve seed diversity (see Section 6.3.2). The move toward homestead farming as a response to food security and sovereignty challenges can be seen in the lives of the eight female research participants in this study: many are involved in projects and programmes focused on small-scale farming and home food production (see Chapters Five and Six). Below is a discussion of the benefits and constraints of the adoption of rainwater harvesting and food gardening for a South African context.

2.2.4 Benefits of the use of rainwater harvesting and homestead food gardening in South Africa

The benefits of rainwater harvesting and homestead food gardening practices are broad, ranging from improved ecological conditions to socio-economic benefits. Many studies point to the potential benefits of rainwater harvesting for South Africa to meet its Millennium Development Goals (MGDs) by 2015 of halving the number of people without sustainable access to safe drinking water and basic sanitation (Ngigi, 2003; Mwenge-Kahinda et al., 2008; Denison & Wotshela, 2009; Denison et al., 2011a; Mwenge-Kahinda & Taigbenu, 2011). In tandem with rainwater harvesting methods, homestead food gardens and small-scale farming also have the potential to increase people’s food security and improve nutrient deficient diets. With the strong linkage between the provision of clean water, adequate sanitation and food security, improving the quantity and quality of water supply through rainwater harvesting methods is considered to be an effective way of increasing levels of sanitation, health and water and food security for South Africans (Mwenge-Kahinda & Taigbenu, 2011: 2). Mwenge-Kahinda and Taigbenu (2011: 1) have argued that rainwater harvesting methods have the potential to improve South Africa’s rural water supply and

contribute to the provision of the first 6 kl set out by the DWA for monthly consumption of each household.

In a study of the benefits of rainwater harvesting practices in rural Zimbabwe it was found that resource poor subsistence farmers using rainwater harvesting experienced an increase in agricultural productivity, enhanced household food security and raising of their incomes (Mutekwa & Kusangaya, 2006). Using rainwater harvesting technologies also improved environmental management through water conservation, reduced soil erosion and resuscitated wetlands in the area (Mutekwa & Kusangaya, 2006). The same was found in a study of the assessment of the acceptability of rainwater harvesting methods in urban and peri-urban areas in the Free State and Eastern Cape of South Africa (Viljoen et al., 2012). In their learning package on water harvesting and conservation (WHC) methods Denison et al. (2011b) argued that these technologies have the potential to improve food security, income levels and the standard of living of people who live in arid areas. WHC methods also help to conserve the soil and reduce soil erosion while being low-cost, simple to construct and requiring little maintenance (Denison et al., 2011b). Women and children also benefit as WHC techniques reduce or eliminate the time needed to collect water from sources such as rivers or streams. Households can therefore become water-independent, especially through off-roof catchment systems (Denison et al., 2011b: 14).

Rainwater harvesting can also contribute to South African food security by increasing water productivity of dry land agriculture and enabling homestead gardening (Umthathi, 2011; Ngigi, 2003; Mwenge-Kahinda et al., 2008; Denison & Wotshela, 2009; Denison et al., 2011b; Mwenge-Kahinda & Taigbenu 2011; Viljoen et al., 2012). Researchers agree that the potential for increasing the productivity and livelihoods of the rural poor in South Africa relies on rainwater harvesting technologies in that they are often low-cost and sustainable (Mwenge-Kahinda et al., 2008: ii; Rockström, 2003). While other studies confirm that rainwater harvesting and small homestead food gardening techniques have positive financial returns as well as positive returns to investment for food gardeners, it is also argued that resource-poor households need assistance in obtaining most of the required infrastructure (Viljoen et al., 2012). It is further argued that the agronomic sustainability⁵ and

⁵ Agronomic sustainability: the ability of a section of land to produce at 'acceptable' levels for an extended period of time (Viljoen et al., 2012: 41).

environmental sustainability⁶ of these practices are impossible to decipher in and of themselves and that sustainability relies on other important factors such as management practices, institutional arrangements and socio-economic conditions (Viljoen et al., 2012). Several of the factors that potentially constrain the adoption of rainwater harvesting practices in South Africa are considered below.

2.2.5 Challenges to the adoption and use of rainwater harvesting and homestead food gardening in South Africa

Various constraints affect the adoption of rainwater harvesting practices by more South African communities. Several of these include challenges around terminology, socio-cultural dynamics, institutional arrangements and infrastructural support (Viljoen et al., 2012).

When measuring human capital⁷ factors in the adoption of rainwater harvesting and food gardening practices it was discovered that in light of social grants, out-migration, remittances, various forms of employment, participation in urban economies, social networks and other livelihood sources, the benefits of rainwater harvesting and food gardening were marginal. Most people were more interested in looking for jobs or relying on social grants for their food security than investing their time and energy into agricultural activities. It was also found that there was little correlation between higher education levels and the uptake of rainwater harvesting and food gardening technologies and that it was actually older, less educated women who adopted, shared and extended knowledge around these practices to other members of their villages (Viljoen et al., 2012). The adoption of these practices can thus be understood as revolving around *needs*. Factors such as households assisting each other in agricultural duties and sharing economic burdens also impact upon the uptake of these technologies: drawing on social networks occurs at the ‘exchange’ level and not at the ‘production’ level, therefore enforcing relationships of dependency. These social networks act as safety nets but can also perpetuate poverty and scarcity. They are structured around

⁶ Environmental sustainability: the ability to maintain qualities that are valued in the physical environment. Therefore environmental sustainability involves maintaining the natural environment as ‘natural’ as possible (Viljoen et al., 2012: 43).

⁷ Human capital in this sense refers to a less linear and broader understanding of the concept in terms of ‘human capacities’. This means that apparent linear improvements in formal education, earnings and seeming transfers of agricultural skills as not simply seen as necessarily positive. Viljoen et al. (2012: 80) argued instead that “we need to make sense of what kind of human capital is acquired, and whether people in the villages who apparently ‘acquire it’ can actually use it”.

dependency as individuals look to others for the exchange of goods, foods and money but not necessarily for labour for production purposes.

The adoption of agricultural practices such as rainwater harvesting is not only dependent on human capital factors but on institutions and institutional arrangements over which individual rainwater harvesters often have no control. Institutions are defined as “a set of formal and informal rules and regulation of conduct that facilitate coordination or govern relationships between individuals or groups” (Viljoen et al., 2012: 114). Several important institutional factors which affect adoption of rainwater harvesting and smallholder agriculture technologies include market services, access to credit, extension, education and land tenure systems. Although low-cost rainwater harvesting technologies are usually identified for resource poor farmers, the highly seasonal and labour-intensive nature of these technologies has been found to hinder the adoption of these technologies (Viljoen et al., 2012). The security of land tenure rights also informs farmers’ decisions to invest in their land. Although studies are inconclusive of the role of land tenure on technology adoption, in South Africa research has shown that insecurity in land tenure arrangements impact negatively on smallholder environments as people hesitate to invest in their land (Manona & Baiphethi, 2008). As a result of landholders being fearful of losing their land rights, much land is not being farmed as intensely on communal dry lands and irrigation schemes (Manona & Baiphethi, 2008).

Government policies are also important factors that can either encourage or discourage the successful and sustainable adoption of productivity enhancing technologies such as rainwater harvesting. In 2011 the South African government launched a new green economic accord which sought to facilitate investment in green initiatives such as installing a million solar water heaters as well as implementing water projects such as rainwater harvesting (RSA, 2011). According to some authors however, the South African government does not generally promote rainwater harvesting technologies as a supplementary source of water and views these technologies as short-term solutions (Dyer, 1999). Reaching rural and usually poorer areas through standard large-scale public water schemes has proven difficult (Siyambonga, 2009). Dyer (1999: 3) argued that “the prevailing assumption that everyone will receive a piped service, while politically popular, clearly does not encourage rainwater harvesting for domestic consumption”. It is thus usually NGOs who are responsible for the promotion of rainwater harvesting technologies and homestead food gardens as a response to water and

food security challenges in South Africa. This is confirmed by Viljoen et al. (2012) as they argued that there is a general absence by the Department of Agriculture in their extension activities aimed at the use of rainwater harvesting practices. They found that most individuals involved in rainwater harvesting practices gained their support and information from “NGOs, research organisations, universities and other organisations” (Viljoen et al., 2012: 133).

In terms of smallholder agriculture on the other hand, the Department of Agriculture does acknowledge the importance of this mechanism for rural economic development and has taken a supportive role in rolling out different initiatives and programmes (Viljoen et al., 2012). Policies that support these initiatives are important in terms of aiding household access to assets, converting these to livelihood outcomes and distributing the benefits. One constraint hindering the adoption of rainwater harvesting and smallholder agricultural technologies is that tensions between local institutions were found in terms of different understandings of what rainwater harvesting and smallholder agriculture entails (Viljoen et al., 2012). This leads to confusion over aims of projects and how to implement them effectively. With regard to research into mechanisms such as smallholder agriculture and forestry projects as responses to poverty, it was cited that technical, economic and governance constraints were the major hindrances to poor communities being able to take up forestry for commercial purposes (Department of Water Affairs & Forestry (DWAF), 2005). This is confirmed in studies that observed that while rainwater harvesting and food gardening technologies do make more water available for plant growth, factors such as poor management practices, lack of knowledge around cultivation, lack of inputs, poor support services and infrastructure will negatively impact upon plant yields (Viljoen et al., 2012). Another constraining factor to the adoption of rainwater harvesting and food gardening technologies identified is the ‘discourse of support’ by government departments which may be responsible for nurturing a ‘culture of dependency’ where people become heavily reliant on government inputs for their livelihood needs (see Section 7.3.2) (Viljoen et al., 2012).

From the discussion above it can be understood that many socio-cultural, economic, ecological and institutional factors must be taken into account in order to understand the complex dynamic of adoption and use of rainwater harvesting and small-scale food gardening technologies in South Africa.

2.3 Integrated Water Resource Management (IWRM) and Social Learning

Social and environmental risks and challenges such as widespread poverty and water and food security issues have come to be understood as extremely complex and interrelated (Beck, 1992; Giddens, 1999; Irwin, 2001). Beck (1992: 21) defined risks as “a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself”. In his conception of a ‘risk society’ he saw the scientific and industrial developments of our modern age as producing risks and hazards as never faced before. For example, these risks are not temporally or spatially limited: future generations are affected by them and they cross over national boundaries. Risk is understood as forming the very foundation upon which modern capitalist society is based in that the continuous process depends on calculating future profit and loss (Beck, 1992; Giddens, 1999). Giddens (1999: 31-35) defined risk as “hazards that are actively assessed in relation to future possibilities” and distinguishes between ‘external risk’ (risk experienced as coming from outside) such as droughts or floods and ‘manufactured risk’ (risk created by the impact of our knowledge on the world). Environmental problems such as scarce water resources and food insecurity are examples of manufactured risks as they are directly linked to intensifying modernisation processes (Giddens, 1999; Beck, 1992).

Critiquing Beck’s (1992; 2000) reflexive modernisation theory, Irwin (2001) argued that his theory is too macro in scale and does not consider how risk is constructed and responded to at the micro-level in the everyday lives of citizens in specific cultural contexts. Irwin (2001) termed his sociological approach to environmental problems a citizen-based approach and considered the active construction of environmental risks in particular and knowledge in general in everyday social settings. The significance and implication of exploring and understanding how particular groups of people construct and negotiate risk is to understand why some environmental campaigns, for example, are not received positively by citizens. Deficit theories, as Beck (2000) termed them, assume a lack of understanding and knowledge on the part of citizens and sometimes treat them as blank slates on which to impose environmental agendas. Irwin (2001) alluded to situated knowledge and situated learning theories⁸ when he argued that knowledge is not separable from wider cultural understandings

⁸ Learning that is situated in physical and social contexts (Lave & Wenger, 1991; Schunk, 2004). In situated learning theory decontextualised learning is a contradiction in terms as “changing understanding and situated practices are part and parcel of the lived social world” or context (Lave, 1993: 6). As Lave (1993: 5) argued “situated activity always involves changes in knowledge and action and changes in knowledge and action are central to what we mean by ‘learning’”.

and everyday experience must be embedded within it. Local knowledge and understandings of environmental concerns is thus placed in opposition to scientific, 'expert' or 'official' knowledge. It is crucially important therefore to take account of how environmental issues are locally constructed because different contexts lead to different interpretations of problems which results in different courses of action (Irwin, 2001). An important point here is that while governments and their departments may define environmental issues as technical, their local construction demonstrates that they are social in character (Irwin, 2001).

Over the past 40 years the way in which the environment has come to be conceptualised has shifted from something that is external to humans to something that is life itself and "the crucible in which our identities, our relations with others and our "being-in-the-world" are formed" (UNESCO, 2002: 1). The socio-ecological model of the environment in Figure 2.4 below places people at the centre, thus recognising the socio-historical origin of environmental problems.

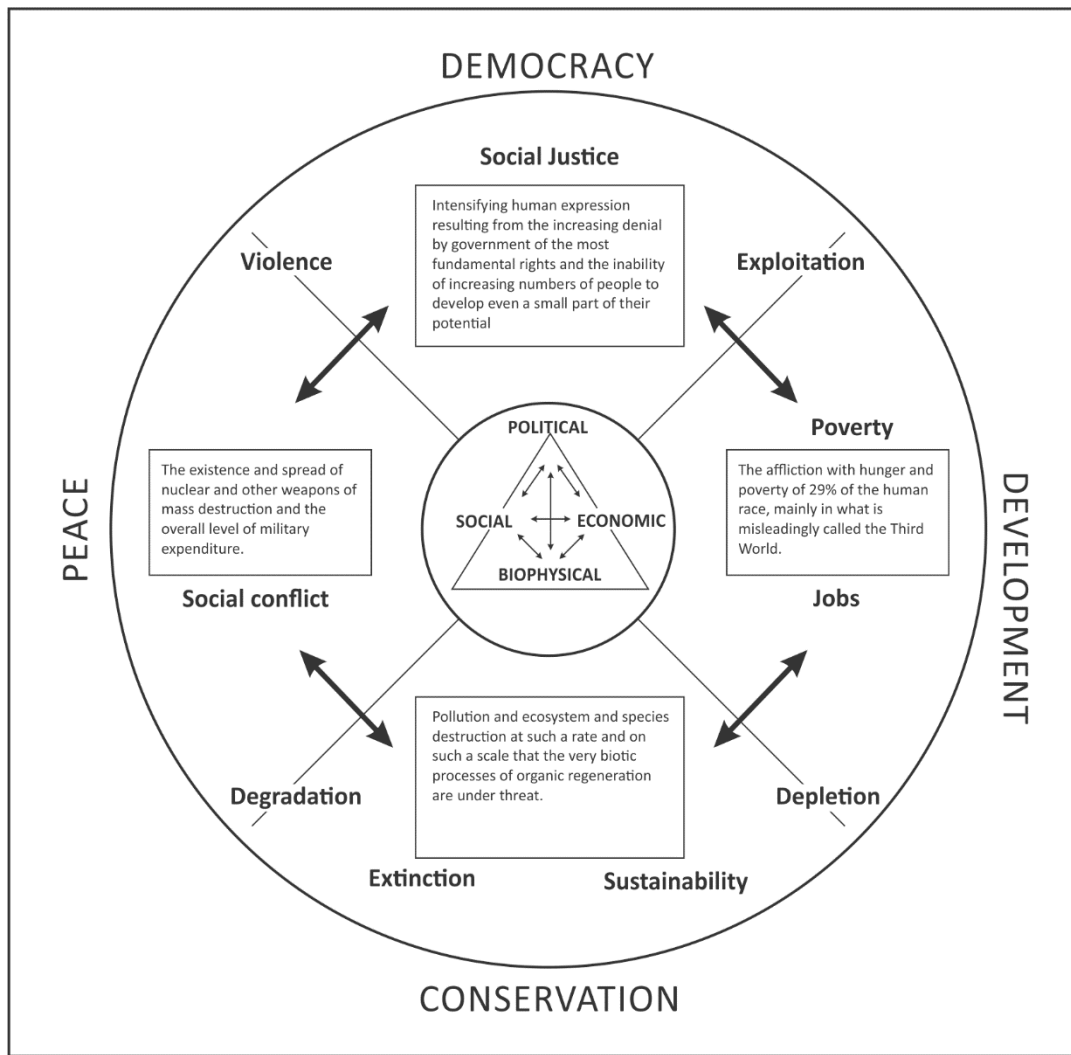


Figure 2.4: A broader view of environment (adapted from Ekins (1993) in Lotz, 1999: 50)

The 'environment' has thus come to be understood as encompassing the socio-political, socio-economic and socio-ecological systems of modern society. Environmental problems are socially constituted as Irwin (in Lotz, 1999: 48) argued

environmental problems are not problems of our surroundings, but-in their origins and through their consequences-are thoroughly social problems, problems of people, their history, their living conditions, their relation to the world and reality, their social, cultural and living conditions ... At the end of the twentieth century nature is society and society is also nature.

This acknowledgement has caused a shift in society's consciousness from worrying what nature can do to us (external risks) to worrying more about what we can do to nature (manufactured risks). In order to mediate and mitigate risks and for society to change and evolve, Beck (1992) called for a 'reflexive modernity' where the foundations of science and

scientific knowledge are held with scepticism and are both generalised and demystified. Reflexive modernity includes reflexive learning processes that recognise that risks are always created and effected in social systems, the magnitude of these risks are a direct function of the quality of social relations and processes and thirdly, that the actors and institutions who create these risk are often obscure or inaccessible from the people most affected by the risks. Beck also called for a ‘cosmopolitan moment’ where in our reflexive deliberations we must think inclusively about everyone on the planet because, as stated before, the nature of risks are not localised but are far reaching both in time and space (Beck, 1992).

In light of this acknowledgment that environmental issues have to be understood in terms of what people do and therefore how they think and learn, in the 1970s and 80s it became evident that classical top-down approaches to water management were not producing the desired results (Lotz-Sisitka & Burt, 2006). In the past and to a degree at present, water resource management was based on a ‘command-and-control’ approach and end-of-pipe solutions (Pahl-Wostl, Sendzimir, Jeffrey, Aerts, Berkamp, & Cross, 2007b: 1; Pahl-Wostl, Tabara, Bouwen, Craps, Dewulf, Mostert, Ridder, & Taillieu, 2008b). Environmental problems were seen as predictable, controllable and dealt with in isolation which resulted in undesirable outcomes (Pahl-Wostl, Craps, Dewulf, Mostert, Tabara, & Taillieu, 2007a; Pahl-Wostl et al., 2007b). Ways of managing natural resources were usually top-down, hierarchical and market based. This approach tends to be inflexible and unable to respond to changes in environmental, economic and social circumstances (Ison et al., 2007: 501).

As a response to this need for a new and more sustainable management approach to water Integrated Water Resource Management (IWRM) was put forward to encourage participation and equity by multiple stakeholders (Lotz-Sisitka & Burt, 2006: 9). The consensus for the criteria and implications for IWRM were based on the Dublin principles (Figure 2.1). IWRM is defined as “a management approach, which requires the active participation of multiple parties across multiple levels, in many different ways” (Lotz-Sisitka & Burt 2006: 9).

Another definition states that it is “a process that promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (van Beek, 2009: 71). Essentially this framework attempts to embrace a wider perspective including economic, social and political factors (Pahl-Wostl et al., 2007a).

IWRM is based on two overriding criteria: social equity and environmental and ecological

sustainability (van Beek, 2009: 72). Social equity asserts that it is the basic right of all people to have adequate quality and quantity of water to address their human well-being.

Environmental and ecological sustainability argues that present use of water resources is depleting and undermining the life support system, compromising future generations of their right to water (van Beek, 2009: 72).

Previous water management approaches also failed to account for the growing complexity and uncertainty within both the ecological and social environment and have thus been found wanting in their ability to address resource dilemmas (Pahl-Wostl, Mostert, & Tabara, 2008a; Pahl-Wostl et al., 2007a). Within the IWRM model Pahl-Wostl et al. (2007b) proposed four areas of uncertainty that need to be accounted for in the water sector: our lack of knowledge; uncertainty in our understanding of systems themselves (ecological, social, economic, political and cultural); the unpredictability of particular factors; and the uncertainty inherent in the multiple frames different stakeholders have of situations. The water sector has thus had to question its understanding of how to manage complex socio-ecological systems and what role learning plays in IWRM (Munnik & Burt, 2014; Wals, 2007; Jiggins et al., 2007; Steyaert, Barzman, Billaud, Brives, Hubert, Ollivier & Roche, 2007; Collins, Blackmore, Morris & Watson, 2007). Part of this is the way learning is understood as a social process that takes place through doing and practice collectively rather than individually and in separate compartments (Burt, Lotz-Sisitka, Rivers, Berold, Ntshudu, Wigley & Kruger, 2014). This approach to learning is referred to as social learning or change-orientated learning and is central to developing sound water resource management practices (Munnik & Burt, 2014; Burt & Berold, 2011; Lotz-Sisitka, 2008a). The following section of this review will address learning for change. Before considering the role of social learning in natural resource management, it is first important to situate its emergence within the field of Environmental Education (EE) and Education for Sustainability.

2.3.1 Environmental Education (EE) and Education for Sustainability

Within IWRM education has emerged as a key response to environmental risks confronting us in our present age (Lotz, 1999). This is evidenced in international calls from the United Nations Conference on Environment and Development's (UNCED) Agenda 21 in 1992 and regional developments such as the SADC Regional Environmental Education Programme (Lotz, 1999). Environmental education is not merely a form of education or a tool to solve environmental problems but is "an essential dimension of basic education focused on a

sphere of interaction that lies at the root of personal and social development: the sphere of relationships with our environment, with our common “home of life” UNESCO (2002: 1).

One of the challenges of environmental education however is that it has been framed as a tool in the service of a contested and problematic ideology: sustainable development.

Sustainability and sustainable development are open to multiple interpretations within multiple contexts. In 1987 the World Commission on Environment and Development (WCED: 1987) famously defined sustainable development as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”. This definition has come under much critique over the decades as the environment is seen merely as a pool of resources to be utilised and sustained in order to sustain economic growth which is regarded as the pre-condition for ‘human development’ (Sauvé, Berryman, & Brunelle, 2002: 43). Sustainable development is often represented by three overlapping circles labelled, ‘social,’ ‘environmental’ and ‘economic’ which, for opponents of sustainable development, reflects the current alienation of society from the environment (see Figure 2.5).

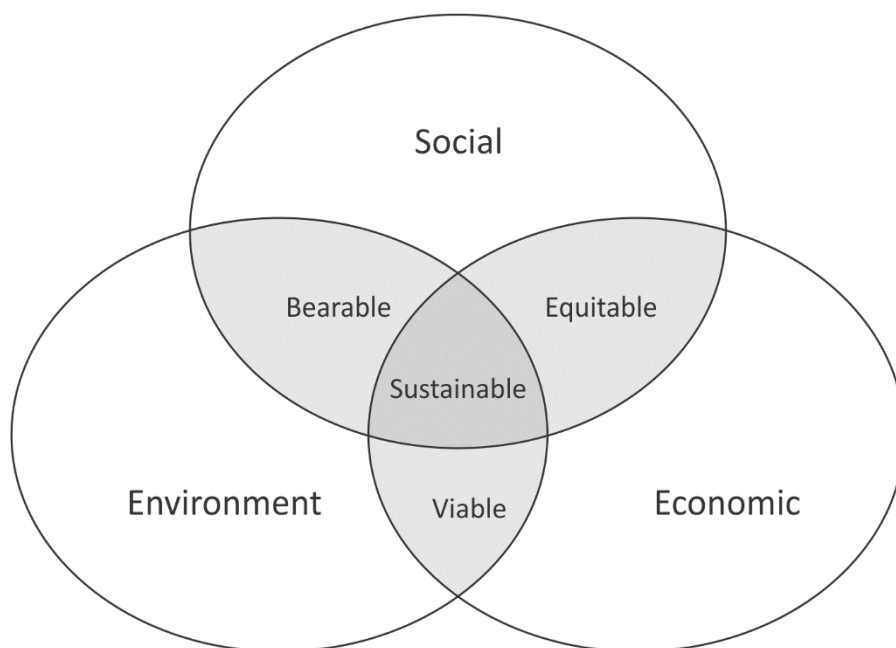


Figure 2.5: The often-used representation of sustainable development (Hesse & Armiger, 2013: 13)

Tilbury (2007: 119) argued that sustainability is more than linking social, environmental and economic systems together and has more to do with transforming current systems. Attempts at defining sustainability and sustainable development have however often led to ambiguous understandings of the terms where conflicting values, beliefs and points of view of what

should be done and how to achieve this coexist (Loeber, van Mierlo, Grin, & Leeuwis, 2007). Some authors have seen this ambiguous space as positive compared to earlier environmentalist notions of the concept which understood it as a trade-off between the economy and the environment (Loeber et al., 2007). Pretty (1995: 11) argued that:

sustainability itself is a complex and contested concept. To some it implies persistence and the capacity of something to continue for a long time. To others, it implies resilience and the capacity to bounce back after unexpected difficulties. With regard to the environment, it involves not damaging or degrading natural resources. Others see it as a concept that means developmental activities simply take account of the environment.

Glasser (2007: 36) coined the term ‘ecocultural sustainability’ which referred to a state of “dynamic equilibrium and a social process that is desirable and ecologically sound”. This requires a society that supports 1) a rich cultural and biological diversity, 2) just, transparent and participatory forms of governance, 3) economies that are accountable and bio-regionally sound, and 4) production and consumption that promotes universalisable lifestyles and keeps itself in check by learning from and working with nature (Glasser, 2007: 36). For Tilbury (2007: 117) the sustainability movement represents a particular intention which is to envision and negotiate change as opposed to ‘sustaining’ the status quo and sees sustainability as “an ongoing social learning process that actively involves stakeholders in creating their vision, acting and reviewing changes”. She went on to argue that sustainability is about “challenging our mental models, policies and practices not merely about accommodating dimensions into current work or finding common ground between related programs” (Tilbury, 2007: 119). Learning in this context is thus a reflective process rather than an end product to be achieved.

Wals (2007: 37) argued that:

Determining the meaning of sustainability is a process involving all kinds of stakeholders in many contexts, people who may not agree with one another ... creating a world that is more sustainable than the one currently in prospect, might have something to do with the utilisation of diversity, the creation of space for learning and innovation, and overcoming inequities and power imbalances that limit certain peoples’ possibilities to participate.

Echoing Tilbury’s (2007) call for reflexivity toward sustainability Wals (2007: 37) argued that we “require a more systemic and reflexive way of thinking and acting with the realisation that our world is one of continuous change and ever-present uncertainty”. Speaking to the nature of sustainability challenges he argued that routine problem solving will not work and

has not worked: as one problem has seemingly been solved it changes or crops up again in a different form. Therefore, in order to adequately address problems that keep changing, we ourselves need to be changing.

Lotz-Sisitka (2008a: 1) defined sustainable development as “practices that take full account of the economy environment-society nexus in development interventions and initiatives (e.g. production processes), and that are oriented towards ecological sustainability, social justice, and a more benign economic system”. Within the Southern African context, environmental education has aligned itself to working in the service of social transformation and change (Lotz-Sisitka, 2004; Lotz-Sisitka, 2008a, b). Resolving socio-ecological problems requires learning that fosters enhanced agency and reflexivity in order to strengthen people’s capabilities toward social change for sustainability and environmental justice (Lotz-Sisitka, 2004). For Loeber et al. (2007) learning was an essential element of any project or practice that seeks to move toward sustainability. They argued that sustainability implies a need for learning because it is an essentially *contestable* concept only clarified through a process of collective and contextual deliberation and mutual learning. Secondly, they argued that sustainability is a *normative* concept, involving processes of value judgments and not mere fact finding (Loeber et al., 2007). And finally, in linking social learning to sustainability, they argued that it is a *revolutionary* concept that requires reflexive deliberation to balance feasible and desirable options for the future. This study specifically looks at sustainable livelihoods in the context of access to water and food resources and then broadly to understand the mediating processes impacting upon people’s learning and practices in order to more effectively support sustainable practices.

For many authors and theorists in environmental education then the key to creating a more sustainable world lies in learning, not merely any learning but in transformative learning. Janse van Rensburg and O’Donoghue (in Lotz-Sisitka, 2004: 144) argued that “if environmental education and research is to engage social transformation processes in meaningful ways, an in-depth understanding of change processes is required”. We therefore require epistemological and methodological approaches that will enable us to probe the structural, cultural and political dimensions of the socio-ecological risks facing southern Africa, thus opening up spaces for increased reflexivity, agency and change. Wals (2007: 43) argued that “sustainable living requires more than consensus in the present about what

sustainability is or even might be ... Instead contextual solutions are required that are, at least partly, co-created and co-owned by those who are to (want to) live sustainably”.

Within environmental education research this is seen in the concern for deeper exploration of the contexts, histories, power relations, construction of meaning, narratives and social interactions in the socio-ecological phenomena studied (Lotz-Sisitka, 2004). Accompanying these shifts in social science and educational research are discussions about rationality and knowledge and how knowledge used to be understood, as something merely transferred to a person to an understanding that knowledge and meaning is constructed through interactions within a social environment using tools such as language and material objects within a socio-cultural historical context (United Nations Environment Programme (UNEP), 2006). In line with this thinking, social learning theories have been taken up by researchers, policy makers and organisations in searching for solutions toward a more sustainable world.

2.3.2 The role of social learning for sustainability

“Social learning approaches attempt to translate cubic meters of water into human behaviour” (Ison et al., 2007: 500)

The water sector is, of all natural resource management sectors, by far the most engaged in exploring and applying social learning theories to resource management practices (Cundill & Rodela, 2012). The working definition of social learning in this study is Reed, Evely, Cundill, Fazey, Glass, Laing, & Stringer’s (2010: 6) definition: “a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice^{9 10} through social interactions between actors within social networks”. While using this definition it is acknowledged that the term social learning “conceals great diversity” and that when used it often does not indicate a common theoretical perspective (Parson & Clark

⁹ Out of situated learning theory, Wenger (1998) coined the term ‘communities of practice’ to describe the broader social networks or communities in which people with a common practice and goal participate (Muro & Jeffery, 2008). A community of practice is defined as “a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice” (Lave & Wenger, 1991: 98). Linked to this concept is their concept of legitimate peripheral participation which is “the process whereby newcomers become part of a community of practice” and which “provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artefacts, and communities of knowledge and practice” (Lave & Wenger, 1991: 29). Learning in this sense is therefore understood in terms of becoming a full participant in a certain socio-cultural community of practice (Lave & Wenger, 1991).

¹⁰ Practices are “embodied, materially mediated arrays of human activity centrally organised around shared practical understanding” (Shatzki et al., 2001: 11). Human bodies and their activities are thus located or constituted within practices. The field of practices then is the total nexus of interacting human practices (Shatzki et al., 2001).

in Wals, 2007: 18). In its conceptualisation, social learning has been seen both as an *evolving product* and as an *engaging process* but authors such as Wals, Glasser, Rist, Delgado and Wiesmann (in Wals, 2007) are much more interested in social learning as a process. They argued that the point of social learning is not so much what people should know or be able to do but rather is a process that uncovers what people want to learn, how they learn, how people overcome personal biases and group thinking and how people can become more sensitive to alternative ways of knowing, valuing and doing (Wals, 2007). Literature on social learning often refers to the bringing together of multiple perspectives, values and interests in order to creatively work on stubborn practices that lead to unsustainability (Wals in Lotz-Sisitka, 2012). Wals (in Lotz-Sisitka, 2012) argued that this creative process does not happen automatically and that social cohesion is one of the key elements needed in order for different actors to work constructively together to find solutions to sustainability challenges.

Wals (2007: 39) defined social learning as:

... learning that takes place when divergent interests, norms, values and constructions of reality meet in an environment that is conducive to learning ... this learning can take place at multiple levels, i.e., at the level of the individual, at the level of a group or organisation, or at the level of networks of actors and stakeholders.

He argued that social learning is not merely a naturally occurring phenomena but a way of organising communities of learners and learning. Social learning processes provide a space for humans to encounter one another and these encounters lead to dissonance and social cohesion. The success of social learning is dependent on the mediating space provided by the social learning community to work on these dissonances and contradictions (Wals, 2007). Wals (2007) used the concept of framing and deframing in the working out of this dissonance and moving forward to social cohesion. He argued that people learn on the edge of their comfort zones: if they experience too much dissonance they will fail to learn but if their views and ideas are not challenged at all, then minimal if any learning will happen. Wals (2007) used the metaphor of frames (the ways of thinking about and interpreting the world that people hold) to illustrate this point and argued that transformative social learning can only take place once people are made aware of their frames and are then able to deconstruct them by acknowledging hidden assumptions, untangling relationships and blind spots and learning from these insights (Wals, 2007). When deconstruction or de-framing is done jointly, dissonance is managed and people are exposed to the frames of others and are challenged to rethink and construct different frames together. Wals (2007: 40) argued:

perhaps the essence and success of social learning lies in people's ability to transcend their individual frames, so that they can reach a plane where they are able find each other and create enough 'chemistry' to feel empowered to work jointly on the challenges they come to share.

2.3.3 Change-oriented learning

With sustainability in mind social learning is harnessed to and aimed toward change. Social learning, as used in the field of environmental education / education for sustainable development and IWRM (Cundill & Rodela, 2012), is often referred to as change-oriented learning or learning-based change. Learning enables individuals and groups to reflect on their experiences and to learn how to drive change processes. Learning-based change for sustainability therefore helps learners to develop the skills to influence change within a wider system, organisation or wider society. An organisation aligned with sustainability is therefore often defined as a 'learning organisation' (Tilbury, 2007: 119). Change oriented learning seeks to identify relationships that can embed change and challenge root causes. It seeks structural and systematic change and is mindful of how social transformation occurs in particular contexts and considers people's assumptions and actions for change. It seeks to go beyond once-off activities like planting a tree or cleaning up litter and instead encourages critical and systemic thinking skills, aimed at the source of key issues (Tilbury, 2007). Tilbury (2007) identified several pathways that enable learning based change which include mentoring, facilitation, participative inquiry, action learning and action research.

Reading across the social learning literature then one is able to identify trends of how social learning is conceptualised and the different strategies or levers proposed in order to initiate social learning processes. Dyball, Brown and Keen (2007: 191) have viewed social learning along the same lines as Tilbury (2007) and argued that social learning in environmental management "is essentially about managing change". They conceptualised social learning as comprised of five 'strands': reflection and reflexivity, system orientation and systems thinking, integration and synthesis, negotiation and collaboration, and participation and engagement (Dyball et al. 2007). The goal of social learning as taken up by the environmental sector is toward social transformation and change in the form of sustainability.

2.3.4 Monitoring social learning

Because there is limited consensus on what is meant by social learning one of the often quoted critiques is that it is difficult to identify strategies to support or monitor it. Wals and

Heymann (2004) proposed a process for designing and monitoring social learning in practices. This process includes several activities: orientation and exploration, self-awareness raising, deframing or deconstructing, co-creating, applying/experimenting and reviewing. These indicators can be employed during the learning processes of rainwater harvesters and food gardeners and can be planned or observed by development facilitators in their own social contexts. These indicators are as follows:

- *Orientation and exploration* – the identification of key actors in rainwater harvesting and food gardening and with them, identifying key issues of concern to address in a way that connects their prior experience and backgrounds to learning these practices, thereby increasing their motivation and sense of purpose;
- *(Self) awareness raising* – through interviews, observations or workshop discussions the facilitator can elicit rainwater harvesters' and food gardeners' own frames of reference relevant to issues and challenges in the learning of rainwater harvesting and food gardening;
- *Deframing or deconstruction* – Through group discussions during training workshops, facilitators can observe and take note of articulations of the issues by rainwater harvesters and food gardeners, and how these challenge others frames through a process of exposure to alternative frames and thinking about the practice of rainwater harvesting and food gardening;
- *Co-creating* – Facilitators can work with rainwater harvesters and food gardeners in constructing and clarifying new or changed ideas together;
- *Applying/ experimenting* – During this period facilitators can encourage collaborative action using the newly co-created frames for rainwater harvesting and food gardening;
- *Reviewing* – Rainwater harvesters and food gardeners assess the degree to which the co-created issues or challenges on learning rainwater harvesting and food gardening have been addressed, and also review the changes that have occurred in the way the issues/challenges were originally framed, through a reflective and evaluative process.

This process is by no means linear but cyclical, requiring reflexivity and reflection throughout the social learning process (Wals & Heymann, 2004). With these indicators in mind it is important to remember that the aim of social learning is not what people should

know or do but rather to equip individuals with the ability to be able to recognise future goals and evaluate current practices, norms and values (Wals, 2007). This process for monitoring social learning is similar to the expansive learning process put forward by Engeström (2001) and is addressed in more detail in the next chapter (see Section 3.8.5).

2.3.5 Critiques of the potential of social learning for sustainability

It is useful also to consider the limitations and challenges to using social learning as a vehicle towards sustainability and to contribute to successful natural resource management (Muro & Jeffery, 2008). Glasser (2007:57) warned that in its many uses social learning “currently runs the risk of being perceived as a silver bullet or panacea” and argued that while social learning may encourage deeper understandings of environmental issues and open up spaces for creative problem solving, these benefits are not guaranteed. One of the first limitations to social learning is that there is no coherent definition of the term, making it difficult to create and apply social learning techniques and instruments to help people move toward sustainable practices. Another limitation is that most authors, in their consideration of social learning, assume that in order to move toward sustainability and societal change, people need a shared understanding of problems. Social learning does not guarantee that a plurality of viewpoints can be achieved and this may therefore limit the potential for social learning processes to bring about change (Glasser, 2007; Muro & Jeffery, 2008).

A third limitation to the use of social learning towards sustainability is that not all behavioural change is brought about as a response to learning (Muro & Jeffery, 2008: 338). For example, in cases where highly contested issues are at stake, some authors question learning as a means to solve problems and instead suggest a system of incentives or penalties as more fitting (Loeber et al., 2007; Muro & Jeffery, 2008). A fourth main critique of social learning is the question of why participants in a group should change their views or interests in favour of a group consensus. A group is made up of individuals with divergent views, interests and motives and some people may change their views to that of the group to feel accepted and part of the group. Glasser (2007) identified two significant potential weaknesses in his active social learning typologies. The first is that processes of active social learning can be used to support maladaptation (as with Hitler’s efforts to stimulate ethnic conflict). Employing the process of active social learning may therefore not translate into its benefits of building critical thinking, facilitating anticipatory responses, building a common language, tolerance, mutual trust, collaboration, shared interest and concern for the common good. The

second weakness of active social learning is that its success depends on effective capacity building and on the preparedness, competence, openness and maturity of the individuals participating in the learning process. Authors who critique social learning highlight these practical and conceptual concerns of the social learning model not to diminish its potential for sustainability but to build critical thinking around the concept and greater reflection on how to employ social learning strategies and tools more effectively.

2.4 Conclusion

This chapter has examined the notion of risk in the form of water and food security challenges and how these play out at global and local levels. The chapter also discussed some of the risks and uncertainties being faced in (southern) Africa and more locally in the Eastern Cape and explored the practice of rainwater harvesting and small-scale food gardening as a response to these problems. Safer sources of drinking water, basic sanitation and improved nutrient deficient diets were discussed as some of the opportunities of these practices but economic realities such as jobs and social grants were seen to constrain the uptake of rainwater harvesting and food gardening practices. The chapter has further highlighted the paradigm shift within the water sector from technical solutions to social learning theories which identified learning and education as a key area in searching for sustainable solutions within IWRM. In his conceptualisation of social learning, Wals (2007) asserted that the ever-changing nature of challenges and risks requires the need for reflexivity in attending to them as well as addressing different knowledge systems and therefore dialectical matters. Monitoring social learning can be problematic as well but Wals and Heymann (2004) put forward a framework for doing this and a critical reflection on the limitations of social learning is constructive when considering how to use it most effectively.

The following chapter (Chapter Three) presents the ontological and epistemological theories used in this study which enabled me to address the research questions outlined in the first chapter (see Section 1.3).

CHAPTER THREE

SOCIO-CULTURAL HISTORICAL AND SOCIO-MATERIAL PERSPECTIVES ON DEVELOPMENT AND LEARNING

3.0 Introduction

Chapter Three presents the ontological and epistemological theories which I drew on in this study. It relates to Chapter One in that the theoretical framing discussed in this chapter enabled me to address the research questions outlined in the first chapter (see Section 1.3), to explore the mediating processes that shape the learning and practice of rainwater harvesting and food gardening and how a learning resource can expand this learning. This chapter also aligns with Chapter Two in that the theories discussed here are concerned with enabling the answering of learning and practice questions pertaining to rainwater harvesting and food gardening practices within the broader nexus of water and food security challenges.

For this study I worked with Vygotsky's (1978) theory of mediation (Section 3.2) in order to provide an understanding of the factors that shape the learning process around rainwater harvesting and food gardening practices of rural women. I also drew on the post-Vygotskian epistemological theory of Cultural Historical Activity Theory (CHAT) (Section 3.8) to illuminate current mediating processes in food and water security practices. Finally, the chapter concludes with an explanation of the philosophical underpinnings of the study which rests on relationalism, critical realism and social realism as 'underlabourers' to the above theories (Section 3.9). Critical realism enables the study to allow for enquiries into questions of relatedness and causal or generative mechanisms. In this chapter I explain reasons for drawing on each theory, their main features and how I worked with these theoretical concepts and why.

3.1 Socio-cultural historical and socio-material perspectives on development and learning

Social learning theories (Section 2.4.4) are found within the socio-cultural historical perspectives of learning and have become a new emergent area of research in environmental education (Lotz-Sisitka, 2012). Below is a discussion of socio-cultural historical approaches

to human development and learning and this lays the foundation for the introduction to Vygotsky's theory of mediation (Section 3.2) and its role in this study.

Fundamental to socio-cultural historical and socio-material theories of development is that learning is not a discreet cognitive process that occurs merely in the mind of an individual (Daniels, 2008). Socio-cultural historical theories are also "underwritten by ideology of empowerment and social justice" which illustrates the relationship between socio-cultural perspectives and change-oriented learning (Section 2.4.5) (Stetsenko, 2008: 473). These perspectives of learning are wide-ranging and are often interchangeably used with terms such as socio-cultural learning theory, social learning theory, activity theory, cultural-historical activity theory (CHAT), situated learning and cognition, and context-based learning theory (Niewolny & Wilson, 2009). Although each of the socio-cultural theories listed above is distinct in subtle ways, their common intersection is the rejection of the premise that "learning is only an internal or psychological activity characterised by individuals accumulating knowledge and skills, putatively assumed to be transferable from context to context" (Niewolny & Wilson, 2009:1). Lantolf (2004: 30-1) argued that socio-cultural theory is not a theory of the social or cultural aspects of human existence but rather "a theory of mind ... that recognizes the central role that social relationships and culturally constructed artifacts play in organizing uniquely human forms of thinking". These perspectives recognise therefore that learners are "cultural and historical agents embedded within and constituted by socially structured relationship and tool-mediated activity" (Niewolny & Wilson, 2009: 2). As a result the field is unified in its focus of the social formation of mind and that learning is a complex set of social practices (Daniels, 2008).

A common foundation to socio-cultural theories is the rejection of the Cartesian split between people and the world. Toulmin (1992: 32) explained the Cartesian split that fed into the philosophical commitment to abstract rationality in modernity:

Descartes saw the curiosity that inspires historians and ethnographers as a pardonable human trait; but he taught that philosophical understanding never comes from accumulating experience of particular individuals and specific cases. The demands of rationality impose on philosophy a need to seek out abstract, general ideas and principles, by which particulars can be connected together.

Toulmin (1992:32) summarised this attitude among the founders of modern philosophy as "abstract axioms were in, concrete diversity was out". CHAT rejects this split between the individual and the social and calls instead for the adoption of a relational ontology of human

development where social and psychological phenomena are understood as processes that exist in “the realm of relations and interactions” (Stetsenko, 2008: 477) (see also Section 3.9.1). Social phenomena are thus embedded, situated and co-constructed within contexts as well as woven into these contexts. A relational ontology thus points to a relational understanding of ‘context’ in that people learn both *in* and *with* context (Edwards, 2005a). In this notion of context, agency and structure are understood dialectically as “tightly coproducing” in that learning is *in* and *with* context, not separate from or applied to context (Niewolny & Wilson, 2009: 9). Speaking to theories such as situated learning theory and activity theory that adopt a relational notion of context, Edwards (2005a: 5) argued that fundamental to these approaches is a framing of context as “a weaving together of people and their tools in complex networks”. Understanding context as not merely a backdrop to action but acknowledging how it shapes action allows researchers and educators to understand more fully how learning is a socio-cultural phenomenon. The implication of understanding context as dialectical, relational and recursive is that it shapes how mediation is understood in this current study. Learning rainwater harvesting and food gardening practices therefore are both shaped by and shape the context in which they occur.

Socio-cultural perspectives, as developed by Piaget, Dewey and Vygotsky, argue that social and psychological processes occur in the realm between individuals and their world. In her discussion of socio-cultural perspectives, Stetsenko (2008: 477) proposed replacing the Cartesian metaphor of separation (typical of mechanistic and cognitive models of learning and development) with a metaphor of “in-between-unity” which is “of mutual construction, co-evolution, continuous dialogue, belonging, participation ... all underscoring relatedness and interconnectedness, blending and meshing”. This metaphor has profound implications for how social phenomena such as the self, identity, mind, knowledge and intelligence are conceptualised and studied.

Supporting a relational view of context, another factor that sets socio-cultural perspectives apart from cognitivist, behavioural or constructionist views, is that *embodied human action* is understood as constitutive of the relation between people and the world, taking place not only in the head but in the world, and therefore is the origin of psychological phenomena (Stetsenko, 2008). For Piaget, Dewey and Vygotsky, people do not simply exist in the world and the mind is not simply a container that stores knowledge or a mirror that reflects reality but is “a dynamic system formed and carried out in and *as* actions by individuals who,

through these actions, realize their relations in and to the world” (Stetsenko, 2008: 479). Active engagement with, in and on the world is thus at the core of socio-cultural perspectives of development and learning and becomes the “supreme ontological principle” as it brings organisms into relations with the world and with each other (Stetsenko, 2008:479). Learning according to the socio-cultural perspective is thus an active process rather than a passive transmission of information and people learn by doing or through practice.

Vygotsky (1978) merged his cultural-historical theory with ideas of activity into one composite framework: cultural-historical activity theory (CHAT). In CHAT, Vygotsky (1978) broke away from Piaget and Dewey and viewed humans as set apart from other biological beings by adopting a Marxist dialectical materialist view which argued that “[the] base for human thinking is precisely *man changing nature* and not nature alone as such, and the mind developed according to how human beings learned to change nature” (Engels quoted in Vygotsky in Stetsenko, 2008: 482; italics in the original). Below is a brief overview of socio-material perspectives on learning.

3.1.1 Socio-material perspectives on learning and development

In line with the notion of embodied human action taking place in the world, socio-material theories emphasise the material aspects of practice and not merely the social or cultural aspects. As discussed above, socio-material theories such as CHAT and complexity theory argue that everyday educational activity and knowing is critically shaped through the material. These theories recognise that “things matter, not as discreet and reified objects with properties, but as effects of dynamic materializing practices that cause them to emerge and act in entanglements of both patterned, yet open, local everyday practice” (Fenwick, Edwards & Sawchuk, 2011: 168).

Fenwick et al. (2011) identified several key characteristics of socio-material theories. The first is that in general they focus on the relations among entities through which actions occur, rather than entities themselves as the source of actions. The relations and interactions between entities are thus the key focus in socio-material theories and rather than simply arguing that practices are complex and messy, these theories provide ways to engage with that complexity in detail in order to better understand the implications these have for learning, education and change (Fenwick et al., 2011). Secondly, similar to socio-cultural theories, socio-materiality decentres the individual as the unit of analysis in education and

instead focuses on physical and mental action. Socio-material theories also challenge the binaries that often frame our understanding of practices such as between subject and object, nature and society and matter and meaning. These binaries are seen as the basis upon which other things can be explained rather than fixed categories or naturally occurring phenomena. As considered above (Section 3.1) notions of context as a container are also challenged by socio-material theories; education does not sit within a context but is crisscrossed by visible and invisible relations (Fenwick et al., 2011).

A fifth characteristic of socio-material theories is that they adopt an anti-reductionist and anti-Cartesian position on education, learning and human development. They argue that change or transformation is produced through humans in concert with non-human material entities. Socio-material theories also embrace the notion of categorical complexity by bringing into view the multiple instances and opportunities for the exercise of individual and collective agency (Fenwick et al., 2011). Finally, socio-materiality accepts the fundamental uncertainty of practices and activity, especially those found in educational processes by taking account of all the materialities at play in practices such as rainwater harvesting and food gardening. Socio-material theories thus enable researchers to ask a specific series of questions about socio-material phenomena such as the relations across people, objects, tools, signs, texts, conventions, and values as well as questions around the processes and systems these relations produce, what mediates these processes and about the changes that are set into motion (Fenwick et al., 2011). It is important to note here that there are different intellectual roots in socio-material theories in education. In this thesis I do not work with the intellectual roots provided for by Gilles Deleuze and Bruno Latour (used in much of Fenwick's (2011) work), but rather the socio-material interpretations as proposed by the cultural historical theoretical schools, of which Vygotsky is recognised as a leading social development theorist drawing on Marxian theories of materialism, a project which was continued by Leon'tev, and later Engeström and his colleagues who further developed CHAT.

Lev Vygotsky's (1978) theory of mediation is situated within socio-cultural theories but is not necessarily a theory of the social or cultural aspects of human existence; rather it is a theory of the development of the mind which considers the important role of social relationships and culturally produced artefacts in organising human thinking (Lantolf in Daniels, 2008). The socio-cultural collective is thus incorporated into the consciousness through processes of mediation. The theory of mediation is discussed below with a specific

focus on how to analyse for mediating processes within human activity such as rainwater harvesting and food gardening practices.

3.2 Mediation in the learning and practice of rainwater harvesting and food gardening

Burt and Berold's 2011 consultancy revealed that mediation (understood as social interaction) was one of the main themes to emerge within the context of community based water management practices. In discussion groups many participants felt that the best learning occurred through direct human-to-human interaction (Burt & Berold, 2012). They found that a learning resource, good or bad, was not useful unless mediated by a local organisation or person sensitive to and having a firm understanding of local practices and context (Burt & Berold, 2012). A mediator in this context is understood as a person who "re-interpret[s] knowledge in a way that is relevant to a particular water practice and to those involved" (Burt & Berold, 2012: 4).

A mediator of knowledge, however, can be something other than an individual: it can be a psychological tool (a concept) or a material tool (a rainwater tank). Engeström in Daniels (2008: 4) defined a mediator of knowledge as the means "by which the individual acts upon and is acted upon by social, cultural and historical factors" in human activity. In order for knowledge to be relevant to individuals and communities therefore, an awareness and understanding of the contextual factors that mediate how people learn, what they learn, why they learn and what they want to learn is required. This current study adopts Lev Vygotsky's (1978) theory of mediation to explore how social and cultural processes mediate the learning and practices of individuals.

Lev Vygotsky (1978) was a Russian psychologist who proposed a theory of mediation in his exploration of how the collective impacts on how the individual thinks and acts or how humans develop from biological beings to social and cultural beings. The theory of mediation was a theory of the development of the mind and argued that "our actions on the world are mediated by the practices and understandings which are salient in our cultures" (Edwards, 2005a: 3). Whereas other species act directly upon the object of interest to them, humans on most occasions interpose a mediating artefact between themselves and the object, thereby enabling them to act more effectively (Wells, 2002).

When defining mediation, Hasan (2012: 83) argued that it is “a process that is inherently transitive” in that it calls for at least two participants: something/someone mediates something. Engeström (in Daniels 2008: 4) defined a mediator as “the means by which the individual acts upon and is acted upon by social, cultural and historical factors” in human activity. In his socio-cultural understanding of mediation Doehler (2002: 23) argued that “higher forms of human mental activity are mediated by tools (objects and symbolic means, such as language) collaboratively constructed by members of culture, and the development of these forms is rooted in sociointeractional practices within that culture”. Niewolny and Wilson (2009: 13) defined mediation as a “person performing actions in a sociohistorical setting through the appropriation of language and tools”. The tools referred to can be both cultural (e.g. concepts) or material (e.g. rainwater tanks).

The unit of analysis proposed by Vygotsky (1978) to describe human activity is the individual acting with mediational means (Wells, 2002). This is commonly represented in Vygotsky’s famous triad of subject, object and mediating artefact (see Figure 3.1).

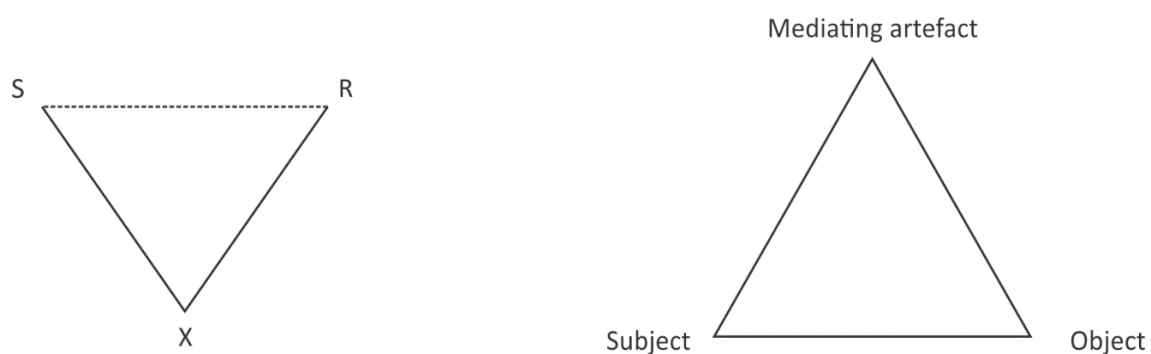


Figure 3.1: (A) Vygotsky’s model of mediated act and (B) its common reformulation (Engeström, 2001: 134)

The direct connection between stimulus (S) and response (R) was transcended by ‘a complex mediated act’ (Figure 3.1A). The common reformulation of Vygotsky’s model of mediated action is depicted as the triad of subject, object and mediating artefact (Figure 3.1B). The ‘subject’ is the individual or individuals participating in the mediated action; the ‘mediating artefact/tool’ can include artefacts, social others and prior knowledge of the subject; and the ‘object’ is the “raw material or problem space that gives reason for the subject to participate the activity” (Yamagata-Lynch, 2003: 102). The insertion of cultural artefacts into human

actions was groundbreaking because “the individual could no longer be understood without his or her cultural means; and the society could no longer be understood without the agency of individuals who use and produce artifacts” (Engeström in Daniels, 2008: 4). How a person thinks is thus revealed in the way that material and/or psychological tools are used to act on and change the object.¹¹ The object is what is being worked on and is not to be confused with the objective. Rather, the object is what is being shaped or transformed by the tool. A woman planting a food garden, for example, might be faced with a problem of not having enough water for her vegetables (not having enough water is the object). Whether she collects water from the community tap, asks her neighbours for some or invests in a rainwater tank to collect water (possible tools), her social capital or her knowledge of rainwater tanks (possible use of tools) will reveal her thinking.

The implication of the theory of mediation is that it rejects social determinism, or that human development is determined by social structures alone, because it argues that humans master themselves through external symbolic, cultural systems instead of being subjugated by and in them (Daniels, 2005; 2008). A focus on the self-construction of humans through cultural tools emphasises two important factors: firstly, the individual is an active agent in his/her development, and secondly, it highlights the importance of context as the agent is using tools which are available at a particular time in a particular place. These material and psychological tools do two things: (1) they first alter the structure of human physical or mental labour, and (2) they eventually affect the nature of the environment in which humans live or, in the case with psychological or cognitive tools, they alter the structure of human mental functions and determine the structure of a new instrumental act (Hasan, 2012).

Although not an easy concept to navigate, three important themes can be understood as running through the theory of mediation: (1) an understanding of human mental functioning must include an analysis of the tools and signs that mediate it (Section 3.2.1; 3.2.1.1; 3.3); (2) the claim that higher mental functioning in individuals (intrapersonal) has its origins in social life (interpersonal) (Section 3.4); and (3) a reliance on a genetic or developmental method (Section 3.5). Each of these themes will be explored in order to better explicate the theory of

¹¹ Mead (in Kozulin, 1998) made the important distinction between objects and stimuli by arguing that stimuli are simply responded to while humans ‘construct’ and interact with objects. Humans construct objects from stimuli in the environment that have taken on meaning during the course of human activity which is social by nature.

mediation. Of particular importance to this study is the first theme which focuses on an analysis of the tools and signs that mediate rural women's rainwater harvesting and food gardening practices. It is important to note that these themes are not easily separated but are intertwined and rely on each other to explain each other.

Authors such as Hasan (2012), Wertsch (2007) and Bernstein (1999) have attempted to clarify the concept of mediation by differentiating between 'explicit' and 'implicit', 'concrete' and 'semiotic', and 'horizontal' and 'vertical' forms of mediation. Before elaborating on these different notions of mediation however, it is first helpful to explain what is meant by mediating tools and artefacts as these stand in a dialectical relationship to the mental or physical labour that is undertaken and therefore determine what type of mediation occurs.

3.2.1 Mediating artefacts

In his writing Vygotsky never proposed a unified definition of mediation but excavated three dimensions of mediation through the use of 1) signs, 2) tools, and 3) another person or persons (social interaction or cooperation) (Langemeyer & Roth, 2006).

The theory of mediation argues that mental processes such as thinking and acting are mediated by signs and tools which are cultural artefacts constructed by humans (artificial) and inscribed with meaning and are thus "used to control behaviour from the outside" (Daniels, 2008: 8-9). The common meaning of 'artefact' in archaeology is an object that is formed by humans. Cole (1999: 90) defined an artefact as "a material object that has been modified by human beings as a means of regulating their interactions with the world and each other". These artefacts carry successful adaptations of an earlier time and in this sense, combine the ideal and the material. Artefacts therefore carry with them the historical remains of human activity over time and thus transmit accumulated socio-cultural knowledge (Hasan, 2012). Through human activity therefore, meaning is ascribed to objects and things and it is this meaning that mediates human activity. Cole (in Daniels, 2001) argued that the concept of 'tool' should be treated as a subcategory of the superordinate notion of artefact.

3.2.1.1 Three kinds of mediating tools

Vygotsky proposed three different kinds of mediating tools: material or practical tools, psychological or cognitive tools and other humans (Kozulin, 1998; Langemeyer & Roth, 2006). Material tools are directed at the objects of nature and presuppose collective use and

symbolic representation (Kozulin, 1998). Examples of material tools in this study are water, rainwater tanks, gutters, seeds and garden fences. Material tools then give rise to psychological or cognitive tools in their symbolic representation. While material tools mediate the objects of nature or physical labour, psychological tools mediate human psychological processes or mental labour. Examples of psychological tools include language, discourses, maps, schemas, works of art and cultural symbolic systems. Examples of psychological tools in this study are the language used by trainers, learning resources such as posters, manuals and information booklets, concepts of rainwater harvesting and permaculture training, mainstream agricultural discourses and the communal ethos held within communities of food gardeners. Vygotsky's (1978) notion of mediation by 'signs' and by 'tools' incorporates a strong interaction between thinking, communicative action and instrumental action. Tool use influences the nature of external behaviour as well as mental functioning but as this study has a strong focus on practice, the focus will be more on instrumental and tool-mediated action (Edwards, 2005b).

While the distinction between material and cognitive tools may simplify the concept of mediation, authors such as Engeström and Leander (in Daniels, 2008) have argued that a distinction between material and cognitive artefacts is not helpful because the forms are inextricably linked and in constant movement between the ideal and the material. Leander (in Daniels, 2008: 10) asserted that:

A broad definition of artefact as any mediational means ... would not draw sharp distinctions between semiotic and material artifacts for various reasons. It is difficult not to find at least some material dimension in all mediational means ... Secondly, the materiality of artifacts is always deeply embedded in their ideational (cultural and historical) meanings ... Third, transformations between semiotic and material realizations of any artefact are in constant flux.

The concept of 'objectification' explains the relationship between ideal artefacts with material ones and refers to "the idea of meaning embodied or ... sedimented in objects as they are put into use in social worlds" (Daniels, 2001: 21). What distinguishes a table from the raw wood it is made of, for example, is that it has been produced for a certain purpose and incorporated into a system of human ends; "the object thus confronts us as an embodiment of meaning, placed and sustained in it by 'aimed-oriented' human activity" (Bakhurst, 1995: 160). Another concept, 'ideality' is linked to this which provides an account of the way in which humans inscribe significance and value into the very physical objects of their

environment. Bakhurst (1995: 173) asserted that “nature is the clay on which humanity inscribes its mark”. Cultural artefacts are thus both material (here and now) and yet also ideal or conceptual, “entertaining the far away, the long ago, and the never has-been” (Cole, 1998: 94).

Daniels (2001) has offered a useful comparison between approaches to mediation within cultural psychology that emphasise either semiotic or activity means. See Table 3.1 that follows.

Table 3.1: Strengths and weaknesses to two approaches to mediation (Adapted from Daniels, 2001: 77)

Approach	Strengths	Weaknesses
Symbolic	<ul style="list-style-type: none"> • Emphasises cognitive basis of psychological processes • Elaborates social content of psychological processes • Recognises social construction and sharing of concepts 	<ul style="list-style-type: none"> • Overlooks practical activities, artefacts and conditions • Symbols appear arbitrary • Minimises individual differences in concepts and processes • Indefinite process of social construction
Activity	<ul style="list-style-type: none"> • Emphasises action rather than pure cognition • Emphasises tools • Emphasises social agency • Recognises heterogeneity of psychological processes 	<ul style="list-style-type: none"> • Activity and tools are conceived as devoid of social content • Unclear about how activity organises psychological processes • Minimises individual agency

The third type of mediational tool is another individual. This can occur in two instances. The first instance refers to another individual as the mediator of meaning such as a parent, teacher or a permaculture trainer. It is through the mediation through another person then that one’s own meaning is formed. Vygotsky (in Kozulin, 1998: 64) asserted that “one may say that only through the other do we become ourselves”. This type of mediational tool resonates with the African philosophy of *ubuntu* which is sometimes summarised as follows: “A person is a person through other people” (Eze, 2010: 190). The emphasis here is on the mediation through the activities of and with other people in a socio-cultural setting and underpins the role of another individual as a mediator of meaning (Daniels, 2001).

The second instance of an understanding of mediation through another person occurs on two planes: the interpersonal and then the intrapersonal (Daniels, 2001; 2008). In his famous statement, Vygotsky (1978: 57) argued that “every function in the child’s cultural

development appears twice: first, on the social level, and later on the individual level, first, *between* people (interpsychological), and then *inside* the child (intrapsychological)". This interplay between the interpersonal and the intrapersonal is encompassed in Vygotsky's developmental method. Clarifying this concept of mediation by the other, Hood Holzman (1986: 357) argued that "for Vygotsky, social does not mean interpersonal ... The activities of human behaviour, at all stages of development and organization, are social products and must be seen as historical developments".

Three notions of artefacts have been proposed (Daniels, 2005; Cole, 1999). The first are 'primary artefacts' used directly to make things – axes, clubs, needles, words, writing instruments and telecommunication networks (Daniels, 2005). 'Secondary artefacts' include "both representations of primary artefacts and of modes of action using them" and include traditional beliefs, norms and constitutions (Cole, 1999: 91). Secondary artefacts play a central role in transmitting and preserving modes of action. 'Tertiary artefacts' "constitute a relatively autonomous 'world' in which the rules, conventions and outcomes no longer appear directly practical, or which, indeed, seem to constitute an arena of non-practical, or 'free' play or game activity" (Cole, 1999: 91). Tertiary artefacts can be understood as imagined worlds, such as art, or ways in which we see the 'actual' world and can be used as a tool "for changing current praxis" (Daniels, 2005: 203). Within a rainwater harvesting context, a rainwater tank is a primary artefact because it is a physical tool used to collect water. If traditions and beliefs were formed around water tanks, then a water tank or the beliefs thereof would also become a secondary artefact. A tertiary artefact is the most abstracted form of artefact in the sense that it informs the imagination. The following example shows how a tertiary artefact can change current practice. A Xhosa woman was given a clay pot by her mother, which she admired as an ornament and displayed on her mantelpiece (the pot then exists as a tertiary artefact). This pot had once been a primary artefact for her mother, used to collect water. The daughter then heard a talk on the cultural significance of these pots, the traditions surrounding them (secondary artefacts) and their usefulness. She was inspired to start using the clay pot as a working tool (primary artefact) again, to collect and store water.

Culturally produced artefacts (such as forms of talk, representations in the form of ideas and beliefs, signs and symbols) therefore shape and are shaped by human engagement with the

world (Vygotsky, 1978; Daniels, 2008; 2012). From a practical perspective for this study, this means that all human learning is mediated via culturally produced artefacts (e.g. the words used to mediate rainwater harvesting and food gardening and the material tools that we have to do it with e.g. rainwater tanks etc.) and this needs to be taken into account in learning processes i.e. how these external artefacts are internalised by people via mediation.

3.3 Forms of mediation

As discussed earlier some authors concerned with mediation have sought to clarify the concept by distinguishing between different forms of mediation. Wertsch (2007) differentiated between ‘explicit’ and ‘implicit’ mediation (Section 3.3.1), Hasan (2012) drew a distinction between ‘semiotic’ and ‘concrete’ mediation (Section 3.3.2) and Bernstein (1999) spoke about ‘horizontal’ and ‘vertical’ discourses (Section 3.3.3). It is important to note from the outset that these categories are often not easily separable because of the nature of the mediational means in constant movement as discussed earlier.

3.3.1 Explicit and implicit mediation

In order to clarify the concept of mediation Wertsch (2007) presented two forms of mediation: explicit (visible) and implicit (invisible) mediation. Mediation is explicit in two senses. Firstly, mediation is explicit when another person directs an individual and intentionally introduces a “stimulus means” into an activity (Wertsch, 2007: 180). Secondly, mediation is explicit when the “materiality of the stimulus means, or signs involved, tends to be obvious and nontransitory” (Wertsch, 2007: 180). Explicit mediation then is the intentional and overt introduction of a sign “into problem solving activity, often by an outside party” (Wertsch, 2007: 191). Signs are thus introduced to help organise explicit mediation. Similarly, Daniels (2008: 6) defined explicit mediation as mediation that “mediates a specific category of reasoning. The world is therefore classified in a particular way”. An example of explicit mediation within rainwater harvesting practices is trainers or facilitators who re-interpret knowledge in a specific way and aim to teach or inform through a particular category of reasoning. The use of material tools such as reports, posters and manuals or gutters, roofs and rainwater tanks as well as concepts around permaculture or water systems are also examples of explicit mediation tools.

Implicit or invisible mediation on the other hand is less obvious and difficult to detect because it occurs in the discourses and practices embedded in our everyday lives (Wertsch, 2007). Implicit mediation is characterised by the

Use of signs, such as language, whose primary function is communication ... these signs are not purposefully introduced into human action, and they do not initially emerge for the purpose of organizing it. Instead, they are part of a pre-existing, independent stream of communicative action that becomes integrated with other forms of goal-directed behaviour. (Daniels, 2008: 181)

Signs such as language pre-exist in communication, or naturally occur in thinking, remembering and other forms of mental functioning and are therefore transparent or invisible. Because signs such as language are not consciously or intentionally introduced into problem-solving tasks they are thus even more transparent (Wertsch, 2007). Due to the invisible nature of implicit mediation, the different parties are unaware of what is being or has been mediated (Hasan, 2012). The underlying argument here is that things get mediated whether or not mediation is intentional. An example of the interplay between explicit and implicit mediation is the way in which a child's development or consciousness is mediated invisibly at home through his or her parent's practices prior to attending school. This implicit mediation is an important determinant of how that child will respond to explicit forms of (semiotic) mediation of specific concepts and elements of vertical knowledge structures in school. In Vygotsky's words, "any learning a child encounters in school has a previous history" (in Hasan, 2012: 91).

Closer to the context of this study is the example of the gendered relations amongst rural women and how this mediates, for example, the time they can set aside to learn new practices or how they share knowledge (see Section 7.2). Another example of implicit mediation is the impact of negative stereotypes some groups of people may appropriate without realising it. Wertsch (1998) used the example of the effect of racial stereotypes on the academic performance of African Americans who experienced obvious stress when it was implied they were being tested on the grounds of being members of a specific racial group. Wertsch (1998: 176) argued that "appropriation [of cultural tools] oftentimes is almost done *to* – rather than *by* – the agent. Instead of involving wilful assent, a cultural tool often affects mediated action in ways the agent neither envisions nor desires".

These two categories of mediation (explicit and implicit) are not neatly separate and are part of Vygotsky's broader conceptual framework of his developmental method (see Section 3.5) in which the relationship between signs and behaviour undergo fundamental changes (Wertsch, 2007: 186). The premise is that people use signs all the time in which they do not fully understand what they (people) are doing (Wertsch, 2007: 186). People act with a tool

before they fully understand it. The goal then of instruction is to teach students to become competent users of a sign system and to be able to master the use of cultural tools by becoming experts (Wertsch, 2007: 186). An example of this is a group of students instructed by their teacher to make sense of quantitative data on their observations of the conditions that foster the most growth in plants (Wertsch, 2007: 188). These students were given graphing paper (explicit mediatory tool) and told to determine the ‘typical’ fast plant and to find out how ‘spread out’ the data was (implicit mediatory tool). Although the teacher did not use the technical language of statistics such as ‘central tendency’ or ‘variation’ she was trying to introduce and familiarise them with these concepts (Wertsch, 2007: 188). At first the students did not understand how to use the graph paper to interpret their data but after several suggestions from the teacher, they were able to group their data to reflect central tendency and distribution. The students then participated in an activity where they had a limited understanding of what the graph paper was for and what the teacher was saying. Through their (the teacher and the students) interactions however, they moved toward an understanding of how to use these tools (Wertsch, 2007: 190). Thus sign meanings develop as students move from a state of confusion to a state of understanding.

The significance of both explicit and implicit mediation for this study is the understanding that implicit mediation is “something that is automatically and in most cases unintentionally built into mental functioning” and has the ability to both constrain and enable (Wertsch, 2007: 184). The social world thus influences cognition through implicit usually psychological tools such as language, signs and social institutions (Schunk, 2004: 294). Kemmis (2009: 32) has argued that there are ‘mediating preconditions’ or ‘practice architectures’ which can be understood as:

cultures and discourses, social and political structures and dynamics, and material and economic conditions under which a practice is practiced. The arrangement of these mediating preconditions enables and constrains particular characteristic modes of professional practices as well as local variations on their more general forms.

These structures do not always or entirely constrain or enable practice but instead can be understood as “simply a background against which the practice can be conducted and from which different forms of practice might be developed” (Kemmis, 2009: 32). Significant for this study then is to be aware of the implicit mediating processes within rainwater harvesting and food gardening practices, those processes that are “not the object of conscious reflection and not externally or intentionally introduced” (Wertsch, 2007: 184). Examples of implicit

mediation in the practices of rainwater harvesters and food gardeners include their speech and language, their beliefs, traditions, norms, values, and the socio-economic, political and religious institutions that impinge on their practices. The way risk is socially constructed, the way environmental regulations are implemented and the multiple voices and interests involved in water management also implicitly and explicitly mediate these water practices and the learning of them (Ison et al., 2007). Chapter Seven presents data on the implicit and explicit mediating processes within rainwater harvesting and food gardening practices.

3.3.2 Concrete and semiotic mediation

Along similar lines Hasan (2012) differentiated between concrete and semiotic mediation. Concrete mediation is the use of concrete or material tools (such as rainwater tanks) during practical, physical human labour. The mediation by concrete tools (1) alters the structure of physical labour, and (2) eventually affects the nature of the environment in which humans live (Hasan, 2012). Material tools do not exist as individual implements but presuppose collective use, interpersonal communication and symbolic representation (Kozulin, 1998). This symbolic representation gives rise to signs and symbols which stand as psychological tools. Semiotic mediation “is concerned with the cultural mediation of mental development through acts of semiosis” or signs and symbols (Hasan, 2012: 80). Semiotic acts are acts of meaning and language is merely one example of a semiotic modality. Mediation through abstract tools such as language is different from mediation through concrete tools in that it is based on “interactive events of meaning exchange” between a meaner, a meaning and to whom the meaning is meant (Hasan, 2012: 83). Wherever there is discourse or verbal exchange there is therefore semiotic mediation and this verbal exchange implies a social occasion for its occurrence. Semiotic mediation is therefore defined as “mediation by someone of something to someone by means of acts of meaning, typically by the modality of language, which entails a structure of socio-cultural relations” (Hasan, 2012: 83). An example of semiotic mediation in this study is the introduction and use of the question-based learning resource to pilot how it mediates the learning of research participants through the mediation of a person such as a facilitator (see Section 1.3 and Chapter Eight).

Vygotsky emphasised the power of language in the development of humans in that as they acquire language they are transformed into social beings. Semiotic mediation has thus come to mean “mediation by means of the linguistic sign” (Hasan, 2012: 82). A representation of how the mind is shaped through semiotic mediation is given below (Figure 3.2).

Verbal interaction → meanings construing experience → experience construing mind

Figure 3.2: Analytical representation of process of semiotic mediation
(Hasan, 2012: 84)

Vygotsky (in Hasan, 2012: 82) argued that “prior to mastering his own behaviour, the child begins to master his surroundings with the help of speech”. For Vygotsky higher mental functions produced by the acquisition of language was unique to humans. Two conclusions can be drawn from an analysis of semiotic mediation. The first is that it is a logically ordered process as seen above (Figure 3.2) and the second is that semiotic mediation implies verbal interaction and therefore context. In light of a seeming absence of theory of semiotic mediation Hasan (2012) argued that Bernstein’s (1999) concepts of horizontal and vertical discourses within his sociological theory of pedagogy aids in understanding semiotic mediation.

3.3.3 Horizontal and vertical discourses

Another vector of differentiation in mediation is Bernstein’s (1999) horizontal and vertical discourses. Horizontal discourses refer to a sphere of knowledge that is often referred to as ‘common-sense’ or ‘everyday’ knowledge in that they are processes that are familiar to the members of any society because they are centred around common problems such as living and dying (Hasan, 2012). An example of horizontal knowledge would be learning how to dress, tie one’s shoe laces or use a telephone. This type of knowledge is characterised in the fact that it is typically (i) oral, (ii) local, (iii), context dependent, (iv) specific, (v) tacit, (vi) multi-layered, (vii) contradictory across contexts but not within, and (viii) segmentally organised (Bernstein, 1999). It is segmentally organised in that the knowledge that is required is related to the specific context or segment in everyday life. For example, there is no relation between learning to use a toilet and learning to tie one’s shoe. The knowledge in horizontal discourses then is context-specific and embedded in ongoing practices, “directed to specific, immediate goals, highly relevant to the acquirer in his/her life” (Bernstein, 1999: 159).

Vertical discourses on the other hand are specialised processes that are not common to all in that they are (i) “a coherent, explicit, and systematically principled structure, hierarchically organized, as in the sciences”, and (ii) they represent “a series of specialized languages with specialized modes of interrogation and specialized criteria for the production and circulation of texts, as in the social sciences and humanities” (Bernstein, 1999: 159). Vertical discourse

is knowledge that is context-independent and abstract in that compared to horizontal discourses, there is a distancing from the local base of participants. Some theorists see the distinction between horizontal and vertical discourses as one (horizontal discourse) creating practical mastery and the other (vertical discourse) symbolic mastery. One creates the 'life world' of people (horizontal) and the other is the source of instrumental rationality (vertical); or one is oral and the other written. In the field of education these two discourses are referred to as 'official' and 'local' knowledge (Bernstein, 1999).

Bernstein's vertical and horizontal discourses are a refinement of Vygotsky's (1978) notion of 'scientific' and 'everyday' concepts (Daniels, 2001). By 'scientific concepts' Vygotsky meant concepts introduced by a teacher in school and that form a logical, hierarchical system of meaning. Scientific concepts are therefore associated with vertical discourse.

'Spontaneous' or 'everyday concepts' on the other hand are those acquired outside of the classroom by children in which explicit instruction exists. The context of 'everyday concepts' is immediate, social, practical activity and is associated with Bernstein's horizontal discourse (Daniels, 2001). As with the other two conceptualisations of mediation, the interdependence between 'everyday' and 'scientific concepts' and horizontal and vertical discourses must be appreciated. Vygotsky (in Daniels, 2001) presented an interconnected model of the relationship between scientific and everyday concepts and argued that the systematic and coherent thinking associated with scientific concepts becomes gradually embedded in everyday concepts and thus give structure and order to everyday thought.

Important to this study is the interplay between 'everyday' and 'scientific concepts'. The idea of 'scientific' and 'everyday concepts' highlights the importance of mediation between everyday practices and new forms of (often more abstract) knowledge. Instruction in rainwater harvesting and food gardening training programmes aim to introduce more abstract or new forms of knowledge. The crucial aspect of Vygotsky's work is that it reminds us that doing so requires a form of pedagogy in which the scientific concepts need to 'connect' with people's everyday knowledge in order for them to make sense and become internalised. This was the rationale used to develop the question-based learning resource (Section 1.3 and Chapter Eight) in order to see how a learning resource that is developed out of the 'everyday' concepts of research participants' experiences finds congruence with 'scientific' concepts within vertical discourses.

Discussed above are some of the ways in which various authors have tried to make sense of what mediation is. As can be seen from these three different notions, they are often not easily separated into neat categories as they exist in a dialectical relation to each other. In spite of this Table 3.2 below provides a comparative representation of the three different conceptualisations of mediation.

Table 3.2: Different conceptualisations of mediation

<p>Explicit/ Visible mediation</p> <ul style="list-style-type: none"> • Signs and tools; materiality of stimulus means obvious and nontransitory • Stimulus means intentionally introduced into human action, directed at a specific concept or line of reasoning; organises human action; the object of conscious reflection 	<p>Implicit/ Invisible mediation</p> <ul style="list-style-type: none"> • Signs (e.g. language), seemingly transparent and transitory • Not intentionally introduced into human action; does not intentionally emerge with purpose of organising human action; already part of ongoing communicative action
<p>Concrete mediation</p> <ul style="list-style-type: none"> • Material/technical tools • Alters the structure of human physical labour • Alters the nature of the environment 	<p>Semiotic mediation</p> <ul style="list-style-type: none"> • Abstract/psychological tools • Alters the structure of human mental labour • Determines the structure of a new instrumental act
<p>Horizontal discourse</p> <ul style="list-style-type: none"> • Oral • Local • Context dependent • Specific • Tacit • Multi-layered • Contradictory across contexts but not within • Segmentally organised 	<p>Vertical discourse</p> <ul style="list-style-type: none"> • Coherent, explicit, and systematically principled structure, hierarchically organised, • Specialised languages; specialised modes of interrogation (as in sciences); specialised criteria for the production and circulation of texts (as in the social sciences and humanities)

Section 3.7 explores a way in which to analyse mediated action and the tools and signs used but first the following sections discuss the two other themes that define mediation, namely the social origins of higher mental functioning and a developmental method.

3.4 Social origins of higher mental functioning

The second theme running through Vygotsky's theory of mediation is that higher mental functioning in individuals has its origins in the social world. Lower mental functions include reflexes and spontaneous, rudimentary conscious processes whereas higher mental functions

are understood as “developed, voluntary mental functions, categorical perception, voluntary attention and voluntary movements” (Ratner in Daniels, 2008: 25). Higher mental functions are developed through socially mediated activity where speech is a means used to direct and master mental processes. Vygotsky (in Daniels, 2008: 26) argued that “initially these [higher mental] functions arise as forms of cooperative activity. Only later are they transformed by the child into the sphere of his own mental activity”. The process in which a person comes to new knowledge or masters a semiotic tool or sign occurs first on the social (intermental) plane and then on the individual (intramental) plane. When encountering a new cultural tool, a person first experiences this on the intermental plane in social interaction with others, for example between experts and novices (Wertsch, 2007). The individual, by means of this social interaction, then interprets and works out the cultural tool.

Vygotsky also introduced the concept of the Zone of Proximal Development (ZPD) which considers the social origins of human development: it refers to the way in which acquiring new knowledge is dependent on previous learning, as well as the availability of instruction (Kozulin, 1998). The ZPD is defined as the “actual developmental level as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky in Daniels, 2008: 20). In other words, it has to do with the relationship between an individual learner and a supportive other or others, even if that other is not physically present in the learning context at that point in time. An example of this in this study is an individual gardener (learner) using permaculture methods (tools) to plant a food garden which was learned in a past garden training workshop (learning context) from a permaculture trainer or expert (supportive other) (see Section 7.2.4).

3.5 Developmental or genetic method

Closely tied to the discussion above is the third theme running through Vygotsky’s theory of mediation: a developmental or ‘genetic’ method when analysing mediation (Daniels, 2008). A developmental method implies that the inclusion of tools and signs into human action does not merely lead to quantitative improvements in development such as increased speed or efficiency. Instead, it leads to qualitative transformations as well in that the inclusion of tools and signs alter the entire flow and structure of mental and physical functions (Wertsch, 2007). This is achieved by determining the structure of a new instrumental act. The implication of a

developmental method is that in order to understand psychological functioning, it is not enough to know whether a problem can be solved but *how* the problem is solved is crucial to understanding the formation of higher mental functions (Daniels, 2008).

Embodied in the developmental method are the concepts of externalisation and internalisation which explains the dialectical phenomenon that “as much as culture creates individuals, culture itself remains a human creation” (Bakhurst & Sypnowich, 1995: 11). Internalisation refers to the “transformation of social functions into individual skills” and is related to the reproduction of culture (Daniels, 2008: 39). Externalisation is defined as the process that “produces artefacts ... that enter into and channel subsequent streams of activity” and is related to the creation of artefacts that are used to transform culture (Prior, 1997: 278).

In internalisation, external social relations and socio-historical systems are transformed into mental actions, outcomes, and embodied states which are understood as knowledge and skill. Internalisation “allow[s] the learner to see the object of his or her activity differently and as more complex” (Mukute, 2010: 17). Learning that happens within the person is called intramental and is part of the internalisation process. The internalisation process that produces new knowledge and ways of thinking then affects how a subject relates with the object, thus externalising what has been learned and giving new meaning (Lave & Wenger, 1991). This shows the relationship between the work of Vygotsky and the work of more recent social learning theorists, who have an interest in human development through learning.

This developmental method supports Vygotsky’s dialectical worldview in which the ‘social’ and the ‘individual’ are in relationship with one another. He argued that “development, according to a well-known definition, is precisely the struggle of opposites. This view alone can support truly dialectical research on the process of children’s development” (Vygotsky 1993: 282-3).

3.6 Mediation in this study

As discussed earlier in the introduction to this thesis, the impetus for this wider Water Research Commission project grew out of the concern that how water knowledge and water practices are mediated is not understood or documented widely within water knowledge research (Section 1.1) (Bielak, Campbell, Pope, Schaefer, & Shaxson, 2008; Burt & Berold,

2012; Shaxson, Bielak, Ahmed, Brien, Conant, Middleton, Pant , 2012). Learning resources developed for community-level learners are often produced without adequate attention to fundamental factors such as socio-cultural and socio-ecological contexts (Burt et al., 2014). According to Lotz-Sisitka & Burt (2006) this has consequences for democratic participation in social practices such as water resources management or land management. Understanding the detailed mediation interactions or processes that take place between people, mediating artefacts, each other and more experienced others within their existing contexts is imperative because it is within these mediated interactions that new knowledge and capabilities for action are formed.

Another way to understand this, in line with Vygotsky's theory of mediation, is that humans inscribe meaning and value into psychological and material artefacts, leading to two important consequences: firstly, humans are active agents in their own development, and secondly, the socio-cultural context must be understood because material and psychological artefacts are used at a particular time and place (Daniels, 2008). Cultural artefacts are thus produced by humans and in order to study how these mediate, one must focus on 'mediated processes' (Daniels, 2008: 13). Mediated processes are the activities of humans taking place in and mediated by specific socio-cultural settings (Daniels, 2008). In order to understand these mediated processes, one must study them in movement or in history, from their beginning to their end (Daniels, 2008). This can be understood as process ontology, where the very nature of reality is a process and changes over time. One can observe this changing reality only by studying the situated social practices or events of humans over time (Daniels, 2008). In order to identify change, one has to know what came before it. One would then be able to observe these mediating processes in the process of change by studying their history (the problematics of a process ontology are discussed in Section 3.9 in relation to a relational ontology).

As presented above, Vygotsky (1978) problematised the idea of knowledge transfer which assumed that the way in which knowledge was understood and applied would be in exactly the same way by everyone given access to this information, irrespective of context. Instead, he argued that learning in humans is a social and cultural process in that individuals internalise whatever is represented in cultural forms (e.g. language, symbols, signs, and artefacts) and integrate this into their practice. As a result, what we know and how we know it cannot be separated out from the cultures and social lives in which we exist.

The implication of this for this study is that if we desire to develop learning resources or tools that are accessible and relevant (both in the manner of how knowledge is shared and generated), we need to understand and respond to the cultural and historical contexts we work in (Burt et al., 2011). A very basic example of this is considering the language that people speak and the kind of access to knowledge resources they have in their particular language. As a result, one of the first goals of this study and in line with the first research question (Section 1.2-3) was to investigate *what* the mediating processes were within rainwater harvesting and food gardening practices and *how* these mediated learning in a specific socio-cultural setting (Cata and Glenconnor, Eastern Cape). In order to track this changing process in more detail, the study was guided by questions of what people were learning, why and how which provides a more holistic account of these situated social events as they change over time, looking at what was done and what was hoped to be achieved (see Chapters Five, Six and Seven). The broader aim was to feed into a body of knowledge to help environmental educators know how to foster learning in different contexts.

In line with the second research question and goal of this study (Sections 1.2-1.3) we wanted to know how to design learning resources that integrate local water management practice and knowledge with more formal water knowledge structures (Burt et al., 2014). In order to do this we designed and pilot tested a model learning resource based on questions that emerged from the practice of community-based rainwater harvesters and food gardeners in Cata village. Expert knowledge about rainwater harvesting and food gardening methods was then carefully melded together with the local knowledge and context. We then introduced this learning resource back into Cata and into a second context, Glenconnor, in order to test how it mediates and extends peoples' learning (see Chapter Eight). Specific attention was also paid to how the water knowledge in the learning resource was mediated by the facilitators themselves.

From the above discussion one is able to thus understand the central role the theory of mediation played in this study. How to analyse mediated action is discussed further below.

3.7 Analysing mediated action

As discussed previously artefacts can be ideational or material and move between inner and outer worlds where meaning is constantly developing. This presents a challenge to studies such as this one which seeks to explore processes of artefact-mediated activity. The focus of this study is not semiotic mediation but rather mediated action (even though it is recognised that the two relate in a dialectical relationship of constant movement). In his socio-cultural theory of mediated action, James Wertsch (1998) offered a helpful analytical framework which takes mediated action as the unit of analysis which he argued provides a natural link between action and the cultural, institutional and historical context in which the action occurs. This analytical framework is presented and discussed below.

Wertsch (1998: 24) argued that the task of socio-cultural analysis “is to explicate the relationships between human *action*, on the one hand, and the cultural, institutional, and historical contexts in which this action occurs, on the other” (italics in original). He defined human action as being both external and internal and it may be carried out by individuals or groups, both small and large (Wertsch, 1998). Wertsch (1998) focused on the psychological *moment* of action within an apparent socio-cultural context. Wertsch’s (1998: 180) impetus of choosing *mediated action* as the unit of socio-cultural analysis is that “it does not carve up phenomena into isolated disciplinary slices that cannot be combined into a more comprehensive whole”.

In their reading of Wertsch’s mediated action, Engeström and Miettinen (1999) argued that Wertsch explicitly distanced himself from ideas of historicity, object orientedness and the collective nature of human activity. This is problematic when one attempts to understand the contexts individuals act in and upon because individuals act in collective practices, communities and institutions. Engeström and Miettinen (1999) asserted that when individual action is given privilege as the unit of analysis, collective action can only be added on as an external envelope. As an attempt to overcome the limited focus of actor and mediational means, Wertsch adopted Burke’s (1962) pentad of literary analysis (discussed below in Section 3.7.1). According to Engeström and Miettinen (1999) however, the embeddedness of action in collective practice remains metaphorical rather than analytical in this pentad. In his socio-cultural theory of mediated action, Wertsch (1998) put forward a useful framework in which to analyse mediated action which, coupled with second generation CHAT (see Section

3.8) as a theoretical and methodological framework, has allowed me to move beyond the individual actor and his/her mediational means to include the collective.

3.7.1 Wertsch's analytical framework

Wertsch (1998) adopted Burke's pentad in order to frame human action. Burke's (in Wertsch, 1998) pentad consists of five elements: Act (what took place, in thought or deed), Scene (the situation in which the act occurred), Agent (what kind of person performed the act), Agency (the means or instruments the agent used), Purpose (why they did the act).

As his analytical framework Wertsch (1998) focused on three central considerations: (1) agents and their cultural tools; (2) mediated action or 'agent-acting-with-mediational-means'; and (3) the link between action and broader cultural, institutional and historical contexts. A focus on the agent and his/her cultural tool gives less emphasis to other elements in Burke's pentad such as scene or purpose and forces the researcher "to live in the middle" and "to go beyond the individual agent when trying to understand the forces that shape human action" (Wertsch, 1998: 24). The second consideration, "agent-acting-with-mediational-means", provides insight into other aspects of the pentad such as scene, purpose and act as these elements are often dialectically shaped by mediated action. The implication of the third consideration is that the socio-cultural embeddedness of human action is always built into one's analysis when looking at the involvement of cultural tools in mediated action (Wertsch, 1998).

Wertsch (1998) explicated ten properties of mediated action that direct the interactions between the elements in mediated action and can be used to analyse mediated action. See Box 3.1 below.

1. There is an irreducible tension between the agent and the mediational means (tools).
2. The materiality of mediational means.
3. Action has multiple, often conflicting goals.
4. Mediated action is historically situated.
5. Mediated action provides both affordance and constraints on action.
6. New tools transform action because they determine the structure and flow of action.
7. Mastery of tools involves following the patterns, the cultural, historical and institutional requirements of a tool.
8. Appropriation of tools which refers to making one's own affordances and constraints inherent in the tool.
9. Consumption of tools in ways that are no longer applicable in a given situation and time can impede performance.
10. Power and authority are to varying degrees inherent tools.

Box 3.1: Wertsch's ten claims of mediation (Wertsch, 1998: 25)

As his first claim Wertsch (1998) argued that an analysis of mediated action focuses on two elements: the agent and the mediational means and the essence of this analysis is to examine them as they interact. This is in order to capture the *moment* of action and Wertsch (1998: 25) warned that "any attempt to reduce the account of mediated action to one or the other of these elements runs the risk of destroying the phenomena under observation". For the purpose of analysis one might need to isolate elements momentarily but must keep in mind that they do not really exist independently of action. To recognise the irreducible tension between the agent and the mediational means is not to treat mediated action as an undifferentiated whole (Wertsch, 1998). Instead, mediated action is conceptualised as a system that consists of dynamic tension among various elements and it is important to keep sight of these elements for two reasons. The first is that it is often the key to understanding how change takes place in mediated action. The second reason for keeping sight of these elements is to understand the dialectical tension between the different elements by being able to separate and compare the elements (Wertsch, 1998).

In line with discussions of the materiality of socio-cultural phenomena (Section 3.1) Wertsch's second claim considering mediation was the materiality of mediational means or tools. The materiality of mediational tools is expressed in the term 'artefacts' which denotes

the sense of historical artefacts that continue to exist after the humans who used them have ceased to exist. They thus continue to exist across time and space and as physical objects even when not incorporated into the flow of action (Wertsch, 1998). All mediational tools are material, even language. The materiality of mediational tools is important for how internal mental processes come into existence in that they require interacting with material properties of cultural tools (Wertsch, 1998).

The third claim of mediated action referred to the fact that mediated action usually serves *multiple* purposes or goals which are often in conflict with each other (Wertsch, 1998). Mediated action is therefore not neatly organised around a single, identifiable goal but multiple goals interact and conflict with one another. An example of this is that a pole vaulter's immediate goal may be to clear a cross bar but this may be part of a broader goal of impressing a particular audience or beating an opponent. At times the mediational means and the goal of the agent come into conflict when the mediational tools are inadequate or not appropriate for a specific act. An example of this is a pole vaulter using a snooker stick to vault across a bar or a child having to use Roman numerals to multiply numbers – the mediational tools are inappropriate for the goal and act. The scene or broader context also dictates goals. When a child is asked to multiply for example, it could be in an examination environment where performance will be judged or the goal could be part of formal instruction where the goal may be to practise.

The fourth claim stated that mediated action is situated on one or more developmental paths which reiterates that mediated action is historically situated (Wertsch, 1998). Agents, their cultural tools and the tensions between them always have a past and are in the process of changing. This is what is meant by Vygotsky's developmental or genetic method: we can only understand aspects of mental functioning by understanding their origin and their transformations. One must interpret mental processes as emerging from the genetic transformation they have undergone and not focus on the static products of development (Wertsch, 1998). 'Development' is a term applied to mediated action, the unit of analysis for socio-cultural studies, and it rejects claims that it is the mind in isolation that develops. An example of a rainwater tank can be used to illustrate how mediational tools develop, rather than the person's mind or skills only. Instead of collecting rainwater with a bucket from a roof a more sophisticated tool is introduced such as a rainwater tank which collects from gutters, is able to store more water and has a tap at the bottom for easy access to the water.

What developed is not so much the person's mind that is using it but the tool. The intelligence involved to use the tank effectively "is an attribute of the *system* created by the irreducible tension between agent and mediational means" (Wertsch, 1998: 35) (italics in original).

In mediated action, development is also subject to all sorts of contingent and accidental events that produce unintended consequences such as complex socio-ecological risks (Section 2.4.1). Another way of explaining this is that cultural tools are often produced for reasons other than to facilitate mediated action. With this in mind however, development cannot be understood without an assumption of an ideal end point, thus distinguishing development from chance or undirected change. Positing that development involves "preferred directionality" with an ideal end point means that it is a normative notion as well. A theory of development is thus what we use to assess, evaluate and regulate human actions and transactions. The point of this fourth claim is that when discussing mediated action, cultural tools and agents it is important to reflect on the end point. Information about intelligence is only meaningful in the context of holding knowledge about the cultural tools an agent will use. Each individual thus has a developmental history with cultural tools and this history can provide important insights to the skills and intelligence he or she has. The notion of development thus focuses largely on how individuals encounter and master an existing set of cultural tools and suggests that a change in cultural tools might be a more powerful force of development than the enhancement of a person's skills or intelligence. In the context of environmental education, implicit and explicit cultural tools such as beliefs, attitudes, norms, ideologies and values that mediate action are seen as powerful forces to be used in order to move towards sustainability practices within the water sector (see Section 2.4.3).

Wertsch's (1998) fifth claim stated that mediation both empowers and constrains action. Because cultural artefacts are products of social and cultural structures they also possess the potential to constrain or enable in that they 'tell' us how to behave towards them (Archer, 2000: 186). Mediational tools can both constrain and enable subjects as they work with them. An example is using a tool that, while it may enable you to do one thing, could constrain you to do another thing. For example, using a particular graphing technique to discover certain patterns in data enables the subject insight into data but it also constrains or prevents the subject from seeing other patterns that could be revealed by employing a different means (Wertsch, 2007). Another example used by Wertsch (1998) is the use of historical narratives

of the development of a nation which allows individual learners to tell a specific narrative of their nation but constrains them in telling the complete story from another perspective. Language was seen by Vygotsky, for example, as providing new capacities for human consciousness. However, a new cultural tool may be developed to overcome a perceived problem in a certain form of mediated action but it may also introduce new limitations and restrictions of its own. Authors working with mediated action usually either take a half-full or half-empty approach to the constraints and affordances presented by cultural tools. Another point pertaining to the constraints and affordances of mediational tools is that one can usually only recognise the constraints imposed by cultural tools in retrospect when compared to the present. It is only when a new and further empowering (and constraining) tool is introduced, for example, that we recognise the limitations of earlier ones. Only in recognising how mediational means play a role in shaping human action can we ask why certain cultural tools are used and not others and who decides what cultural tools are used.

The sixth claim was concerned with how novel cultural tools transform action. This point was important for Vygotsky (in Wertsch, 1998: 43) and he argued that “by being included in the process of behaviour, the psychological tool [sign] alters the entire flow and structure of mental functions. It does this by determining the structure of a new instrumental act ...” Wertsch (1998: 43) argued that “a new mediational means creates a kind of imbalance in the systemic organization of mediated action, an imbalance that sets off changes in other elements such as the agent and changes in mediated action in general”. An example is the introduction of fibreglass poles for vaulting that caused such a transformation in the sport (pole vaulters broke records daily with the new technology) that it caused debate as to whether it was still pole vaulting people were practising. New cultural tools can thus transform action so much that the action might be the same (calculating using a calculator instead of a mathematical formula and paper and pen) but the systemic organisation of the agent and the cultural tool often ends up being different, calling into question whether the same action is being performed.

The seventh claim of mediated action argued that mastery of tools involves following the patterns, the cultural, historical and institutional requirements of a tool. Wertsch (1998) highlighted the problematic definition of ‘internalisation’ as too loaded and misleading and argued instead for using terms such as ‘mastery’ and ‘knowing how’ when referring to learning how to use cultural tools or mediational means with facility.

In addition to mastering cultural tools, the relationship of agents to mediational means can be characterised in terms of ‘appropriation’. Internalisation is thus understood in two forms: as ‘mastery’ and as ‘appropriation’. Wertsch’s (1998: 53) eighth claim of mediated action considered the appropriation of tools which referred to making one’s own affordances and constraints inherent in the tool. Mastery and appropriation are analytically distinct where appropriation denotes the process of taking something that belongs to others and making it one’s own. Appropriation of mediational means need not be related to their mastery. In some instances a high level of correlation of mastery and appropriation may exist; in others the use of cultural tools may be characterised by a high level of mastery and a low level of appropriation. An example of this is when a non-Christian person may know the words to a Christian song very well (mastery) but chooses not to sing it because it conflicts with his or her beliefs and therefore the person is unwilling to identify and take the song into himself or herself (appropriation). Mastery and appropriation may thus operate independently of one another in mediated action (Wertsch, 1998). Cultural tools therefore offer a unique set of affordances and constraints.

The ninth claim of mediated action referred to how cultural tools are produced and suggests that performance can be impeded when tools are used that are no longer applicable in a given situation and time. Wertsch (1998: 58) asserted that if we do not consider both the consumption and production of cultural tools, this leads to an incomplete analysis and understanding of mediated action; the two need to be “examined in tandem in a broad vision of socio-cultural studies”. One of the primary problems of analysing mediated action solely from the perspective of consumption is that it leads to reductionist assumptions that cultural tools are produced in direct response to the needs of the agents consuming them. Wertsch (1998) argued that many cultural tools emerge as accidents or unanticipated spin-offs. An example of this is the introduction of fibreglass poles for pole vaulting which never would have come into existence had fibreglass not been developed in response to military aviation research for lighter and stronger materials. Cultural tools are thus shaped by “historical context and in turn shape our mediated action” (Wertsch, 1998: 61). The implication of using cultural tools that have emerged from unanticipated spin-offs is that we might be using tools that, unbeknownst to us, actually impede our performance. An example of this is how the first typewriters were designed to actually slow typists down by widely distributing the most common letters used, thus trying to achieve a certain kind of inefficiency (Wertsch, 1998). Contrary to this example however is that mediational means are typically not the product of

conscious design. Two points can be made here concerning mediated action: (1) “cultural tools that shape mediated action may have been produced in response to forces other than the conscious requirements of agents currently carrying out such action” and (2) in many cases, the concrete cultural tools used in mediated action have been borrowed from distinct socio-cultural contexts (Wertsch, 1998: 62-63). In a sense then we often misuse tools with the consequence that our action may be impeded.

Finally, Wertsch’s (1998) tenth claim of mediation asserted that power and authority are to varying degrees inherent tools in mediated action. Socio-cultural settings inherently involve power and authority. Accounts that focus on power and authority usually locate this power in individuals or in institutions. Wertsch (1998) gave two reasons for the acknowledgment of the inherent power and authority in cultural tools. The first was that cultural tools have the power and authority to transform human action such as the rise of print media and literacy, for example, which fundamentally transformed how power and authority was organised, distributed and exercised in society. Secondly, by focusing on the cultural tools employed in mediated action one sidesteps the individual-society antinomies and is able to “‘live in the middle’ and address the socio-cultural situatedness of action, power, and authority” (Wertsch, 1998: 65). Socio-cultural settings are shaped by power and authority and these settings provide a ‘cultural tool kit’. It is no surprise then that cultural tools are differentially imbued with power and authority ranked in terms of ‘privileging’ and ‘cognitive values’ (Wertsch, 1998: 66). Cognitive values refers to the fact that the socialisation of knowledge occurs in an environment structured by values which is why certain knowledge is publicly available and other knowledge is not and why certain solutions to problems are viewed as inherently more appropriate or powerful when other solutions would work equally as well. Wertsch’s (1998) main point regarding power and authority as inherent tools is, that by invoking or using the appropriate cultural tools, it is possible for someone’s actions to take on a kind of power and authority.

Linked to power and authority as inherent in mediating tools, as well as Wertsch’s (1998) fifth claim of the constraints and enablements of mediated action, is the phenomena of power relations, social position and identity. Effectively, the social roles individuals occupy mediate how they teach and learn their (water) practice. Actors are positioned by their practices and take up specific social positions. Social positioning is “the establishing of a specific relation

to other subjects and the creating of specific relationships within subjects” (Bernstein in Daniels, 2008: 7). As a result, the same social context can offer different social positions to actors (Daniels, 2008). In the context of rainwater harvesting and food gardening practices, different individuals will be positioned or will take up certain social positions. One of the key findings of Burt and Berold’s 2011 consultancy was that water knowledge learning resources should be based on practices that people are already engaged in and know about. Burt and Berold (2012: 10) argued that “people need knowledge that is directly relevant to their context, that leads them to question their own behaviour, and that of their families, communities, institutions and societal structures such as government”. Hasan (in Daniels 2008: 6) argued that “the context that one learns about are the contexts that one lives, which in turn means that the contexts one lives are those which are specialised to one’s social position”. A link exists then between the context individuals find themselves in, the practices they engage in, the social positions they take up and thus their identity construction. Individuals in these communities may have varied and sometimes multiple gendered, political, racial, cultural and socio-economic identities which mediate their learning and practice (Wertsch, 1998).

This section has broadly outlined some properties of mediated action and presented an analytical framework to explore the mediational processes within the learning and practice of rainwater harvesting and food gardening of rural women in the Eastern Cape. The use of this analytical framework is presented in Chapter Nine. What follows is a discussion of what is often referred to as the post-Vygotskian project where situated learning (Section 1.6.1.1.) and activity theories emerged in order to account for the lack of theorising about the relationship between cognition and context. Cultural Historical Activity Theory (CHAT) is one of the foremost theories incorporating a socio-cultural historical perspective of human activity. It accounts for the social, cultural, historical and material by looking at the various socio-culturally, historically embedded artefacts or tools (both material and psychological) that mediate human activity. The following sections introduce CHAT as the primary theoretical framework of this study.

3.8 Cultural Historical Activity Theory (CHAT)

3.8.1 A general introduction

This study pays particular attention to the dialectics between knowledge, thinking, culture and practice. Forming the epistemological backbone of this study is post-Vygotskian Cultural Historical Activity Theory (CHAT) which provides an expanded framework (from the original Vygotskian work discussed above) and also highlight the socio-material interactions between artefacts, system objects and patterns, individuals and the histories of these dynamics. As a term, CHAT was coined by Cole in 1996 but has emerged from a long dialogue and tradition beginning with Lev Vygotsky's work and collaborations with Vasily Leont'ev and Alexander Luria (Roth & Lee, 2007; Fenwick et al., 2011). Sections 3.8.2-3.8.4 describe in more detail the influence of the Vygotsky-Leont'ev-Luria School on CHAT but it is first necessary to provide a general overview of CHAT's key features and of the theory's contemporary application across different fields of research.

CHAT is informed by the classic German philosophies of Kant and Hegel and Engels' dialectics. The notion of dialectic is based on the understanding that social change occurs when contradictory forces clash to create a new synthesis (Macey, 2000; Johnson, 1995; Abercrombie, Hill & Turner, 1988). Individual development therefore cannot be separated from the social situation in which individuals exist (Engeström, 2001; Edwards, 2011: 2). CHAT is also informed by Karl Marx's transhistorical concept of labour (or activity). This concept states that the simple elements of the labour processes are:

- (i) purposeful activity, that is work itself;
- (ii) the object on which that work is performed; and
- (iii) the instruments of that work. (Marx, as cited in Daniels, 2008)

Within CHAT human activity is the foundation of human development (Stetsenko & Arievitch, 2010: 237). Human nature and development are thus understood as being rooted in the collaborative social practices of people which are aimed at transforming their world. These practices are defined as "human goal-directed, purposeful, collaborative activities" (Stetsenko & Arievitch, 2010: 231). The core ontological premise that people learn by doing is "a theoretical locus where theories on the effects of culture, social interactions, embodiment, and context already converge" (Stetsenko, 2008: 480).

The hallmark of CHAT is its ethical/ideological commitment to social change and the historical materialist commitment to study phenomena in their historical context as they unfold (Stetsenko, 2008). The origins of activity theory (including CHAT) lie in Vygotsky's (1978, 1986) framework for analysing relationships between human actions and cultural artefacts in order to dispense with the individual/social dualism and create a Marxist social psychology. It seeks to understand human development, the way we act, the motives for acting and the problems within the way that we act in order to bring about social change. Explaining the origins of the emancipatory project of CHAT, Shotter (in Edwards, 2005a: 2) explained, "Vygotsky is concerned to study how people, through the use of their own social activities, by changing their own conditions of existence, can change themselves".

CHAT is based on two major assumptions central to human development: (a) socio-cultural contexts and (b) cultural mediation. Stetsenko and Arieivitch (2010) identified five major premises of CHAT. The first is that CHAT overcame the Cartesian split between the subject (living organism as agent) and the object (world) which characterised schools of thought in psychology that saw the world composed of separate, discrete entities. Thus the evolving dynamics of activity connect the properties of individuals and the properties of the environment in a constantly unfolding, dynamic interrelation (Stetsenko & Arieivitch, 2010). Related to this is the second premise of CHAT which argues that the human mind and its development "are fully and profoundly embedded (or situated) within the environment, yet are not directly and immediately determined by its effects" (Stetsenko & Arieivitch, 2010: 237). From a CHAT perspective then, the mind is socio-cultural and historical not only because it is situated in a socio-cultural world but because it is produced from within and driven by the logic of evolving activity between the world, individuals and other people. Thirdly, the mind is understood as a form of relation in and of itself. It therefore does not need to be related by a mechanism or process to the environment because it *is* a relation to the world (Stetsenko & Arieivitch, 2010).

The fourth, and probably least understood, premise of CHAT is that both culture and nature influence development on the one hand, and on the other, activity develops according to its own regularities and dynamics (Stetsenko & Arieivitch, 2010). Activity is therefore understood as a unique level of reality that is beyond the distinction of culture versus nature. Activity is thus an organism-in-activity and not an agent acting separately from interactions with the world. Although activity might initially be influenced by nature and culture, it

eventually evolves into a complex reality with its own logic and internal dynamics, which shapes development. Finally, the mind and other psychological processes are understood as being realised as *bodily* processes, enacted in and through activities. These activities take place under ever-changing conditions and in view of ever-changing goals as opposed to mysterious mental processes emanating from some ‘internal depths’ and not having much practical relevance to everyday life (Stetsenko & Arievitch, 2010: 239). This last premise reflects CHAT’s commitment to a holistic, dynamic and embodied concept of mind. Today CHAT is being used in fields such as communication studies, education, human-computer interaction, literacy and organisational studies (Stetsenko & Arievitch, 2010). In southern Africa it is also being used in the field of environmental education research (Mukute, 2010; Masara, 2011; Lindley, 2014).

Referring to research around natural resource management, Pahl-Wostl et al. (2008a) argued that in order to explore the interplay between culture and structure and the consequential mechanisms on social learning in specific settings, a context-sensitive approach is required. The significance of CHAT for this study is that it has the potential to bridge the gap between lived experience at the micro level and structural realities at the macro level (Engeström, 2000). It provides a way of understanding historically specific local practices, their objects, mediating artefacts, and social organisation that develops and influences qualitative changes in human practices (Foot, 2001). In this study, with its emphasis on mediation, CHAT provides the theoretical tools for exploring the intersection between human action (behaviour), human thinking (consciousness) and the socio-cultural factors (social and cultural structures) surrounding water and food security practices.

CHAT can be seen as having evolved through three generations of research. The following three subsections discuss the progression of this theory from the first through the third generations. Although this study only employed first and second generation CHAT, it is important to discuss all three generations in order to understand the progression of this theoretical perspective.

3.8.2 First generation CHAT

CHAT evolved out of three generations of research beginning with Vygotsky’s interest in the mediating processes within learning in the 1920s and 30s (Daniels, 2005). A detailed discussion of mediation has already been provided above but what is important to note is the

central role it had in establishing the first generation of CHAT and stands as the origins of a long line of collaboration between Vygotsky and his colleagues in developing CHAT. Vygotsky's famous mediational triangle is used to represent first generation CHAT (refer back to Figure 3.1B). As discussed above (Section 3.2), Vygotsky's (1978) model of mediated action consists of the 'subject' acting via mediational means, the 'mediating tools' and the 'object' (Engeström, 2001). Dialectical mediation plays an essential role in CHAT because it provides the link "between the concrete actions carried out by individuals and groups, on one hand, and the cultural, institutional, and historical settings, on the other" (Wertsch, Del Rio & Alvarez, 1995). One of the limitations to Vygotsky's theory of mediation was that the unit of analysis was still the individual and this limited the application of this theory to the collective (Engeström, 2001). This limitation was overcome by Leont'ev with the introduction of second generation CHAT (Engeström, 1987; Engeström, 2001; Edwards, 2005a; Stetsenko & Arievitch, 2010).

3.8.3 Second generation CHAT

In the 1970s Leont'ev extended Vygotsky's theory of mediation into the socio-cultural realm by making explicit the difference between individual action and collective activity (Engeström, 2001: 133). Vygotsky was more focused on semiotic mediation whereas Leont'ev located mediation in everyday life by focusing on activity. Leont'ev thus shifted the focus from mediation tools to the object in the triad and argued that activities are motivated by their object, which reveals the object-oriented nature of learning and doing (Mukute, 2010). Leont'ev (in Fenwick et al., 2011: 65) asserted that activity is "the minimal meaningful context for understanding individual actions" and defined it as:

... a system set within a system of social relations ... The activity of individual people thus depends on their social position, the conditions that fall to their lot, and an accumulation of idiosyncratic, individual factors. Human activity is not a relation between a person and a society that confronts him ... a person does not simply find external conditions to which he must adapt his activity, but, rather, these very social conditions bear within themselves the motives and goals of his activity, its means and modes.

Action on the other hand is "conducted by an individual or group to fulfil some self-consciously held goal" and refers to intentionality or "what people explicitly understand themselves to be doing" (Fenwick et al., 2011: 66). Leont'ev never graphically depicted his conceptualisation of second generation CHAT so Ritva Engeström (1987) worked from Leont'ev's theory and developed the graphic representation of a second generation human

activity system which focuses on the relations between object-oriented activity, the agents and the community to which they belong (see Figure 3.3 below).

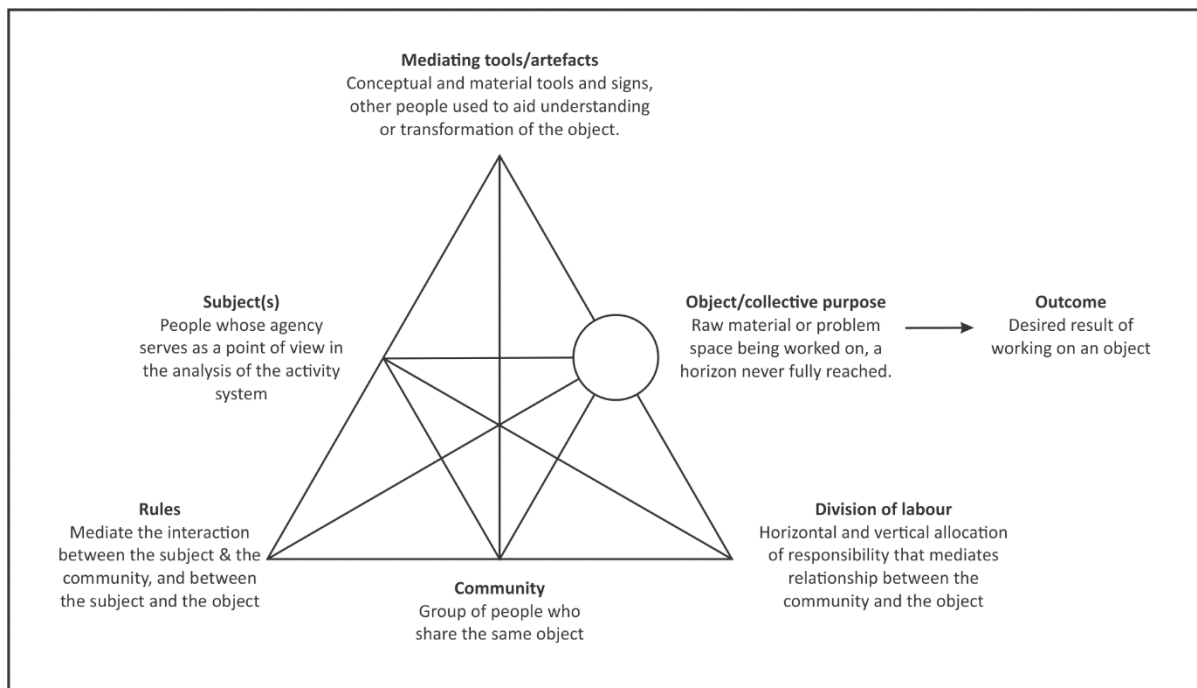


Figure 3.3: Second generation mediational triangle of a cultural and historically constituted human activity system (Adapted from Engeström, 2001)

The top triangle of this activity system is identical to Vygotsky’s mediation triangle; Engeström (in Yamagata-Lynch, 2003) however added the socio-historical aspects of mediation that were omitted by Vygotsky: the rules, community and division of labour. Engeström’s (1987) second generation model is an extension of Vygotsky’s triangle of mediations and can be read as depicting the elements of the social relations that mediate commodity-determined, contradiction-ridden activity. In their analysis of Engeström’s model, Blackler, Crump & McDonald (2000) suggested that (a) the relations between individuals and the object of their activity are mediated by explicit and/or implicit concepts and technologies, (b) the relationships between the community and the overall object of its activity are mediated by its division of labour, and (c) the relations between individuals and the communities, of which they are part, are mediated by rules and procedures, which can also be explicit or implicit. Daniels (2001) noted that the importance of second generation CHAT is that it brings interrelations between individuals and their community into focus.

3.8.3.1 Elements of the activity system

As shown in Figure 3.3 above, an activity system comprises a group of people pursuing a goal in a purposeful way (Peal & Wilson, 2001). There are seven main elements comprising a second generation activity system: the object, subject, rules, tools, community, division of labour and outcome. The ‘object’ is a central organising principle in activity theory and is the physical thing, idea or problem space being worked on by the subjects (Engeström, 2001). The ‘subject(s)’ is/are the individual or group involved working on the object in the activity. It is their agency that is chosen as a point of view in the analysis of the activity system (Edwards, 2007). The subject’s relation with the object is mediated by four elements: rules, tools, community and division of labour, all of which carry cultural meaning and historical development. The ‘rules’ of an activity system refer to formal and informal regulations that either constrain or enable the activity. These rules also provide guidance to the subject(s) as to what is correct procedure and acceptable interactions in relation to community members (Yamagata-Lynch, 2003). The ‘tools’ are psychological or material cultural artefacts that are either introduced explicitly or are implicit in the activity system which either enable or constrain the activity system (Wertsch, 2007). The ‘community’ is the social group to which the subject identifies being a member of while engaging in the activity (Yamagata-Lynch, 2003). The ‘division of labour’ refers to how the work or tasks are shared among the community (Yamagata-Lynch, 2003). When the object of an activity system is achieved, this leads to an ‘outcome(s)’. A correlation between the elements in second generation CHAT and the elements of Burke’s pentad (Section 3.7.1) can be seen: Subject (Agent), Mediating tools (Agency), Object (Purpose), Central activity (Scene).

Whereas with first generation CHAT, the object of analysis is the individual, in the second generation the complex interrelations of the subject and his or her community are the unit of analysis (Engeström, 2001). Models of activity systems are meant to be descriptive and not prescriptive (Yamagata-Lynch, 2003). For this study first and second generation activity theory was used to describe the activities of rainwater harvesters and food gardeners as well as explore the mediation processes within their activities. In the context of rainwater harvesting and food gardening activity systems the elements/components of second generation CHAT can be described as shown by Table 3.3 below:

Table 3.3: Elements of second generation activity system within rainwater harvesting and food gardening activity systems (Adapted from Engeström, 1999b; Yamagata-Lynch, 2003; Peal & Wilson, 2001; Wells, 2002; Puonti, 2004; Edwards, 2007; Mukute, 2012)

Element of activity system	Function/relationship with other components
Subject(s)	Individual or group involved in the activity. It is their agency that is chosen as a point of view in the analysis of the activity system. <i>Individual or collective rainwater harvesters and food gardeners</i>
Object	Physical thing, idea or problem space being worked on (motive of activity including understanding of events, concept, principles, relationships etc.). The 'object' is a central organising principle in activity theory. <i>Harvesting water and growing vegetables for increased food and water security is the object for individual and collective rainwater harvesters and food gardeners.</i>
Outcome	Desired result of working on an object. <i>The result of an object in case of rainwater harvesting and food gardening might be having vegetables for household use or harvesting enough water to water a food garden and water domestic animals.</i>
Tools	Conceptual and material, symbolic, external and internal artefacts for understanding or transforming the object. Tools are embedded with the culture, history, skill knowledge, narratives, descriptions and explanations of the subjects. They are not conveniently handed to subjects, but are invented, purchased, discarded, and replaced in an activity system and can even be sources of disruptions. <i>Conceptual tools such as language, books, permaculture methods, and physical tools such as rainwater tanks, gutters, seeds and spades.</i>
Community	Group of people who share the same object; the social group that the subject identifies being a member of while participating in the activity. <i>These are collectives or individuals such as NGOs, government departments such as DWA, neighbours interested in the social well-being of rainwater harvesters and family members involved in the activity as well.</i>
Rules	Explicit and implicit regulations, norms and conventions that constrain or liberate actions and interactions within an activity system. They provide guidance to the subjects of what the correct procedures and acceptable interactions to take with other community members are. These rules play both explicit and implicit roles in the activity systems. <i>Collective rules or individual rules; these include government legislations such as water acts and policies, donor agency rules and cultural rules and taboos.</i>
Division of labour	How the tasks are shared among the community. Horizontal and vertical allocation of responsibilities which mediates relationship between the community and the object. <i>Labour is distributed between collectives or between individuals within an activity system such as cleaning the tanks, planting the seeds, watering the gardens, selling the vegetables.</i>

Mwanza's (2002: 86) eight-step model incorporated open-ended questions which can be used to interpret the various components of the activity system further:

Activity System	Component question to ask
Activity	What sort of activity am I interested in?
Objective	Why is this activity taking place?
Subjects	Who is involved in carrying out this activity?
Tools	By what means are the subjects carrying out this activity?
Rules and regulations	Any cultural norms, rules and regulations governing the performance of this activity?
Division of labour	Who is responsible for what, when carrying out this activity and how are the roles organised?
Community	What is the environment in which activity is carried out?
Outcome	What is the desired outcome from this activity?

Figure 3.4 below shows the application of activity theory (second generation) to this research. The object of study is the learning and practice of rainwater harvesting and food gardening by rural women. Applying second generation CHAT enabled me to critically look at each element of the activity system with respect to the learning and practice of rainwater harvesting and food gardening. To do this, I identified each component by posing questions as shown in Figure 3.4 that follows.

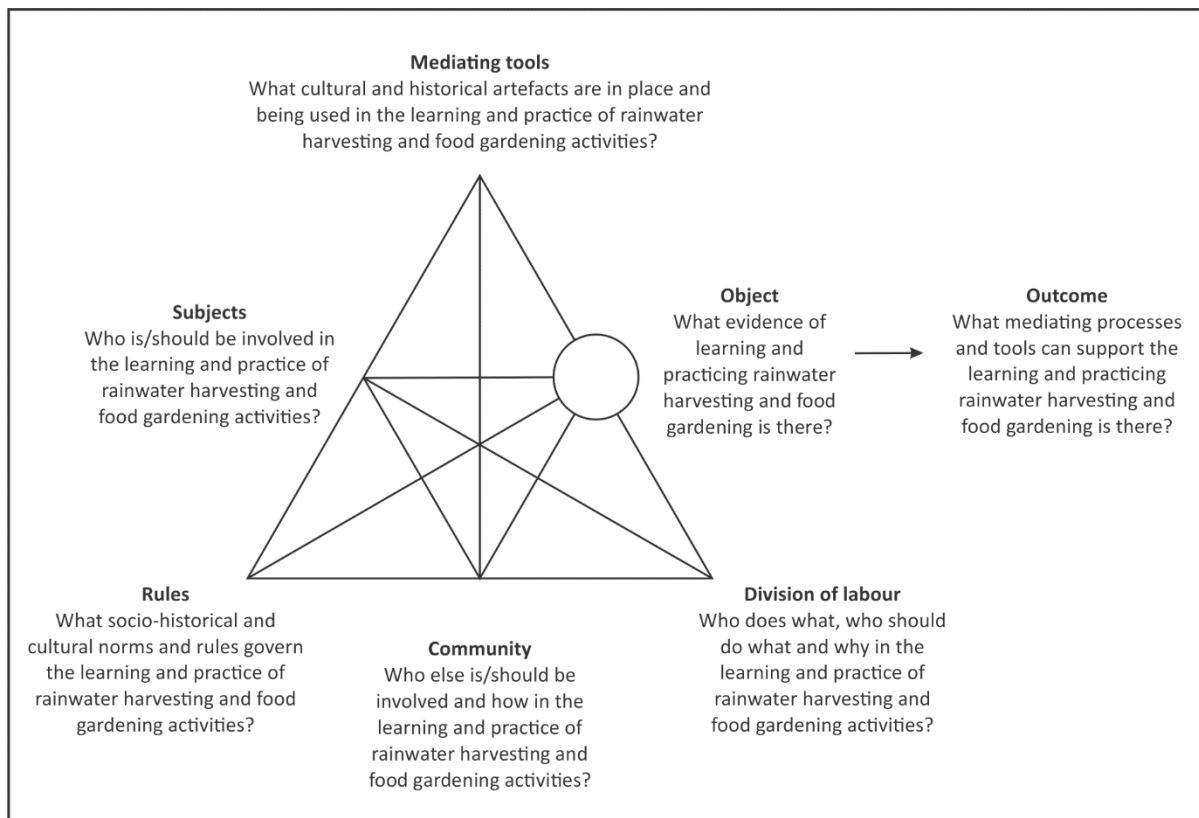


Figure 3.4: Application of activity system to the rainwater harvesting and food gardening activity system (Adapted from Engeström, 1987, 1999; Blackler et al., 2000)

Second generation CHAT helped me understand the relationship between the different elements of the central activity system and the mediation that occurred within. The questions raised for each element supported an abductive analysis of the activity system, as further discussed in Section 4.6 and presented in Chapters Five, Six and Seven.

In the 1990s second generation CHAT was critiqued for not being able to account for cultural diversity. Third generation CHAT was thus developed in order to explain dialogue, multiple perspectives and networks of interacting activity systems (Engeström, 2001).

3.8.4 Third generation CHAT

Third generation CHAT was also developed by Ritva Engeström and others in the 1990s where the concept of multiple, interacting activity systems was introduced (Engeström, 2001). Third generation CHAT is thus usually represented with two interacting activity systems as the minimal model (see Figure 3.5 below).

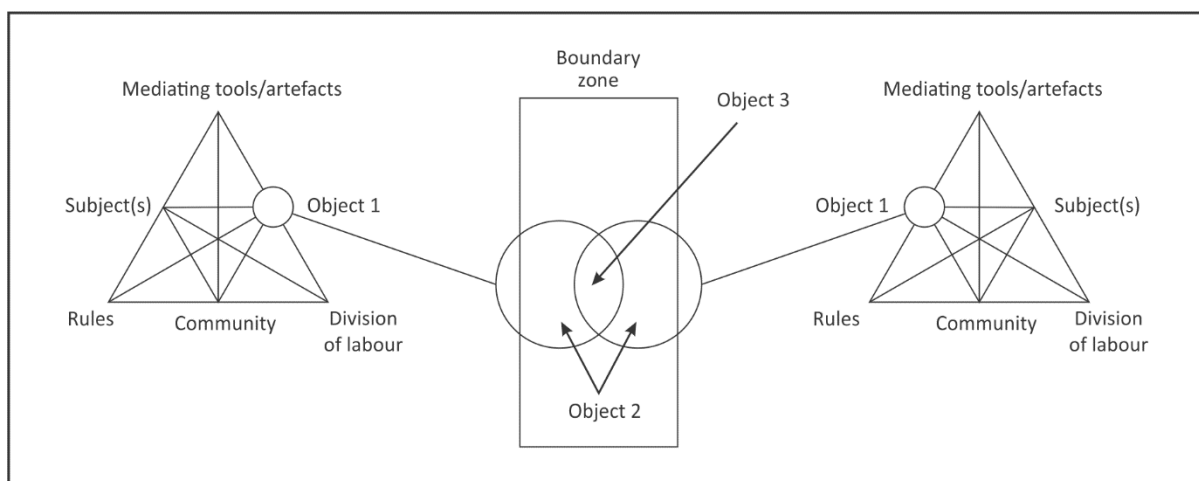


Figure 3.5: Two interacting activity systems as minimal model for the third generation of activity theory (Engeström, 2001: 136)

The oval representations of the object are used to indicate that object-orientated actions are moving targets, “characterised by ambiguity, surprise, interpretation, sense-making, and potential for change” (Engeström, 2001: 134). In the above model, the object (Object 1) moves from an initial state of unreflected, situationally given ‘raw material’ to a collectively meaningful object (Object 2) constructed by the activity system and to a potentially shared or jointly constructed object (Object 3) (Engeström, 2001). Third generation CHAT emphasises the conflictual nature of social practice (Warmington, Daniels, Edwards, Brown, Leadbetter 94

& Martin , 2005). Instability and contradictions are regarded as the force that drives change and development within society through an expansive learning cycle (Engeström, 1999a, 2001) (see Section 3.8.5 below). The transitions and reorganisations within and between activity systems are part of this evolution (Warmington et al., 2005).

Although this study does not make use of third generation CHAT as an analytical tool, it does help to represent and understand the central activity system of rainwater harvesting and food gardening practices and the interacting or neighbouring activity systems such as government trainers, NGOs or funding agents.

3.8.5 Five guiding principles of CHAT

As it currently exists and from the discussion above, CHAT can be summarised into five main principles.

- The first is that the primary unit of analysis is a collective, artefact-mediated and object-oriented activity system (Engeström, 2001). Individual and group actions are seen as relatively subordinate units of analysis, only understandable within the context of an activity system.
- The second principle argues that activity systems are multi-voiced in that they are made up of a community of multiple points of views, traditions and interests. These different points of views and voices are a source of trouble but also innovation, requiring translation and negotiation (Engeström, 2001).
- The third principle is that activity systems are shaped over time. Thus their inherent problems and the potential for change can only be understood against their history. When studying the history of an activity system, one must look at the local history of the activity system as well as the theoretical ideas and tools that have shaped the system. In the case with rainwater harvesting activity systems for example, one would consider the local history that brought about the system as well as the theories that shaped the activity system such as those of rainwater harvesting, water security and rural development at a national and global scale (the historicity of each case study site is presented in Chapters Five and Six).
- The fourth principle is the central role that contradictions play as a source of change and development within activity systems because agents respond to the disturbances caused by these contradictions (Engeström, 2001: 137). Contradictions are not the

same as problems or conflicts but are “historically accumulating structural tensions within and between activity systems” (Engeström, 2001: 137). Four types of contradictions are identified by Engeström (1987):

- *Primary* – occurring within elements of an activity system such as within the community or the rules;
- *Secondary* – taking place between elements of an activity system such as between the rules and the tools of an activity system;
- *Tertiary* – arising when the object of the central activity system clashes with that of a historically more advanced activity system (this usually happens when the more advanced system introduces a new object); and
- *Quaternary* – which occur between the central activity system and its neighbouring activity systems. (Engeström, 1987)

Although he does not work explicitly with CHAT, the concept of tensions and contradictions is similar to Wals’ (2007) concept of working with ‘dissonance’ and de-framing in order to bring about social change (Section 2.4.4-6).

- The fifth principle of CHAT argues that expansive transformations in activity systems are possible. The principle of expansive learning argues that as the contradictions within an activity system are aggravated, some individuals within the system might question the system and deviate from the norms. In some cases, there is the potential for this questioning to lead to a deliberate collective effort to bring about change within the system. Expansive transformation is achieved when the object and motive of the activity are redefined to include wider horizons of possibilities than the previous system (Engeström, 1987). Learning within a CHAT perspective is seen to occur in two ways: through internalisation and externalisation (Engeström, 1999a). Externalisation occurs when an individual or a group of people creates new knowledge or solutions. Internalisation takes place when an individual makes sense of available cultural capital in his/her social relations thinking and actions. Learning that includes both internalisation and externalisation is called *expansive learning* (Engeström, 1999a). Expansive learning thus involves new knowledge and new practices for an activity. The methodological tool used in this case is referred to as Change Laboratory Workshops (Engeström, 2000). Ala-Laurinaho and Koli (2007: 28) explained that “the spirit of the Change [Laboratory] Workshop is to enhance the

building of shared views of the changing object and activity system, in order to develop new practices, tools and models”.

As is discussed above (Section 3.8.4) this study did not enter into the expansive learning phase of CHAT however. I use third generation CHAT merely to describe the interconnections between different activity systems and did not proceed to the expansive learning phase of CHAT as the orientation of this project was not action research or interventionist. Rather, first and second generation CHAT proved adequate explanatory tools to investigate in depth the mediating processes within the learning and practice of rainwater harvesting and food gardening.

3.8.6 Application of CHAT in this study

Earlier in this chapter (Section 3.8) it was stated that CHAT would provide the backbone of the theoretical framework for this study. This subsection summarises CHAT’s application for this study.

CHAT sets out four central guiding questions or sub-questions to be answered similar to those outlined by Mwanza (2002). These questions are: 1) *Who* are the subjects of learning? (how are they defined and located?); 2) *Why* are the subjects learning? (what motivates them?); 3) *What* are the subjects learning? (what are the contents and outcomes of learning?); and 4) *How* do the subjects learn? (what are the key processes of learning?). When focused specifically on exploring the mediating processes surrounding rainwater harvesting and food gardening practices, the above questions could be adapted to *who* is mediating (NGO workers, extension officers, Water Affairs officials, teachers, ordinary community members, others who may be interpreting and explaining scientific information to communities), *what* is mediating (educational or training tools used such as knowledge resources, learning materials, schemas, scripts, representations of scientific information, media and media formats and environmental policies), and *how* mediation is taking place. First generation CHAT therefore offers a structure in which to understand and analyse mediation processes while second generation CHAT extends this analysis into the broader socio-cultural context. CHAT also provides a way in which to account for the multiple voices (Roth & Lee, 2007) present in rainwater harvesting and food gardening activity systems: the economic, social and ecological values and interests. CHAT provides mechanisms for dealing with dialectics to achieve learning and knowledge generation. As mentioned above this study

works with third generation CHAT as an exploratory framework only and due to the nature of the research focus (which is concerned with investigating the mediating processes within learning and practice), it does not pursue the transformative potential of CHAT as provided for in Engeström's (1987, 1999a, 2001) theory of expansive learning nor methodological developments using change laboratory workshops (Engeström, 2007; Mukute, 2010). This does not deny the study's transformative potential, however, because in order to find new and better ways of carrying out practices in change-oriented workplace learning settings an understanding of what mediates practice and the learning thereof is first required. Using CHAT has thus enabled me to:

- a. Illuminate the learning taking place in communities that are promoting and practising rainwater harvesting and food gardening methods;
- b. Look into how rainwater harvesting and food gardening practices have emerged and the way they have been learned and developed, that is, historicising and retrospective learning;
- c. Establish how rural women are currently learning rainwater harvesting and food gardening, that is, contemporary learning; and
- d. Identify and analyse current limitations occurring in the immediate and wider contexts of rainwater harvesting and food gardening practices.

Within a CHAT theoretical perspective, individuals and their environment are thus understood through the activities that they practise. These practices and thus the development of the mind are situated in a specific socio-cultural and historical context which offers agency to the individual (Stetsenko & Arieviditch, 2010: 237). This theoretical perspective informed my conceptual, methodological, explanatory and analytical tools in Phase 1 and 2 of this research project (Chapter Three). Second generation CHAT thus provides the tools to understand the dialectical relationship between the different elements in a central activity system and the mediational processes that take place between these elements.

3.8.7 Critiques of CHAT

In line with the 'three generational model' of CHAT discussed above, Fenwick (2011) drew attention to two main critiques of framing the development of the tradition as such. The first is that this generational model encourages a reading of first, second and third generation scholars in isolation from each other when in fact Vygotsky, Leont'ev and Luria's works were highly co-dependent and dialogical (Fenwick et al, 2011). Along similar lines, the

second critique of presenting the CHAT tradition as a successive trajectory is that it is assumed that the latest generation (third generation CHAT) was built successfully on the past and can stand in for the tradition as a whole. When critics fail to view CHAT as an ongoing contested tradition, co-dependent and dialogical, then third generation scholars become attractive targets for criticism of the tradition as a whole.

How the historical development of CHAT is read thus has implications for other criticisms levelled at it. Garrison (in Fenwick et al., 2011), for example, argued that contemporary CHAT offers an overly structuralist analysis where the use of triangle diagrams are left to stand in for the complexity inherent in activity systems. Peim (2009) argued that a radical localism in CHAT avoids broader structural effects within society. Still others argued that CHAT analysis offers little explanatory value. Fenwick et al. (2011) argued that the above criticisms are almost exclusively levelled at third generation CHAT and that an alternative formulation of CHAT's lineage and development may have an important role to play in debates around CHAT.

CHAT has also been conceptualised broadly as either being canonical or non-canonical (Fenwick et al., 2011). Canonical traditions of CHAT refer to more westernised understandings of Vygotsky and adopt less radical concerns for broader forms of social transformation. Non-canonical CHAT on the other hand focuses on far-reaching, often politicised dimensions of activity. One of the primary critiques levelled against CHAT where it has been understood as more canonical, is that it is viewed by some as being silent on issues of power and adopting managerialist ethics of improvement. Niewolny and Wilson (2009), for example, argued that literature around CHAT is generally silent on issues of power and that little attention is given to how power, "either realized or implicit, that frame how adult educators plan and shape learning opportunities and more particularly, how social positioning and ideological-discursive practices facilitate the participation of some individuals to the exclusion of others" (Niewolny & Wilson, 2009: 4). They cited Fenwick (2000) who argued that "to understand human cognition, we must, from a critical cultural perspective, analyse the structures of dominance that express the social relationships and competing forms of communication and cultural practices within that system" (Niewolny & Wilson, 2009: 4). Daniels (2012: 381) also highlighted this lack of attention to complex power relations in CHAT and suggests that there is need to:

analyse and codify the mediational structures as they deflect and direct attention of participants. In this sense I am advocating the development of cultural-historical analysis of the invisible or implicit mediational properties of institutional structures that themselves are transformed through the actions of those whose interactions are influenced by them.

In response to this, this study adopts critical realism as an underlabourer to CHAT in order to make explicit the implicit structural mechanisms that mediate activities which are addressed in more detail in Section 3.9 below.

Along similar lines, Langemeyer and Roth (2006) argued that contemporary forms of CHAT neglect certain aspects of dialectical thinking which narrows the theory and its potential to a socio-critical approach to societal practice and human development. Daniels and Warmington (2007) argued that there is also need to theorise subject-subject and within subject relations in activity theory as it lacks a theoretical account of social relations and positioning. A focus on the subject is important because the way in which subjects are positioned with respect to one another within an activity has implications for how they engage with tools and objects and even the way in which rules, community and the division of labour regulate the actions of individuals and groups (Daniels & Warmington, 2007).

In light of these critiques, Roth and Lee (2007: 218) reminded us that “CHAT cannot be viewed as a master theory or quick fix, for true to its origins, it is subject to inner contradictions which compel researchers to update, transform, and renew constantly”. In order to explore in more detail the structures and mechanisms that drive the mediational processes within rainwater harvesting and food gardening practices, especially with regard to issues of power and authority, relationalism, critical realism and social realism were used as ‘underlabourers’ or supporting philosophical frameworks to CHAT and are introduced in the following sections.

3.9 Critical realism and social realism as philosophical underlabourers

Chapter One and Chapter Three have introduced and discussed the three main theoretical approaches employed for this study: social learning theory, the theory of mediation and CHAT respectively. In this section I introduce relationalism, critical realism and social realism as ‘underlabourers’ to these theories and explain the ontological and epistemological implications of a critical realist metatheory. Using critical realism and social realism as underlabourers allowed for ontological depth and explanatory critique of the learning

conditions and mechanisms that shape the learning and practice of rainwater harvesting and food gardening. In her social realist theory Archer (1995: 2) highlighted the importance of attending to ontological concerns within social science research when she argued that “what society is held to be ... affects how it is studied”. Before introducing critical realism and social realism and their main characteristics, I first situate the study within a relational ontological perspective.

3.9.1 A relational ontology

This study is positioned within a broad relational philosophy which argues that “all things are ontologically related to their context and can qualitatively change as their contexts change” (Slife, 2004: 159). A relational ontology stands in opposition to a process ontology, spoken to earlier in Section 3.6, and is explained further below (Section 3.9.2). Emirbayer (1997: 282) argued that:

The key question confronting sociologists in the present day is not ‘the material versus the ideal’, ‘structure versus agency’, ‘individual versus society’ or any other dualisms so often noted; rather, it is the choice between substantialism and relationalism.

Substantialism or abstractionism views the world as made of separate and distinct parts that are closed, self-sufficient, given, fixed and capable of some degree of interaction but does not change them (Emirbayer, 1997). All things in the world are thus independent of or abstracted from context. Relationalism, on the other hand, views the world as made of parts that are connected, related to one another, open and dynamic and capable of influencing each other in ways that result in transactions (Emirbayer, 1997). For relationalists, the dynamic processes that occur within these transactions are the primary unit of analysis and not the units that constitute the transactions, as they would be for substantialists (Emirbayer, 1997). Buber (in Bradbury & Bergmann Lichtenstein, 2000) called these transactions the ‘spaces between’ and it is from these that real meaning and interaction arise (Olvitt, 2012).

The implication of a relational ontology for a study such as this is that the object of study is acknowledged as moving and dynamic, as located in particular social, historical, ecological and economic contexts which it influences and is influenced by (as discussed in Section 2.1-2.4). Somers and Gibson (in Emirbayer, 1997: 288) argued that a relational ontology “embeds the actor within relationships and stories that shift over time and space and thus precludes categorical stability in action”. This study focuses on the mediational processes that shape

learning, making it important to examine the interplay of practices, structures and mechanisms *across time and place* and to replace methodological individualism with accounts of socially-embedded transactions. Methodological individualism holds that social phenomenon can only be understood by exploring the actions and motivations of individuals. Popper (1945: 98) described methodological individualism as the doctrine that “... all social phenomena, and especially the functioning of all social institutions, should always be understood as resulting from the decisions, actions, attitudes, etc., of human individuals”. Standing in opposition to methodological individualism is methodological holism which argues that society constrains and enables individual action (Agassi, 1960). As described in Section 3.8, CHAT provides a theoretical and analytical framework to respond to this concern as the notion of an activity system and especially one that interacts with others reflects this relational ontology.

CHAT draws heavily on Marxist dialectical thinking which Emirbayer (1997: 290) recognised as fundamentally relationalist:

Marx, for instance ... was profoundly a relational thinker; this is clear from his early analyses of alienation (Ollman, 1971), his discussion of commodity fetishism, his keen insights into the internal relations among production, distribution, exchange, and consumption and indeed, his understanding of capital/wage-labour relation itself.

Relationalism also resonates with Archer’s (2000; 2003) concepts of structure and agency where the individual as an agent acts in relation to the social world. Archer (in Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013: 51) defined agency as an “intentional and goal directed process, one which has relational autonomy in the subjects exercise of the self”. Archer (2003) made a very clear analytical separation however between individual action and the social context. She argued that a person and society have their own special properties and powers and should therefore be understood as analytically separate in order to acknowledge the real emergent powers of people and the foundation of human agency. Similar to Archer (2000, 2003), Vygotsky’s subject-oriented approach saw individuals as agentic actors in relation to the social world where the social and individual are analytically separate but are also closely interdependent and mutually constitutive (Eteläpelto et al., 2013). Individuals are active agents in their own development but do not act in settings entirely of their own choosing, therefore they are constrained and enabled by their settings (Daniels, 2001).

For social realists reflexivity is what mediates structure and agency. Reflexivity is the exercise of deliberating about ourselves in relation to our circumstances in order to plan a future action. For a social realist such as Archer (2003: 9) reflexivity (properties and powers) “is the most important of personal emergent properties” and is required for the development and emergence of a continuous sense of self. She asserted that reflexivity allows humans to “diagnose their situations ... identify their own interests and ... design projects they deem appropriate to attaining their ends” (Archer, 2003: 9). Human reflexivity is central to the process of mediation and is explained in Archer’s concept of the internal conversation whereby “agents reflexively deliberate upon the social circumstances that they confront” (2003: 15).

The primary philosophical and ontological foundations of this study together with a relational ontology, is critical realism (which is also a relational theory) as put forward by Roy Bhaskar (1998) and the sociological dimension of critical realism, social realism, as put forward by Margaret Archer (2000; 2003) in response to Bhaskar.

3.9.2 Critical realism as underlabourer

As mentioned before critical realism is a philosophical framework that allows for in-depth explanatory critique in that it goes beyond empirical experience and enables a researcher to uncover causal mechanisms (also termed generative mechanisms) that shape and structure social phenomena such as learning through emergence. Coupled with the empirical possibilities of CHAT, critical realism thus provides insight into how structures and mechanisms enable and constrain learning. Below I introduce critical realism from the point of view of how it responds to two ontological propositions within the socio-cultural historical traditions.

As discussed earlier with regard to the socio-cultural historical and socio-material perspectives on development and learning (Section 3.1), although the basic premise of the socio-cultural tradition pulls different theoretical stances together (socio-cultural learning theory, social learning theory, activity theory, cultural-historical activity theory, situated learning and cognition, and context-based learning theory), there are often methodological and ontological differences within these traditions (Daniels, 2008). Two of the primary markers of difference are the notions of ‘process ontology’ and ‘inseparability’. Process ontology (Section 3.6) argues that only processes are real and that structures, patterns and

entities do not really exist. Thus processes are not only guiding orientations but constitute the fundamental nature of reality. Process ontology is problematic in that firstly, a methodological acknowledgment of individuals and groups as ‘things’ is incompatible with the study of situated practices (Daniels, 2008). Secondly, it is not possible to study socially situated practice without analytically distinguishing among individuals, thereby being able to study the relations between them. Lastly, process ontology is problematic in that it makes it difficult to theorise difference and cultural tension and conflict (Daniels, 2008).

In the inseparability thesis, no distinction is made between the individual and social so the researcher cannot distinguish what is internal to the individual and what is external context (Daniels, 2008). The implication of an ontological level of the inseparability thesis is that distinct entities do not really exist which is problematic because when no separation exists between social structures and human agency for example, it becomes difficult to analyse social stability, learning or change. In the sections that follow is a critical realist response to the notions of process ontology and inseparability as put forward by Bhaskar (1998) and Archer (2000).

3.9.2.1 Response to process ontology: Bhaskar’s Critical Realism

Critical realism is not a social theory but is rather a philosophy which functions as an ‘underlabourer’ in research, working together with complementary theories (Olvitt, 2012). For this particular study, the main theory and methodology of CHAT was used while critical realism was used to ‘underlabour’ CHAT in that it provides the tools in which to explain and describe the structures and generative mechanisms that cause events (Shipway, 2011). One of the main theorists of critical realism is Roy Bhaskar, first writing in the 1970s (Shipway, 2011). Bhaskar (1998) was an economist dissatisfied with the ability of economic theory to impact upon important issues such as widespread global poverty. Within critical realism he thus set out to highlight fundamental flaws in scientific enquiry and contest the positivist tradition of science (Olvitt, 2012). Critical realism seeks to understand the structures and mechanisms that generate and support events in the social world and supports the claim that it is only by understanding these that we can seek to change them (Bryman, 2008). For critical realists, knowledge is in the interest of emancipation, transformation and empowerment (Janse van Rensburg, 2001: 24). What makes critical realism *critical* then is the fact that it seeks to uncover the generative mechanisms that support the status quo and thus to change these (Bryman, 2008). One is able to understand then how the emancipatory impetus of

critical realism as an underlabourer compliments theories such as CHAT and change-oriented learning (Section 2.4.5) within the social learning stance of this study.

Intransitive and transitive dimensions of science and stratified reality

Two of the main tenets of critical realism, ‘intransitive and transitive dimensions of science’ and ‘stratified reality’ respond to the socio-cultural tradition of process ontology. The intransitive dimension of science argues that there is a reality that exists independent of our concepts or knowledge of it (Shipway, 2011). This dimension is made up of real things and structures which have their own powers and are causally efficacious (Shipway, 2011). It is not merely processes that are real therefore as a process ontology puts forward. With this understanding objects of scientific enquiry thus “operate prior to and independently of their discovery” (Archer, Bhaskar, Collier, Lawson, & Norrie, 1998: xii). The transitive dimension on the other hand “refers to our socially determined conceptions of reality – our epistemology” (Olvitt, 2012: 35). The theories and ideas that attempt to explain the structures and phenomena of the intransitive dimension are located in the transitive dimension.

The second major tenet of critical realism is that of stratified reality (Bhaskar, 2008). Bhaskar argued that the world consists of the domains of the ‘real’ (mechanisms), the ‘actual’ (events) and the ‘empirical’ (experiences). In the domain of the ‘real’ structures, mechanisms and relations exist which possess powers and tendencies or causal efficacy to either constrain or enable (Shipway, 2011). Archer (2003: 5), who drew on and responded to Bhaskar (2008), defined ‘constraints’ and ‘enablements’ as “the potential *causal powers* of structural emergent properties”. These generative mechanisms (with casual powers) instantiate actual events (and non-events) (Danermark, Ekström, Jakobsen & Karlsson, 2002). When an event takes place there are generative mechanisms causing this event; events do not happen by themselves. This supports Wertsch’s (1998) fifth claim of mediated action in that mediation both empowers and constrains action (see Section 3.7.1). However, structural or cultural conditions do not merely determine human action because in order for these to constrain or enable implies that they are standing in the way or aiding a subjective agent: “For anything to exert the power of a constraint or an enablement, it has to stand in a *relationship* such that it obstructs or aids the achievement of some specific agential enterprise” (Archer, 2003: 4) (the role of human agency is discussed further in Section 3.9.2.2).

In relation to this study these generative mechanisms could be poverty, power relations, language, discourses and values that influence the mediation of learning within rainwater harvesting practices. These events take place in the domain of the ‘actual’ (Shipway, 2011). The domain of the ‘empirical’ is where people experience events and act out their behaviour (Shipway, 2011). This stratified reality is usually represented by Mingers (2004) (Figure 3.6 below) as the ‘empirical’ (what we experience, observe or measure) embedded in the ‘actual’ domain (where events occur regardless of whether we experience them or not) and both of these domains nested within the domain of the ‘real’ (with its generative or causal mechanisms, tendencies or preconditions). Through this account of stratified reality one is able to understand that critical realism is inherently relational.

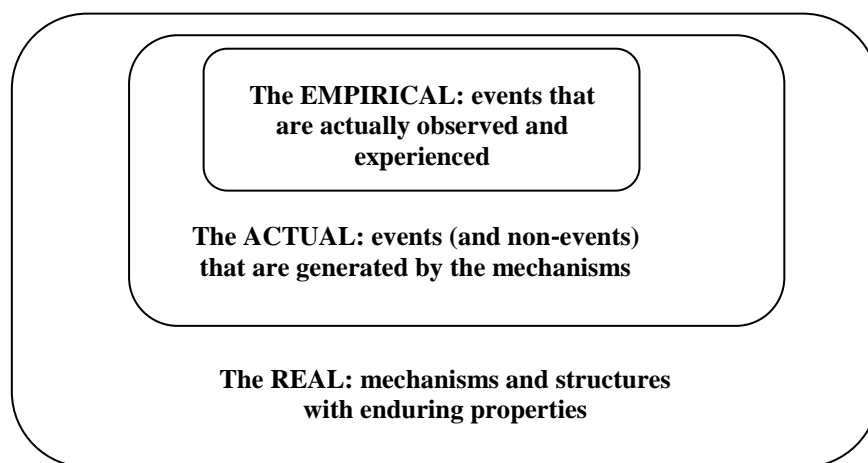


Figure 3.6: The three domains of reality (adapted from Mingers, 2004)

Stratified reality thus responds to process ontology in that it enables studying socially situated practices such as rainwater harvesting and food gardening because it analytically distinguishes between individual agency and social structures, thereby being able to study the relations between them as well as difference, cultural tension and conflict. Understanding reality as stratified means “... reality can go beyond the limited rationality of human individuals [and] shows how society can be modified by people, who hold a reservoir of potential abilities reflected in social relations through causal (agency) and structural powers” (Donati, 2011: 118).

Hierarchical stratification and emergence

Related to a stratified ontology is the claim of critical realism of hierarchical stratification and emergence. Hierarchical stratification argues that objects in the world are hierarchically stratified in that physical, chemical, biological, psychological and social strata, for instance, give rise to each other or are emergent from the other. Danermark et al. (2002: 60) defined emergence as the process “When the properties of underlying strata have been combined, qualitatively new objects have come into existence, each with its own specific structures, forces, powers and mechanisms”. Emergence occurs over time then as the powers, properties and mechanisms of one stratum of reality emerge from those below (Archer, 1995; Danermark et al., 2002). The importance of hierarchical stratification is not that we can isolate causal mechanisms ‘downwards’, explaining the mechanisms of one strata by being able to explain the mechanisms of a more basic strata (thus committing materialistic reductionism); rather through emergence we can understand the properties of new non-reducible properties and mechanisms that are added at each specific stratum. Significant to this study then with a focus on the temporal dimension with a CHAT perspective is that the development of rainwater harvesting and food gardening practices is a result of a process over time of the different properties and mechanisms of different strata of reality (from the ecological to the political such as droughts or floods, access to local and national markets in order to sell food products, oppressive civil laws as was found during the apartheid era and the ongoing activities of NGOs that seek to respond to poverty and unemployment in rural areas) combining to give rise to these practices as they exist in the present (Chapters Five and Six). In line with an emergent approach to reality, Archer et al. (1998: 371) noted that the actions of previous generations (e.g. the influence of apartheid policies) can have more impact than the living:

The actors here present are not responsible for creating the distributions, roles and associated interests within which they live. Equally important is the crucial recognition that the pre-structuring of actors’ contexts and interests is what shapes the pressures for transformation by some and for stable reproduction by others, in the present.

Important to note here is that we cannot predict which mechanisms will emerge from different strata or with what effect. Danermark et al. (2002: 62) explained:

... one cannot predict anything regarding the influence of different mechanisms. Concrete phenomena are complexly composed of powers and mechanisms, which affect, reinforce, weaken and sometimes neutralize the effects of one another. The question of which mechanisms are the most significant for the object under study can

therefore only be decided from case to case, through empirical studies and in relation to the problem we address.

If one understands mediating tools as artefacts of the structural and cultural mechanisms that have constraining and enabling properties, then the fact that we cannot predict their exact effect on human agency confirms Wertsch's (1998) claims of mediated action (Section 3.7.1) for the following reasons: the cultural tools used provide both affordance and constraints on mediated action; action can have multiple, often conflicting goals; the consumption of tools in ways that are no longer applicable in a given situation and time can impede performance; and new tools transform action because they determine the structure and flow of action. As Danermark et al. (2002) argued above, we cannot know for certain how these tools might impede performance or transform action unless we study them in relation to a specific research question and context as this study aims to do.

Through this account of hierarchical stratification and emergence we can see that critical realism is inherently relational as Bhaskar (1997: 139) explained:

Ideas, and ideational connections (including category mistakes, logical contradictions etc.) are part of everything, and everything is real. To deny the reality of a part of everything (of anything), such as ideas (or say person, or consciousness, or agency, or values – or mind or body) extrudes or detotalizes it or them from the world, that is of the rest of the world of which they are in principle causally explicable and causally efficacious parts.

Anything that can affect anything else must therefore be real because of its connection to other things. As the sociological and methodological complement of Bhaskar's (1997) transcendental realism, Margaret Archer's (2000) social critical realism responded to the inseparability thesis of process ontology and is introduced below.

3.9.2.2 Response to inseparability: Archer's social realism

Analytical dualism

Margret Archer's social realism focused on social phenomena and supported Bhaskar's notion of a stratified ontology for cultures, structures and agents (Olvitt, 2012). Addressing the problem of inseparability, Archer (1995) argues for 'analytical dualism' when approaching the study of social and cultural phenomena which called for structure and agency or culture and agency to be kept analytically apart (Archer, 1995). She described analytical dualism as "the guiding methodological principle underpinning non-conflationary

theorizing [that examines] the interplay between the ‘parts and the people’, the ‘social and the systemic’, ‘structure and agency’, or ‘action and its environments’ ” (Archer, 1995: 15). Archer (1995) argued for analytical dualism firstly because they are part of different levels of stratified social reality which are ontologically different and should not be conflated and secondly because of their interrelationship in time which she explained “... is not a static method of differentiation but a tool for examining the dynamics by which the ‘parts’ and the ‘people’ shape and re-shape one another through their reciprocal interaction over time” (Archer, 1995: 194).

Expanding on the notion of analytical dualism with reference to the socio-cultural tradition, Archer (1996) argued that the way culture has been conceptualised within this tradition is problematic because it gave way to the ‘Myth of Cultural Integration’ in which culture was portrayed as a perfectly integrated system, where all its elements were interdependent with each other (Archer, 1996). Culture as a concept was therefore understood to have a *cultural pattern* or fundamental coherence to it and a *uniform action* which produced social homogeneity (Archer, 1996). Archer (1996) argued that this is problematic in that this myth contains analytical confusion between two elements, which in sociology, are logically distinct. This confusion is between the elements of ‘logical consistency’ and ‘causal consensus’. Logical consistency refers to the degree of internal compatibility between the components of culture and is a property of the world of ideas (e.g. beliefs, norms, language and mythology) whereas causal consensus refers to how one set of people order another through the imposition of culture and is a property of people (e.g. caste, the class system, priesthood or intelligentsia) (Archer, 1996).

Archer (1996) termed logical consistency as ‘cultural system integration’ and causal cohesion is referred to as ‘socio-cultural integration’. The first has to do with ordering our experiences or ideas of the world and the second with ordering people. These elements are thus logically and empirically distinct, therefore, varying independently from one another. Defining culture as a coherent whole then made it impossible to account for maintenance or change of the cultural system originating from within or from internal dynamics. In order to understand the interplay between the social and cultural and to analyse stability and change, it is thus important to be able to distinguish between the two (Archer, 1996). For example, a given social unit may display logical consistency through a shared language or belief system that has a logical consistency to them but the same social unit can be low on causal consensus,

through for example, an outright rejection of the culture imposed. In a culture where the elite dominate, the non-elite may behave differently because they have access to more restricted ideas or resources and this may result in an absence of social uniformity. Power relations are the causal element that can build or break down cultural consensus. An example of this in this study is a grass roots movement in the second case study site that fights for the right to land and water resources by those disenfranchised by past laws.

Archer (1995) also argued for the theoretical unification of structure and culture, thereby enabling an analysis of culture in the same way as structure. She argued that theoretical unification discourages “both the inflated importance assigned to culture, presented as society’s bandmaster, or its relegation to a reflective role as society’s looking-glass” (Archer, 1996: 274). Cultural systems can thus be analysed in a similar way to social systems.

In order to understand the relationship between socio-cultural systems and human agency Archer (1995) proposed a morphogenic approach. This approach sought to understand how humans either maintain (morphostasis) or change (morphogenesis) social and cultural systems (Danermark et al., 2002). In her morphogenic approach Archer (1995) understood structure and human agency in temporal difference. When structural change arises from socio-cultural interaction, it is called morphogenesis; when structures are reproduced and maintained, it is called morphostasis. In her account of morphogenesis/stasis, Archer (1995) argued for a direct relationship between structure and human agency but asserted that this relationship is neither linear nor deterministic as mentioned above in the discussion of hierarchical stratification and emergence. In terms of the inter-relationship between structure and agency, Archer (2003: 2) argued that “causal power of social forms is mediated through social agency”. Social and cultural phenomena therefore emerge from people and are efficacious only through people. Figure 3.7 shows the connection between social structure and human agency.

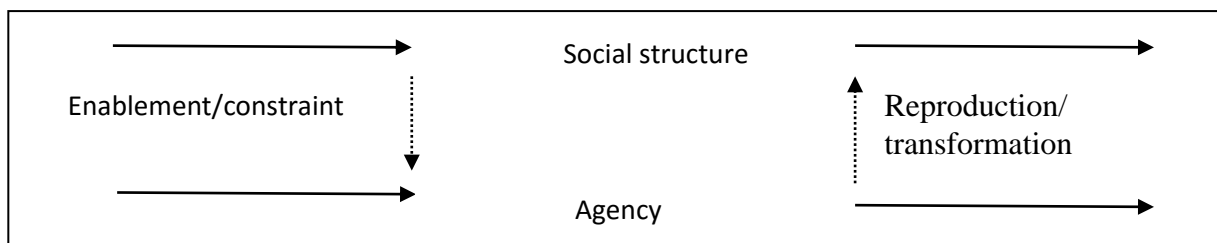


Figure 3.7: The transformational model of social agency: connection between social structure and agency (Bhaskar, 1993 in Danermark et al., 2002: 180)

On one hand, social and cultural structures *differentially enable or constrain* the agency of individuals and/or groups and, on the other, the agency of individuals and collectivities is able to impact on structures (Archer, 2003). People are *constrained and/or enabled* by social and cultural factors only because they envisage a project or certain course of action that they would like to take and this is *differential* because they might choose to pursue the course of action from different social contexts (Archer, 2003). An example of this in this study is the way in which different research participants chose differential approaches to their water and food security constraints because some were from different social contexts. One participant for example, joined a group aimed at helping people increase their water and food security because her and her household were very poor (constraint). Another research participant felt no need to join this group and simply invested in her own rainwater tank in order to solve her problem of lack of easy access of water near her home (constraint). She also learned from her parents how to grow vegetables so felt confident in her ability to provide for her household (*enablement*).

It is important to distinguish between the existence of constraints and enablements and the exercise of their causal powers. Constraints and enablements do not possess an intrinsic ability to constrain and enable but instead have *causal powers* that rely on agents to activate them when they (agents) undertake a project (Archer, 2003). Examples of social causal powers are distributions, roles, organisations or institutions while examples of cultural causal powers include propositions, theories or doctrines. Two important factors of the emergent properties of social constraints and enablements is that reflexive humans can *anticipate them*, thus choosing a different course of action (where constraints are concerned) and agents have degrees of freedom to *work around them*, by acting strategically, for example, within the course of a project to achieve the most out of certain circumstances (see Section 9.1.2). Archer (1995) therefore sought to understand the properties and powers of human agents (for example, their powers and abilities to engage in food and water security practices) so as to understand more fully their relationship with the structural and cultural dimensions of the social world (that is, how these rainwater harvesting and food gardening practices come to be shaped in and through structures and culture). Considerable synergy exists therefore between Archer's (2003) critical social realism and CHAT (Lindley, 2014). Chapters Five, Six and Seven are committed to exploring in depth, through the CHAT framework, how the rainwater harvesting and food gardening practices in each site came to be shaped through social,

political, historical, ecological and economic structures and through certain cultural causal powers and personal emergent powers.

3.10 Conclusion

Chapter Three has discussed the theoretical frameworks of mediation and CHAT and how they relate to each other. It was noted that within the socio-cultural historical and material theories of learning, understanding the socio-cultural and historical contexts in which learning occurs, is essential. In order to know how to learn more effectively we need to study how, why and what people do *in context* and understand that everything is related, making ‘solutions’ more complex. As a result the theoretical aspects of mediation, held within the heuristic of second generation CHAT, were considered. The study’s philosophical underpinnings were discussed as provided by relationalism, critical realism and social realism. The theories presented in this chapter help situate the study within the environmental education framework as discussed in Section 1.1 and 2.4 and also form a link to the critical methodological orientation discussed in the following chapter.

The following chapter (Chapter Four) demonstrates the epistemological and methodological implications for the theories and philosophies presented in Chapters Two and Three. It discusses the research design and methodological framework of this study and sets out the requirements of a qualitative research process in developing and implementing data generating techniques, in analysing data and ensuring quality and validity.

CHAPTER FOUR

METHODOLOGY AND METHODS

4.0 Introduction

“What society is held to be also affects how it is studied” (Archer, 1995: 2)

This chapter discusses how I generated data through my interactions with research participants and then analysed it. In structuring this chapter I drew from Creswell’s (2003: 3) questions concerned with research design:

- What knowledge claims are being made by the researcher (including theoretical perspective)?
- What strategies of inquiry will inform the procedures?
- What methods of data collection and analysis will be used?

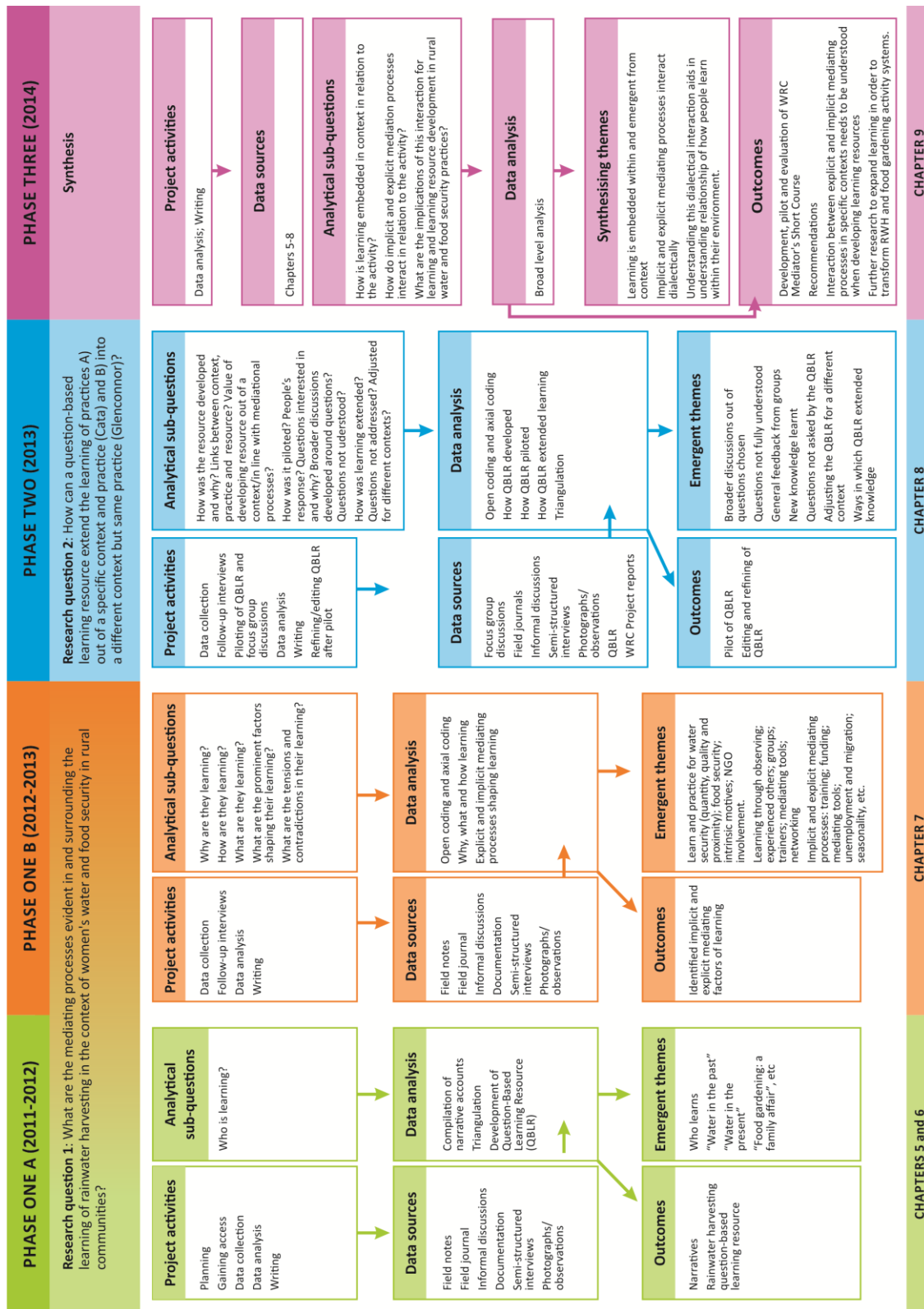
With the broader interest and goal of developing more relevant and context-specific learning resources in mind (Chapter One) and guided by CHAT (Chapter Two), this chapter shows how the research participants and I, as the researcher, reflexively worked together in understanding what mediating processes are at play within their water and food security practices. I therefore set out to explore *with* research participants, focusing on their practices and stories; this is not research *on* them. Studying individual behaviour can be understood as merely a gateway into the activity of the subject; once the researcher identifies the activity, he or she needs to go beyond individual behaviour and examine the motive-goal-instrumental conditions and use that information to understand what mediates activity (Yamagata-Lynch, 2003). This chapter also shows that while I spent time in both the field and at my study station – that is moments taking place at separate and distinct times and places – these moments were brought together through deliberations between the two active agents – the research participants and researcher. In this process of engagement we examined current practice and discussed the processes that mediate their learning.

This study was carried out over a period of about four years beginning in mid-2011 to 2014. In order to explore the mediating processes within the learning of rainwater harvesting and

food gardening practices I used case study and narrative inquiry methodological approaches (Section 4.2), conducting field work in two case study sites in the rural Eastern Cape. As discussed in Chapter Three, CHAT epistemologically provided the explanatory space to interpret practice as activity and explore the link between event and context, thereby exploring the mediating processes inherent in practice and providing insight into how to develop context-specific learning resources (Blackler et al., 2000). Critical realism as an underlabourer to CHAT, as well as the methodological implications for this study, are also discussed (Section 4.1). I used research methods such as document analysis, semi-structured interviews, participant observation and focus group discussions to generate data (Section 4.5). This methodological triangulation enhanced the trustworthiness and validity of the research (Section 4.3). Ethical issues did arise and I drew on the work of researchers such as Maxwell (2009; 2012) and Guilleman and Gillman (2004) to help me navigate the way (see Section 4.3).

My task as researcher at the analytical stage was “to enable theory-reality congruence” (Mukute, 2010: 115) where the researcher seeks to build a bridge between the two spaces of the “real world” and the “represented”. I achieved this through inductive and abductive analytical processes (Section 4.6) where I first made sense of the data generated by clustering data into categories based on the notion of “letting data speak” through an inductive process. Abductive analysis involved linking the data with theory from CHAT and Vygotsky’s and Wertsch’s theory of mediated action (Chapter Three). Retroductive analysis then gave shape to the critical realist project of this study by trying to establish “what must be the case” for things to be in existence (Danermark et al., 2002). This chapter thus presents the beliefs about the nature of reality (ontology), what counts as legitimate knowledge (epistemology) and how one should go about studying and collecting knowledge (methodology). Figure 4.1 below maps the research design and research process followed in this study.

Figure 4.1: Map of phases of research process



CHAPTER 9

CHAPTER 8

CHAPTER 7

CHAPTERS 5 and 6

4.1 Critical Realism and CHAT: Methodological implications

As discussed above for this study I adopted a broadly interpretive epistemological perspective underlaboured by a critical realist ontological research orientation. From Archer's (1995) opening quote in this chapter it is important to be explicit about one's ontological and epistemological orientation as they influence the research project throughout, from how data is collected to how the researcher interprets his or her findings (Mantzoukas, 2007). My aim in this section is to account for the methodological implications of the relationship between the underlabouring relational critical realist ontology and CHAT as the dominant theoretical framework for this study. As the theoretical and conceptual relation between critical realism and CHAT was discussed in Chapter Three (Section 3.9), this chapter emphasises their methodological implications.

One of the key tenets of critical realism is that of *ubiquity determinism which leads to causal efficacy* which argues that the reasons people give for phenomena can be causes. The implication of this tenet for educational research is that "the reasons people have for doing things are seen as valid data, and are given priority over other research data, such as researcher observation" (Shipway, 2011: 165). Critical realism as a research orientation thus had bearing on the research design as I used a narrative inquiry approach to elicit research participants' accounts of their rainwater harvesting and food gardening practices. In line with this tenet therefore, my point of departure in exploring the mediating processes inherent in food and water security practices and learning was the reasons people gave for their actions. As noted before (Section 3.9), critical realism is not a social theory but a philosophical underlabourer and does not claim to develop a new method for social science research. Rather, critical realism stands as a foundation from which complementary social theories such as CHAT as the primary theoretical frame for this study can be applied. In line with a critical realist understanding CHAT is also more of a descriptive meta-theory or framework than a predictive or prescriptive theory (Jonassen & Rohrer-Murphy, 1999; Mwanza, 2002). CHAT provided me with theoretical tools to identify the mediating processes inherent in certain water and food security practices. As will be discussed below (Section 4.4.3) the first phase of data generation was based on the CHAT framework and was used to trace and describe the history of rainwater harvesting and food gardening practices using document review. CHAT was also used to design research tools such as interview and observation schedules to generate data on the current activities on learning rainwater harvesting and food

gardening in the two central activity systems in each case study and their neighbouring activity systems (see Section 4.5). During this phase, CHAT was also used to guide the first level data analysis to construct activity systems of learning rainwater harvesting and food gardening practices in the emerging socio-cultural contexts of Cata and Glenconnor. I used both the second and third generation activity systems (Section 3.8) to present the different elements that mediate the rainwater harvesting and food gardening activity systems. The second generation activity system helped in identifying social/collective elements and their interactions, while the third generation activity system revealed the relationships between the central rainwater harvesting and food gardening activity systems and the neighbouring activity systems of trainers, government agents and NGOs. Daniels and Warmington (2007: 377) noted CHAT's intention to "develop conceptual tools to understand dialogues, multiple perspectives and networks of interacting activity systems".

As one of its main goals, CHAT seeks to identify and analyse the cultural-historical factors that come to bear on human activity. This resonates with the critical realist project of identifying underlying causal mechanisms. Critical realism also reaches into the real and actual domains, going beyond the positivist tradition of 'cause and effect' analyses which takes place in the domain of the empirical, or what can be observed (Danermark et al., 2002). According to Olvitt (2012: 102):

CHAT achieves this because its primary unit of analysis (joint human activity) is conceptualised as a dynamic process of complex, heterogeneous, historically and culturally emergent, open-ended inter-relationships. These inter-relationships are causally efficacious across time and space, enabling an activity theoretical analysis to move beyond the empirical domain and to acknowledge the structures, mechanisms and powers of the real and actual domains too.

Table 4.1 summarises the relationship between critical realism, relational ontology and CHAT in terms of their methodological implications and tools (as used in this study).

Table 4.1: Summary of the main theoretical frames used in the study, and their associated methodological implications and tools (Adapted from Olvitt, 2012: 101)

	Theoretical Frame	Methodological Implications	Methodological Tools / Procedures
Ontological / Philosophical	Critical Realism	Disentangling structure and agency across time-space through examination of real, actual and empirical domains; Explanatory critique through uncovering causal mechanisms	Analytical dualism; Retroduction
	Relational Ontology	Attention to complex relational webs; Examine relationships <i>among</i> rather than individual properties <i>of</i> agents	
Social	Cultural-Historical Activity Theory (CHAT)	Identify inter- relationships; historical and cultural emergence within/across activity systems	2 nd and 3 rd Generation Activity System heuristic (interacting activity triangles); Dialectic between object oriented activities, goal oriented actions, and conditional operations

Combining CHAT with critical realism therefore allowed for explanatory critique which helped to reveal the underlying causal mechanisms that structure learning in rainwater harvesting and food gardening activity systems. Critical realism also provided in-depth insight into the structural constraints and enablements that mediate learning at the individual, institutional and societal level.

As discussed previously (Section 3.9 and 3.9.2) critical realism and CHAT also share an emancipatory agenda. Critical realists seek to bring about change by understanding the generative mechanisms that underlie social structures and therefore change them while CHAT aims to examine the tensions and contradictions within human activity thereby seeking social transformation. Many studies which adopt critical realism and CHAT are action-oriented or referred to as interventionist or catalytic studies where the study aims to empower participants to change their circumstances through a two-way encounter with the researcher (Janse van Rensburg, 2001; Mukute, 2010; Chikunda, 2013). As noted earlier (Section 3.8.5) however, this study was not an interventionist study, it was constituted as a case study. I did not bring about change in the immediate through change laboratory workshops but rather took the approach of first understanding and explaining the generative

mechanisms inherent in the learning of water and food security practices so as to better inform and bring about change in the way learning resources are developed. This study is, however, very much concerned with this question: in whose interest is knowledge created for and this is one of the key questions for critical realists (Cohen et al., 2010). As explained in the introductory chapter of this thesis, one of the key motivations of this study is to generate knowledge that emerges directly from the activities of rainwater harvesting practitioners so as to offer mediational tools that are directly relevant to their lived experiences and that enable social learning. Chapter Eight speaks more to this process of knowledge production and what effect it had on the ground.

4.2 Methodological framework

The choice of the research methodology, design and methods was influenced by the research goal (Section 1.3), the sensitising concepts and principles (Section 1.6) and the theoretical framework (Chapters Two and Three). A qualitative approach using case study methodology, Cultural Historical Activity Theory (CHAT) and narrative enquiry was employed to investigate the mediating processes at work within the context of social learning in rainwater harvesting and food gardening practices. The sections below introduce the methodological approaches used.

4.2.1 Case study approach

For this study I used a case study approach which sought to engage with the complexity of social, historical, cultural and educational activity in each case study site (Chadderton & Torrance, 2011; Yin, 2009). Yin (2009: 18) defined case study methodology as that which “investigates contemporary phenomenon in depth and within its real-life context especially when the boundaries between phenomenon and context are not clearly defined” (Yin, 2009). The fact that case-study methodology allows for an in-depth exploration of, for example, contextual mediating factors and rainwater harvesting and food gardening practices, was an important deciding factor in using case study methodology as the boundaries between cultural context and practice are not always clearly defined.

My focus on the mediating processes that shape rainwater harvesting and food gardening practices was a description of a complex social process. Using CHAT language, mediation or mediating processes was therefore the object that was being worked on throughout the study. Case study methodology is premised on the fact that ‘social reality’ is created through social

interaction situated in particular histories and contexts which is why coupling this approach with CHAT is consistent. Commenting on the choice of study designs within social learning research Rodela, Cundill and Wals (2012: 20) argued that case studies allow for “historical depth and a fine grained description”. Case studies are an appropriate approach to answer questions of *how* and *why* which also resonates with the four main learning questions CHAT asks of social phenomena: who, why, how and why (Section 3.8.6) (Corcoran, Walker, & Wals, 2004).

Corcoran (2004: 10) argued for three defining features of the case study approach: particularistic, descriptive and heuristic. Particularistic refers to the fact that case studies usually focus on a special event, situation or programme. This specificity of focus makes it an especially good design for practical problems that arise out of every day practice. It is for this reason that I used it to question what impacts on the learning and practice of food and water security activities. Descriptive refers to the fact that case studies are a ‘thick’ description of the phenomenon under study or include as many variables and an analysis of their interaction over time (Merriam, 2009: 43). Case study methodology has thus been labelled holistic, lifelike and explanatory (Merriam, 2009). In line with this lifelike nature of case studies I adopted narrative inquiry (Section 4.2.2) to convey my understanding of each case as presented in Chapters Five and Six. Heuristic means case studies broaden the reader’s understanding of a particular phenomenon in a way that extends the reader’s experience (Corcoran et al., 2004). In support of this Rodela et al. (2012: 20) argued that case studies can be used to identify “causal processes and theory building”. Heuristic in case study design hinges on theoretical validity of the research and it is used as such in this study (Section 4.3.2.4).

4.2.1.1 Multi-site case studies with related activity systems

I used a multiple case study approach, exploring mediating processes across two case studies (Chadderton & Torrance, 2011). In this study a minimum of two networked activity systems constituted a case study (see Figure 4.2).

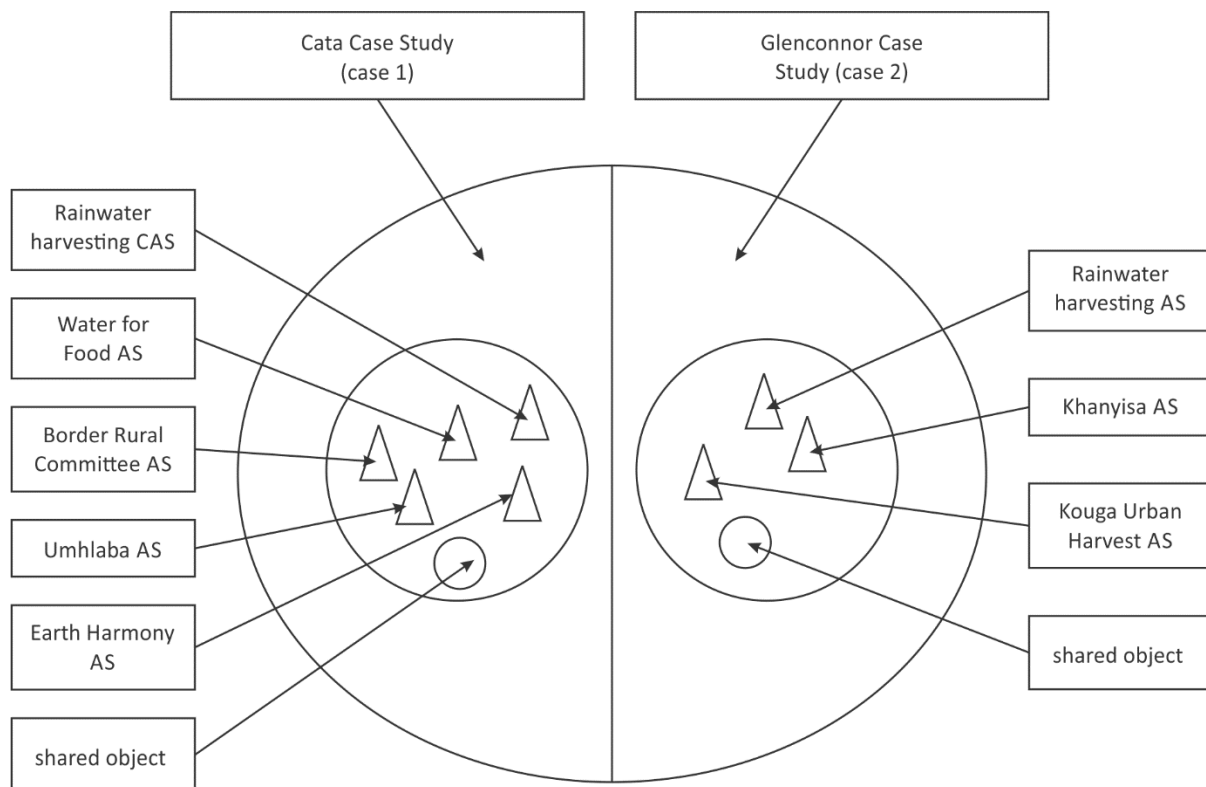


Figure 4.2: Networked activity systems in Cata case study (Case 1) and Glenconnor case study (Case 2)
 Key: AS: Activity System; CAS: Central Activity System

As shown in Figure 4.2, the various activity systems are related cases within the case. Using activity systems allows for analysis of implicit and explicit mediating processes as the unit of analysis for this particular study and also enables researchers to capture (a) the dynamic structure of the activity, (b) the historical development of the activity, and the multi-voiced nature of human activity (Yamagata-Lynch, 2003).

4.2.2 Narrative inquiry approach

As a complementary approach to the holistic and grounded nature of case study methodology, I employed narrative inquiry in order to bring to life the case studies and activity systems within the study. Narrative inquiry as a methodology holds as its main premise that people are by nature “storytelling organisms who, individually and socially, lead storied lives” (Connelly & Clandinin, 1990: 2). Narrative inquiry is thus “the study of the ways humans experience the world” and “education and educational research is the construction and reconstruction of personal and social stories” (Connelly & Clandinin, 1990: 2). Narrative is both phenomenon and method. ‘Stories’ are the phenomenon while ‘narratives’ are the method. In other words, people tell stories while narratives are the product of stories which

have been analysed and interpreted by the researcher (Riley & Hawe, 2005). The researcher thus analyses the “underlying narrative that the storytellers may not be able to give voice to themselves” (Riley & Hawe, 2005: 227).

Narrative inquiry as a research methodology complemented the situated learning (Section 1.6.1.1) theory that also formed part of the sensitising concepts and principles of this study in that “narrative is a linguistic form uniquely situated for displaying human existence in situated action” (Hart, 2002: 141). The relevance of narrative enquiry as a methodology for this particular study was articulated by Connelly and Clandinin (1990: 8) when they argued that, “stories stand between the general and the particular, mediating between the generic demands of sciences with the personal, practical, concrete demands of living”. People’s stories thus bring social phenomena to life making narrative inquiry particularly useful to a study which seeks to make research more relevant to those it seeks to aid for best practice. Through the stories people tell, one is better equipped to find out on a very practical and concrete level what people are learning, why they are learning, what they want to learn and why they want to learn. Within the field of educational research more specifically, Connelly and Clandinin (in Pepper & Wildy, 2009: 21) argued that narrative accounts “bring theoretical ideas about the nature of human life as lived to bear on educational experience as lived”.

Along with case study methodology, a narrative inquiry approach allowed a creative weaving of methodologies where respondents’ stories of their rainwater harvesting and food gardening practices were constructed into narrative accounts. As shown below (Figure 4.3) I constructed four narrative accounts for each case study from each primary research participant’s story of their rainwater harvesting and food gardening practice, amounting to a total of eight narrative accounts.

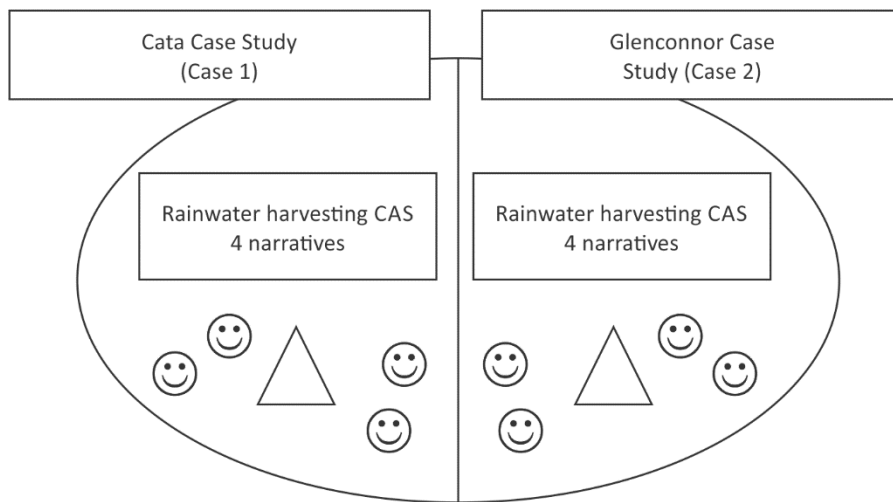


Figure 4.3: Narrative accounts of rainwater harvesting and food gardening in each central activity system (CAS)

Constructing narratives from individuals' accounts of their practices allows the researcher to surface nuance and read between the lines. Narrative inquiry focuses on the particular as opposed to the general. Below I discuss the process of collecting stories and constructing narratives.

4.2.2.1 Interpretative processes: Collecting and writing up stories

Collecting stories

In order to collect people's stories of their rainwater harvesting and food gardening practices I interviewed primary research participants as well as made observations (see Sections 4.5.2 and 4.5.3) of their practice. The data collected in the form of peoples' stories was interpretive in that as the researcher I selected what information was of interest to the study or what I deemed relevant. Interview data is interpretive as well in the sense that research participants interpret the researcher's comments, questions and actions and in turn filter information in deciding what and how much they share (Pepper & Wildy, 2009). Collecting and writing up narratives is thus not a neutral process. These have been mediated by myself as the researcher and by my research participants throughout the data collection, processing and analysis phases. In narrative enquiry the power of the relationship between the researcher and the researched is thus recognised as well as the power of words as data (Craig & Huber, 2007).

Constructing narratives

After collecting people's stories of their rainwater harvesting and food gardening practices I then constructed narrative accounts of these stories (as presented in Chapter Five and Six). As noted earlier narratives are not the same as interview data, field notes or stories. In order to create narrative accounts, interview and observation data are processed and constructed to give an account of a research participant's particular experience of a phenomenon (Pepper & Wildy, 2009). In constructing narratives two criteria are identified: *continuity* and *interaction* (Pepper & Wildy, 2009). Continuity refers to the fact that experiences grow from prior experiences which lead to other experiences (Pepper & Wildy, 2009). Interaction on the other hand refers to the social context of an individual's experience (Pepper and Wildy, 2009). Within these two criteria lie particular tensions. Within continuity there are tensions of temporality, people, action and certainty while in interaction there are tensions of context, people, action and certainty (Clandinin & Connelly in Pepper & Wildy, 2009). 'Temporality' refers to locating the events in a narrative in a particular time (Pepper & Wildy, 2009). People are important in other people's stories as they are usually involved in some sort of personal change. 'Action' of some type also occurs with the historical significance highlighted for its relevance. Events in a narrative can always be interpreted in a variety of different ways calling into question the 'certainty' of a narrative (Pepper & Wildy 2009: 20). A narrative writer should therefore aim to produce "an ethical, honest interpretation of the data while being aware that other interpretations are possible" (Pepper & Wildy, 2009: 20). Taking account of 'context' is key when constructing narratives as the significance of events and peoples' actions can only be understood in context which is why I devoted a large section to contextually profiling each study site (see Sections 5.2-3 and 6.1-2). Dewey (in Craig & Huber, 2007: 255) argued that "narrative inquiry is the study of experience, and experience ... is a matter of people in relation contextually and temporally".

Keeping in mind the elements of narrative (continuity and interaction) and their accompanying tensions I then began to construct each person's narrative account of their practice. In order to construct the narratives of my research participants I followed the themes of my interview questions which focused broadly on what research participants did for water in the past, what they do in the present, how they harvest rainwater, what they use it for, how they grow food and the challenges they have had in each (see Appendix 2 for sample of primary research participant interview and contextual interview). When constructing

narratives the writer must be sensitive to what is important, subtle and complex and must understand the relationship between events and the different tensions described above (temporality, people, action and certainty) and (context, people, action and certainty) (Pepper & Wildy, 2009: 21). The researcher must also be attentive to what is being written and how it is being written. Clandinin and Connelly (in Pepper & Wildy, 2009: 22) referred to this as ‘wakefulness’. Wakefulness necessitates that the writer engages in an ongoing process of reflection while constructing narratives in order to avoid simplistic plots and one-dimensional characters. During this interpretive process, I therefore aimed to be as reflexive as possible to not only make sure the narratives were a fair representation of the stories research participants told me but also of how my own values, bias and personal history influenced my interpretations and findings (Maxwell, 2008).

Legitimate representation

In order to make sure the narratives I constructed were valid or as close to the data I collected, I included as much of each research participant’s voice as possible by interposing narratives with direct quotes from individuals. Addressing the issue of quality and validity in a qualitative methodology such as narrative inquiry, Hart (2002) argued that “... stories of human experience (i.e., intention and action) are written with a different interest than whether something is testably correct. The narrative interest is in whether it is believable”. They went on to argue that the goal in narrative inquiry is not to seek universal rules through context independence and objective verification but rather to understand and represent human events in their complexity, within context (Hart, 2002). Articulating the politics of representation and legitimation in narrative enquiry Peshkin (in Connelly & Clandinin, 1990: 8) argued that “my ideas are candidates for others to entertain, not necessarily truth, let alone Truth, but as positions about the nature and meaning of a phenomenon that may fit their sensibility and shape their thinking about their own inquiries”. The narratives I constructed with the data I collected were merely ways of reflecting back stories to research participants and presenting them with another way of looking at their own practices. This does not mean that anything goes however and inherent ethical criteria of ethics and values come through clearly in the research process (see Section 4.3). At the end of each narrative account I identified the most prominent mediating factors within research participants’ stories. I then presented research participants with the respective narratives I constructed about their practice and asked them to qualify them as valid or not (see Section 4.3.2.3). Through this process one can understand

then how narrative inquiry as a research approach complements CHAT in that through people's accounts one can then mirror back their own thoughts and actions.

Narratives and the question-based learning resource (QBLR)

One of the reasons I chose narrative inquiry as a research methodology for this study was with the broader research project in mind of facilitating relevant (water) knowledge and making learning resources more useful to their intended audiences (see Chapter One). As discussed earlier (Section 1.1 and 3.1-3.8) there has been a tendency to view learning materials as “objects that are disembedded from the context in which they are used” (Lotz-Sisitka, 2004: 141). There has thus been a shift in environmental education research to highlight the significance of context and narrative and the need for in-depth analysis of cases in context when developing learning support materials (Lotz-Sisitka, 2004; Lupele, 2003). Pepper and Wildy (2009: 22) argued that plausible accounts or narratives should “ring true” for the reader and have enough detail in them so that they resonate with the experiences of the reader. This is exactly what was sought in the development of the question-based learning resource (QBLR) (see Section 1.2 and Chapter Eight) for the wider WRC project. After constructing the narratives of primary research participants and narratives of other participants of interest to the broader study, the research team then used these to design a learning support resource (the QBLR) around rainwater harvesting and food gardening practices. The QBLR was thus developed out of the direct experiences of those that it was intended for so that it rung true to their experiences and current water harvesting practices. If the mediation of a learning resource resonates with peoples' experiences then their understanding, processing and use of that knowledge is more likely to be successful as was discovered by Burt and Berold (2012). This was also observed during the piloting of the QBLR (see Section 8.2) in the two case studies; people were receptive and excited that a learning resource spoke so directly to their everyday practices and experiences. Narrative inquiry was thus a useful methodology in that I was able to surface the prominent problems and concerns (mediating factors) within my research participants' learning as they emerged out of their own stories of their rainwater harvesting and food gardening practices.

4.3 Reflexivity, research ethics and validity

“Representation... is always self-presentation” (Denzin in Mauthner & Doucet, 2008: 94)

4.3.1 Reflexivity and ethics

Guilleman and Gillman (2004) distinguished between ‘procedural ethics’ in research and ‘ethics in practice’. By procedural ethics they meant codes of professional practice that must be complied to, “a formality, a hurdle to surmount to get on and do the research” (Guilleman & Gillman, 2004: 263). ‘Ethics in practice’ (or ‘micro-ethics’) on the other hand have an ‘everyday’ quality to them and refer to ethical situations which arise in the day-to-day of research practice, negotiated by the researcher in the moment. Examples of micro-ethics include “the way the researcher responds when participants indicate discomfort with their answer, or reveal a vulnerability” (Guilleman & Gillman, 2004: 265). For the most part this study was not of a sensitive nature so there were not many situations which were uncomfortable or ethically loaded. An example of ethics in practice in this study was when research participants asked that their real names be used as opposed to pseudonyms as they were proud to be part of the study and wanted to be acknowledged.

Guilleman and Gillman (2004) argued that procedural ethics can be inadequate when dealing with ethically important moments in the research process and propose the notion of reflexivity as a tool for understanding how ethical practice in research can be achieved. Mason (1996, cited in Guilleman & Gillman, 2004: 274) argued that reflexive research “means that the researcher should constantly take stock of their actions and their role in the research process and subject these to the same critical scrutiny as the rest of their “data””. It is thus important for researchers to ‘situate’ themselves socially, emotionally and intellectually so as to maintain a hold on the blurred space between research participants’ stories and our interpretation and construction of these narratives. The aim of reflexivity therefore is not to strip oneself of personal bias but rather to be aware of what one brings to a project of knowledge construction. In an attempt to avoid a static representation of ethical concerns in this study I have woven my accounts of reflexivity and research ethics throughout the different sections and chapters of this thesis as I explicate how the study was carried out and the decisions which informed it.

4.3.2 Research validity

In line with the interrelationship between ethics and reflexive research is the notion of validity. In his realist approach to qualitative research Maxwell (2012: 130) argued that validity pertains to “the accounts or conclusions reached by using a particular method in a particular context for a particular purpose, not the method itself”. Maxwell (2012) proposed three broad categories of validity: descriptive validity, interpretive validity and theoretical validity.

4.3.2.1 ‘Rich’ data (descriptive validity)

Descriptive validity pertains to generating ‘rich’ data which is “... detailed and varied enough [to] provide a full and revealing picture of what is going on” (Maxwell 2009: 244; 2012). ‘Rich’ data counters the danger of producing data that supports mistaken conclusions as well as making it difficult for the researcher to only focus on what supports his or her prejudices and preconceptions (Maxwell, 2009). One way of generating rich data is by using multiple data collection techniques as was used in this study (Section 4.5) in order to test the integrity of inferences drawn from data against each other (Maxwell, 2009). Interviews were audio-recorded and transcribed (see Appendix 2) and observations were recorded in my field journal, providing detailed accounts of the concrete events I observed (see Appendix 3).

4.3.2.2 Triangulation of data

Linked closely to generating ‘rich’ data is triangulation, which refers to using multiple methods, multiple sources of data and multiple theories (Maxwell, 2009; Denzin in Merriam, 2009). With regard to multiple methods of data generation, I used document analysis, semi-structured, in-depth interviews, participant observations and focus group discussions (see Section 4.5). Through this process I was able to verify what was found in interview data with data in documents for example. In terms of multiple sources of data my data set included field notes, a detailed field journal, informal discussions, documentation, transcriptions from semi-structured interviews and informal discussions, photographs and focus group discussions. Using triangulation enabled me to verify individual accounts and viewpoints against others which allowed me to construct a rich overarching picture of the needs, behaviours and attitudes of the people in each case study site. Theoretical triangulation involved the use of multiple theories as presented in Chapter Two and Three and the presentation of a coherent set of findings linked to theory in Chapter Nine.

4.3.2.3 Respondent validation (interpretive validity)

Interpretive validity or respondent validation (member-checking) is concerned with making sure research participants are in agreement with how the researcher has interpreted their actions and practices. After I transcribed interviews and constructed narrative accounts of my primary research participants I presented these as well as photographs back to my research participants and asked if they agreed with the way in which I had interpreted what they had said and what I had observed. Most of my primary research participants either spoke isiXhosa or Afrikaans so I asked Monde Ntshudu, the Xhosa interpreter on the research project (see Section 4.5.2), to interpret each narrative account and transcription with each research participant from Cata. I asked Ewald Kruger, the Afrikaans interpreter (Section 4.5.2) to do the same with participants in Glenconnor and Kleinpoort. In both study sites research participants were satisfied with the constructed narratives of their rainwater harvesting and food gardening practices and were also pleased to receive photographs of themselves.

One research participant interviewed for contextual purposes from the Cata case study was not satisfied with the transcribed interview I sent him and asked if he could change a few things. I gladly agreed and received a reviewed transcription back from him after a few weeks. Another contextual interviewee from Cata requested that I omit a section of the interview which he felt was irrelevant to the interview (I did this) and he was content with the rest of the transcription. From a realist perspective the implication of respondent validation for research is that “the meanings and constructions of actors are part of the reality that an account must be tested against in order to be interpretively as well as descriptively valid” (Maxwell, 2012: 139).

4.3.2.4 Relevant theory (theoretical validity)

Ensuring I employed relevant theories for the phenomena I studied was one way of making sure my research design was valid, reasonable and achievable. Maxwell (2012: 140) argued that theoretical validity refers to “an account’s validity as a theory of some phenomenon”. The concepts themselves within the theory used must be valid as applied to the phenomena and the postulated relationships among the concepts must be valid. As described in Chapter Three, CHAT and Vygotsky’s theory of mediation have thus provided me with explanatory purchase when exploring the mediating processes (both implicit and explicit) that shape the learning and practice of rainwater harvesting and food gardening.

4.3.2.5 Discrepant evidence and negative cases

Searching for discrepant evidence and negative cases is another strategy Maxwell (2009) offered for ensuring validity in research. I thus chose to work with a community who did not use water from rainwater tanks to water their gardens and I also worked with two women who had stopped gardening due to certain contextual circumstances. Working with these discrepant cases allowed me to understand some of the factors that hinder food and water security practices.

4.3.2.6 Invite critique

Another strategy used to ensure validity in research is to invite critique from one's colleagues and supervisors (Maxwell, 2009). The Environmental Learning Research Centre (ELRC), where this study is housed, nurtures an atmosphere and practice of peer support and critical reflection. Students are invited to present their work and gain critical feedback on their research processes during Masters and PhD seminars and workshops. Besides presenting on more than one occasion and gaining constructive feedback, I sought out fellow students to talk through concerns of mine as well as asked a fellow PhD student in another department to read through some of my chapters. This peer review process was invaluable.

4.3.3 No anonymity

Linked to ethical concerns, one of Sieber's (1992) ethical norms calls for no harm to be done to a research participant during a study. Harm in this context could mean divulging certain individuals' identities. Although I discussed the issue of anonymity with my research participants, organisations and institutions, none of them wished to remain anonymous as the nature of the research was not sensitive. I thus decided not to make the case studies anonymous. Using people's real identities however did make me more sensitive to how I presented or commented on certain data. As Olvitt (2012: 115) argued, "This does not mean omitting 'uncomfortable' data from the study; it means... asking 'Is there another way of saying this that would be more respectful or open?'". In rephrasing or being more careful with comments or presentation of certain data I found I produced a fairer account of the phenomenon.

4.3.4 Voluntary informed consent

Voluntary informed consent is another ethical norm that I followed when conducting my research (Sieber, 1992). I negotiated access responsibly with written letters when required

(Appendix 4), clearly communicating in non-technical jargon the aims and expectations of the research project and stressing that participation was voluntary. Before each interview, I or an interpreter explained to each research participant (primary or contextual) (Section 4.5.2) that they were under no obligation to take part in the study and could withdraw at any time they felt uncomfortable with the process. In terms of informing research participants, I was transparent and realistic as to the benefits of a study of this nature. When asked why they had chosen to attend focus group discussions, for example, some group participants confessed that they thought they might receive a rainwater tank. These expectations were quickly dispelled and I explained I was simply inviting them to be part of a knowledge project and that they would not gain any immediate, tangible benefits. However, I did give small gifts as a token of appreciation for their time and energy.

I was mindful of being reflexive about my position and research practice on a daily basis while in the field as well as during the analysis and representation of my research findings. Mirroring this reflexive process I have chosen to weave my response to “ethics in practice” throughout this chapter (as opposed to discussing ethical issues separately which is more artificial) as I discuss and present the research processes.

4.4 Research process

4.4.1 Study sites selection

As discussed earlier (Chapter One), the intention of the study was to investigate the role of knowledge in a democratic society through the lens of mediation and change-oriented learning. I used a multi-site case study research design because the study sought to explore the mediating processes within situated learning which implies studying these practices in naturally occurring settings. The cases were chosen strategically, using purposive sampling which involved the selection of cases based on my judgment about what would be most useful (Bloor & Wood, 2006).

This study was carried out in two communities in the Eastern Cape Province, namely Cata Village in the Amathole district and a peri-urban town called Glenconnor in the Cacadu district (see Figure 4.4 below).

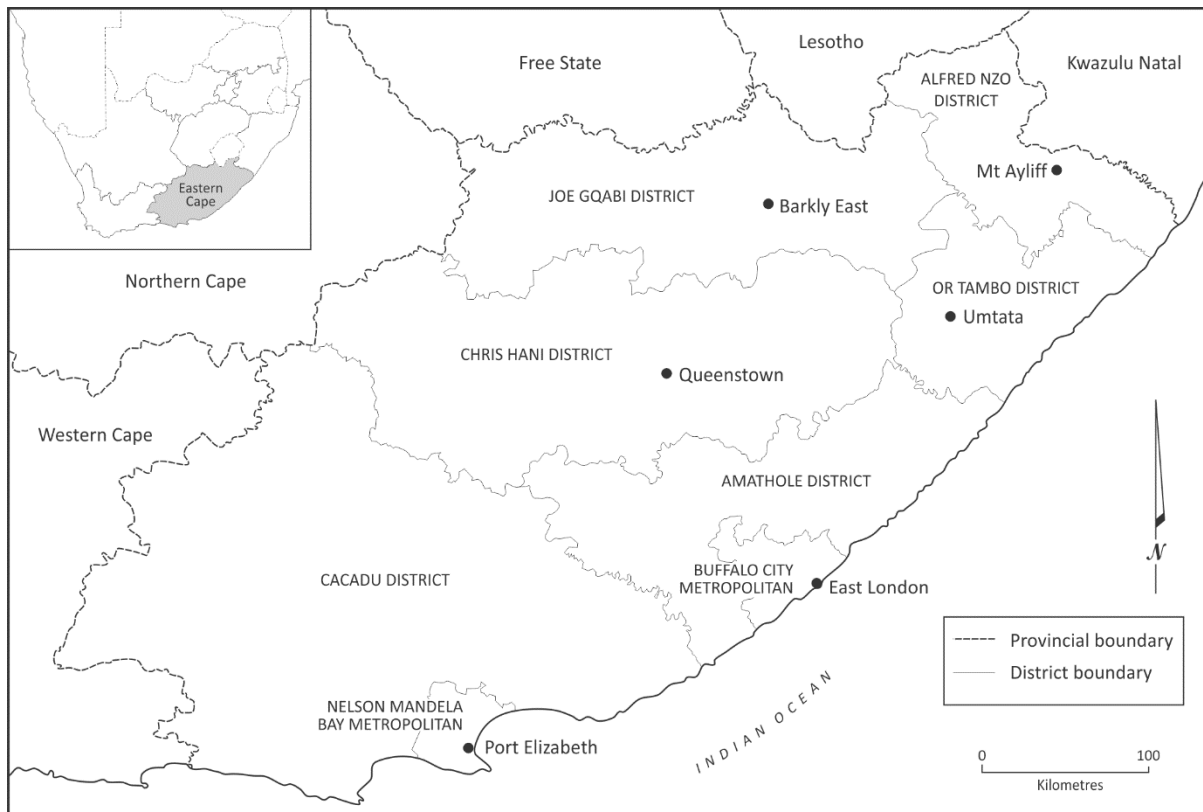


Figure 4.4: Map of Eastern Cape municipalities (www.mapsoftheworld.com)

Cata village was selected as a follow-on site from Charles Phiri's (2012) study as a relationship was thus already established with the Cata community and the broader WRC project required data out of the Cata context in order to develop the QBLR (Section 1.2 and Chapter Eight). I then chose the coastal, rural town of Port St. Johns, located in the former Transkei, for my second study site where people were practising rainwater harvesting and food gardening. After carrying out a pilot study there however it became evident that it was too far and that working in Port St. Johns would increase research costs compared to working in closer sites. Collaborative work between the Environmental Learning Research Centre (ELRC) and the Institute for Water Research (IWR) at Rhodes University, led to my second study site of Glenconnor, located in the Sundays River Valley. A larger project including the Institute for Water Research, the WRC and other stakeholders is being carried out by the Southern African Netherlands Research Programme on Alternatives in Development (SANPAD) in the Sundays River Valley. I thus joined other researchers on this team and my study has fed into the broader SANPAD project (see Appendix 5 for SANPAD workshop meeting minutes at Addo).

Initially the four criteria for each site included: (1) some form of domestic rainwater harvesting as well as small-scale rain fed irrigation being practised, (2) rainwater harvesting for drought relief, (3) organisational involvement, and (4) close to Rhodes University for the sake of project costs. Cata Village fulfilled all four requirements. At the second WRC steering committee meeting (24 May 2012) however it was decided that because of the broad scope and different techniques of rainwater harvesting (see Section 2.2), my study would not focus on two different forms of rainwater harvesting techniques (domestic and agricultural). I then chose to focus my study on the mediating processes and learning around the use of *rainwater tanks* for domestic and small garden use only. The rationale for a second study site was to pilot a question-based learning resource (Section 1.2 and Section 4.4.3 below) in a second community which also uses rainwater harvesting for domestic purposes. Glenconnor in the Sundays River Valley was then chosen as a second study site as communities there were using water tanks for domestic purposes (1). In line with the site criteria these rainwater tanks were also being used for (2) drought relief, (3) organisational involvement was present, and (4) it was a closer site than Port St. Johns. Chapters Five and Six are dedicated to discussing the context and history of each study site in more detail and show how rainwater harvesting and food gardening practices developed in these areas. Sections 4.4.1.1 and 4.4.1.2 below briefly introduce the two research sites.

4.4.1.1 Cata

Cata (sometimes spelled Chatha) is a rural village located in the Keiskammahoek area of the Eastern Cape Province (BRC, 2007; De Wet & Mgujulwa, 2010: 2). It lies about 80 kilometres north-west of East London, 40 kilometres north-west of King William's Town and 30 kilometres south-east of Stutterheim (Westaway, 1993:4). Keiskammahoek Town is the closest administrative and commercial centre to Cata (De Wet, 1997: 2). Figure 4.5 below is a map showing the location of Cata Village.



Figure 4.5: Map showing location of Cata village (Rouhani, Hinrichsen & Davies, 2010)



Figure 4.6: A view of Cata Dam with Cata Village in the background at the foothills of the mountains (March 2011)



Figure 4.7: Ndela Settlement, Cata village (March 2012)



Figure 4.8: The Amatola Mountains from Nyanga settlement encircle a woman and her rainwater tanks (March 2012)

Debate exists around the name of Cata but some argue that it means “add a little bit”, deriving from the fact that the village is nestled against the Amathole Mountains where many streams join together to form a river and an important catchment area (BRC, 2007: 4). Others argue that it means “a little bit” deriving from the agreement of a local chief to give “a little bit” of land to newcomers (A. Westaway, personal communication, October, 12, 2011) The village was established in the 1850s under British colonial rule and was one of the six villages in the area which took part in the Keiskammahoek Rural Survey (KRS) from 1946 to 1950 (De Wet & Mgujulwa, 2010). Today the village is comprised of three different settlement areas: Nyanga, Skafu and Ndela. As will be discussed in further detail in Chapter Five, a broad range of water management practices including rainwater harvesting for domestic use is practised in Cata, making this village a relevant case study site.

4.4.1.2 Glenconnor

The second case study site was a small peri-urban settlement called Glenconnor located in the local Sundays River Valley Municipality (SRVM) in the Cacadu District Municipality. Glenconnor lies about an hour and a half from the Addo Elephant National Park and is surrounded by game farms and the local citrus industry. Figure 4.9 depicts a map of the Sundays River Valley, representing both Glenconnor and Kleinpoort. Glenconnor and Kleinpoort used to be Transnet (the national railway company) settlements until the trains ceased stopping there (see Figures 4.10 and 4.11).

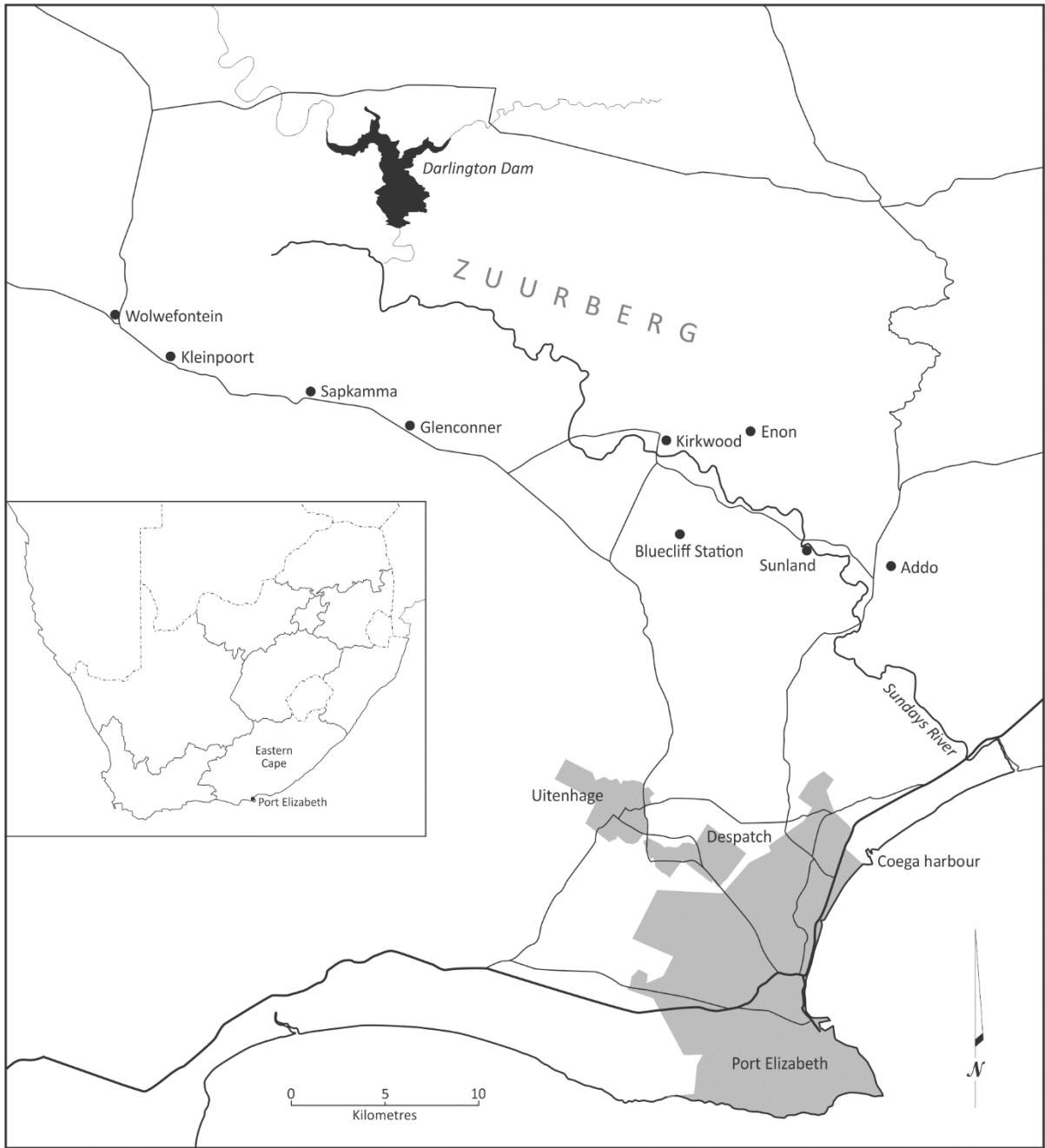


Figure 4.9: Map of the Sundays River Valley showing both Glenconner and Kleinpoort (Connor, 2007: vii).



Figure 4.10: The town of Glenconnor and the railway line that used to carry the national railway company, Transnet, through the town



Figure 4.11 The town of Kleinpoort in the Sundays River Valley

Individuals in this town practise rainwater harvesting and food gardening, making it an appropriate second case study site. I also worked with one research participant in a neighbouring settlement town called Kleinpoort which was about a twenty minute drive from Glenconnor. Both are peri-urban settlements and have similar social, political and ecological histories. My motivation for working with someone from Kleinpoort was that I could not find enough women who matched the research participant profile I was looking for in Glenconnor (see Section 4.4.2 for selection of research participants). The Kleinpoort participant was willing to work with me and she and her husband harvested rainwater and were avid food gardeners. For the purposes of the contextual profile presented in Chapter Six, I will focus on Glenconnor and note where Kleinpoort differs markedly from Glenconnor.

4.4.1.3 Negotiating access

Gaining access to one's research sites is also a process to be undertaken with much care and respect as the way one enters and leaves the field has ethical implications. Bloor and Wood (2006) argued that negotiating access in social science research is both a social and physical process which they referred to as "getting in" and "getting on" respectively. Getting on was achieved throughout the research process by building trust and rapport, learning about and respecting local customs, listening carefully and keeping promises. The ongoing process of building rapport and trust with the research participants is addressed in more detail as I carried out my research methods (Section 4.5). I negotiated initial access in each case study

by visiting each site and being pointed by community members to the ‘people of influence’ to ask permission.

In Cata I was told to report to Boniswa Tonsi, a support officer for the Border Rural Committee (BRC), an organisation concerned with land reform and sustainable rural development (see Section 5.2 and 5.4.2 for more details on the role of the BRC in Cata). The BRC often acts as the middle man between outsiders and any kind of research activities or development projects being implemented in the community. As a result, it made sense to introduce myself to them and ask their permission to conduct research in the village. It seemed that because there were so many research and development projects being implemented in Cata, traditional gatekeepers such as the village chief or headman need not be consulted. After being told by several other people in the Cata community that I need not trouble the chief, I decided that alerting the BRC and gaining permission from my primary research participants was sufficient entry into the site. On reflection though I wish I had gone to the chief out of respect to traditional protocol.

Before conducting a pilot field visit to Glenconnor and Kleinpoort I first sought consent from the ward counsellor for the area at the local municipality in Kirkwood. After not being able to contact him (I called him twice and left a message on his phone) I then gained permission from two other ward councillors who were aware of the SANPAD project and knew the other researchers. Once I had explained my research to the councillors one of them assured me, “There is very little food security because of the water problem. It’s a hit and miss often, so any research in the area is welcome” (Int.9G). I took this as a green light and reported back to her before leaving the field. I also sent a formal letter of permission to another councillor for access to the study site (see Appendix 4 letter to Counsellor Blou). During the pilot field visit to Glenconnor I then asked permission to conduct research from a community development worker (CDW) who represented the community.

Negotiating access to a community through formal gatekeepers is important but gaining access to the lives of the people one actually works with is what really counts and lies at the ethics-in-practice level (Section 4.3). In Cata, Monde Ntshudu was a tremendous help in terms of gaining access to community members. He used to work for Bird Life South Africa in Cata so many people knew and trusted him. Although he was not previously acquainted with the people we interviewed and worked with, it helped that he spoke isiXhosa and had a

way with people which puts them at ease. Generally people were extremely friendly and welcoming and agreed to be interviewed and show us their food gardens. I made it clear that people were under no obligation to take part in the research project. I was cognisant of the power dynamics we as researchers brought into the field however and the fine line between people merely obliging our research needs and sincerely wanting to be part of the research project. These cannot be avoided but one can be aware of how they influence research interactions.

In Glenconnor I could not draw upon the social capital of a person such as Monde who knew members of the community beforehand. Therefore, my fellow researcher/interpreter, Ewald Kruger, and I introduced ourselves to people in the settlements of Glenconnor and Kleinpoort when scoping to see if the site would be suitable for research. People soon let us know who the active members of a community were and we quickly made useful contacts. However, we were careful not to bias the study by focusing too heavily on people who supposedly have power in communities. Due to the fact that I can understand Afrikaans much better than isiXhosa and am able to speak a limited amount of Afrikaans, I found that I was much more successful in building good relationships with my research participants in Glenconnor.

The process of managing and concluding field relationships started with negotiating access, and in all three cases there were three aspects to this process (adapted from Mukute, 2010):

- Giving research participants feedback on what was emerging from the research and getting their feedback;
- Thanking research participants for having taken part in the research process; and
- Bidding research participants farewell.

Conducting research in two sites was a challenge as it required much energy to invest in two communities, build good rapport with each research participant and be trusted and accepted by these communities. At the end of field work, I withdrew from the field by saying goodbye to research participants and giving small gifts of thanks for their time and effort. I am still in intermittent contact with some research participants through social media networks such as Facebook and WhatsApp.

4.4.2 Selection of research participants

In terms of sampling, I used a purposive sampling method which is a non-probability form of sampling (Bryman, 2008). Those selected are chosen for a strategic purpose according to

relevance to the research question in order to understand a social phenomenon such as the social learning process surrounding food and water practices (Bryman, 2008). Purposive sampling does not allow the researcher to generalise to a population because it is a non-probability sampling method (Bryman, 2008).

For my study I initially interviewed a wide sample of women in each study site and then selected four women from that group who I thought had diverse stories of rainwater harvesting and gardening practices and importantly, were willing to work with me. Some women I chose to work with specifically if they had gardens in the past but were not actively gardening in the present so as to understand why this was the case. I thus ended up with eight primary research participants in total. I previously set out to collect eight to ten primary narrative accounts in each study site but decided on four instead. This might seem like a small sample to work with but because I used the narrative enquiry method which requires in-depth interviews, my data was ‘thick’ enough for the purpose of the study. As a general rule when conducting in-depth interviews, once the same story or theme emerges from the interviewees, this is an indication that one has a large enough sample (Boyce & Neale, 2006). I found this to be true when collecting data for this particular study.

In Cata I interviewed about twenty people (both women and men but mostly women, not including the irrigation manager, the manager for WfF and the administrative officer for the BRC in Cata) in order to get a wide enough sample of people (see Chapter Five). Because my work followed on from a previous Masters student in the same village I thought I would perhaps work with several of the same women he had worked with. This was not the case however as he did not work directly with women in the Water for Food (WfF) programme or who gardened independently. Out of these initial interviews I selected four women to work with from Cata. I chose to work with these women because they had rainwater tanks and were using them to garden or had used them in the past to garden.

In Glenconnor there was not as wide a sample of women to work with as the rainwater tank and gardening initiative was smaller compared to the one established in Cata. After initially interviewing several women in Glenconnor and Kleinpoort I selected to work with two women in Glenconnor who were gardening and one other who had attended the gardening workshop but was not gardening due to certain constraints. As explained earlier (Section

1.4.2), I also worked with one woman in Kleinpoort due to the small selection size in Glenconnor.

4.4.3 Phases of the study

As presented in Figure 4.1 the research project as a whole can be thought of as taking place in three phases: Phase One A and B (Chapters Five, Six and Seven), Phase Two (Chapter Eight) and Phase Three (Chapter Nine). Data was only collected in the first two phases of the research process however.

4.4.3.1 Phase One A and B

Phase One A (Chapters Five and Six) responded to the first research question:

What are the mediating processes evident in and surrounding the learning of rainwater harvesting and food gardening in the context of women's water and food security in rural communities?

The analytical sub-question for this phase was:

- Who is learning?

Phase One A provided the context and historicity required to develop a systematic view of each case study and related activity systems. In this phase, I used multiple research methods such as document analysis, semi-structured in-depth interviews and observations (see Section 4.5 below). This methodological triangulation enhanced the validity of the study as discussed in Section 4.3.2.2. My data sources included field notes, a detailed field journal, informal discussions, documentation, transcriptions from semi-structured interviews and informal discussions and photographs.

Preparation for Phase One A in both sites involved careful designing of the research tools (semi-structured, in-depth interviews and observation schedules). I also had to consider what documents to analyse: which documents to look for, where they might be and what to look for in a particular document. Acquiring audio and photography recording equipment were also part of the preparation. As discussed earlier I also had to seek permission to work in each case study site, establish contacts and decide who my primary research participants would be. Fieldwork involved interviews and document analysis. All the interviews were audio recorded and later transcribed. Data collected during this phase was also used to construct

narrative accounts of each primary research participant in order to answer the analytical sub-question of ‘Who is learning?’ (see Section 4.2.2).

As will be discussed (Section 4.5.2) I conducted first stage interviews with primary research participants and contextual interviews with other people in each case study. I then made adjustments to the research tools (interview and observation schedules) according to the feedback from first stage interviews and then conducted follow-up interviews.

Phase One B (Chapter Seven) also responded to the first research question:

What are the mediating processes evident in and surrounding the learning of rainwater harvesting and food gardening in the context of women's water and food security in rural communities?

The analytical focus of this phase was on the mediating processes shaping these practices however so the analytical sub-questions guiding this research phase included:

- Why are they learning?
- How are they learning?
- What are they learning?
- What are the prominent mediating processes shaping their learning and practice?

Analysis within Phase One B used much of the data collected in Phase One A, however I went back into the field and reviewed more documents in order to verify data when necessary during Phase One B. For example, I contacted and interviewed an organisation (Kouga Urban Harvest (Section 6.3.3)) in Phase One B that I did not realise in Phase One A was an important interacting activity system in the Glenconnor central activity system. I then of course adjusted this new information for the previous phase.

4.4.3.2 Phase Two

Phase Two (Chapter Eight) responded to the second research question:

How can a question-based learning resource (QBLR) extend the learning of practices A) out of a specific context and practice (Cata) and B) into a different context but same practice (Glenconnor)?

The analytical sub-questions guiding this phase included:

- How was the resource developed and why? What are the links between the context, practice and the resource? What is the value of developing a resource out of a context/in line with the mediational processes?
- How was it piloted? How did people respond? What questions were people interested in and why? What broader discussions developed around these questions? What questions did people not understand?
- How did it extend their learning? What questions did it not address? How can it be adjusted for different contexts?

In this phase I used focus group discussions (see Sections 4.5.4) to collect data. Together with research participants, we discussed the QBLR, if they found it useful and where improvements could be made. The intention behind this phase was for focus group participants to reflect on their current rainwater harvesting and food gardening practice and to see if the QBLR represented their experiences. The aim of this phase was to investigate the relationship between the QBLR, peoples' practice and their particular contexts.

4.4.3.3 Phase Three

Phase Three (Chapter Nine) synthesises the findings across the study and responds to both the primary research questions. The analytical sub-questions guiding this phase included:

- How is learning embedded in context?
- How do implicit and explicit mediation processes interact?
- What are the implications of this interaction for learning and development in rural water and food security practices?

As mentioned earlier no data was collected during this phase as it was an analytical phase of the research process which is discussed in detail in Section 4.6. Data sources were drawn from findings across Chapters Five through Eight.

4.5 Research methods

As discussed above I collected data in two phases (Phase One and Two) and used multiple data collection techniques. In explaining my data collection methods I also wove in my experience of ethical issues as they arose in the field, providing a more reflexive presentation

of ‘ethics in practice’ (Section 4.3.1). In summary the research methods used in this study included:

- Document analysis;
- Semi-structured interviews;
- Participant observations; and
- Focus group discussions.

4.5.1 Document analysis

Document analysis constituted Phase One and Two of the data collection process. Document analysis is the systematic reviewing or evaluating of documents (Bowen, 2009). According to Chikunda (2013: 175), “Documents carry the culture, history and context of practice”. Given that I was using CHAT, a theory that is historical, cultural and context-dependent, document analysis formed an important part of the data generation process, especially in constructing contextual profiles of each case study. Merriam (2009) offered useful guidelines when using documentary material as data: finding relevant material, keeping an open mind when searching for documents and assessing the authenticity and accuracy of documents. The documents I used in the study included municipal and organisational reports, books, previous studies conducted by researchers on the two study sites and training materials. I obtained some of the documents through tracking down leads from fellow researchers and organisations, being open to new insights, and being sensitive to incoming data. Access to these documents was negotiated prior and during the course of the study. A full list of the documents analysed is provided in Table 4.2 below.

Table 4.2: List of documents analysed

Name of document	What the document provided	Index code
<i>The Cata Story</i>	Contextual information on Cata and the restitution process as well as the prevailing development discourse	Doc1
Charles Phiri Masters thesis: <i>Participation and social learning in communities of practice in natural resource management</i> , Rhodes University	Contextual information on Cata, findings on participation in particular communities of practice around water, recommendations for further study	Doc2

Denison, J. (2010) <i>Pilot Expansion Phase of the Rainwater Harvesting Programme. Close-out report</i>	Contextual information on roll-out of rainwater tanks in Cata and the accompanied training	Doc3
Denison, J. and Wotshela, L., (2009) <i>Indigenous water harvesting and conservation practices: historical context, cases and implications</i> , Water Research Commission report No. TT 392/09, Pretoria.	Contextual information on rainwater harvesting practices throughout southern Africa.	Doc4
BRC Annual Reports 2004-2007	Contextual information on the BRC's various development projects in Cata and specifically the introduction and follow-up of the WfF programme	Doc5 (BRC 2004a) Doc6 (BRC 2004b) Doc7 (BRC 2005a) Doc8 (BRC 2005b) Doc 9 (BRC 2006) Doc10 (BRC 2007a) Doc11 (BRC 2007b)
De Wet, C. J. (1997) <i>From Reserve to Region: apartheid and social change in the Keiskamma District of (former) Ciskei</i> . Grahamstown: Institute of Social and Economic Research, Rhodes University	Historical, educational, political, social and cultural information of the people of Keiskammehoek	Doc12
Field report 1 + 2 (Cata)	Purpose of field trip, reflections on being in the field, condensed outcome of fieldtrip and findings (first phase of analysis)	Doc13
Field report 1 + 2 (Glennconoor/Kleinpoort)	Purpose of field trip, reflections on being in the field, condensed outcome of field trip and findings (first phase of analysis)	Doc14
Connor, T. K. (2007) <i>Opportunity and constraint: historicity, hybridity and notions of cultural identity among farm workers in the Sundays River Valley</i> . Grahamstown: Rhodes University	Contextual (historical, social and political) information on the SRV area, specifically the Addo area	Doc15

Clifford-Holmes, J., Molony, L., Muller, M. and Rivers, N. (2013) <i>Extended Narrative of Change of the Lower Sundays River Valley (LSRV)</i> , Case Study Report (Water Research Commission)	Historical narrative of the Lower SRV through the lens of water developments in the area	Doc16
Khanyisa Education and Development Trust, Narrative Report for Fasternopfer (July-December 2012)	Provides an overview and progress on the work completed for the period January to June 2012	Doc17
Cacadu District Municipality Annual Report (2009-2010 Part 1)	Provides an account of the activities performed by the Cacadu District Municipality during 2009/2010	Doc18
Cacadu District Municipality Annual Report (2011/2012)	Provides an account of the activities performed by the Cacadu District Municipality during 2009/2010	Doc19
TCOE (Trust for Community Outreach and Education) Annual Report 2010	Provides an overview of the activities of the TCOE and its affiliates in the SRV area	Doc20

Document analysis serves several purposes. The first is that it can provide data on the context of the research in terms of background information and historical insight (Yin, 2009). Secondly, document analysis has the potential to generate questions that should be asked in the field as well as alerting the researcher to observations needed to be made (Bowen, 2009). Document analysis can also provide supplementary research data and act as a means to track change and development. For example, some of the documents I analysed were annual reports from an organisation in the Cata case study which allowed me to track the changes in the Water for Food (WfF) programme (Section 5.4.3) as it developed in the village. Another advantage of document analysis is its unobtrusive and non-reactive nature; one can infer issues of a sensitive nature of the object of study with minimum human reaction. Lastly, documents can also verify findings in that when documents are corroboratory with other data sources, the researcher can have greater confidence in the credibility of research findings (Bowen, 2009). An example of this is when an annual report from the Cata case study verified what a research participant had said concerning a decline in participation in the WfF Movement:

Nothemba Languva: This CPWP could be the reason why we are no longer meeting on a regular basis because this programme is diverse in terms of what is happening.

A 2007 BRC report confirmed this finding:

BRC report 2007b: This project has, for some time, been hampered by flagging levels of commitment and interest on the side of participants... The analysis put forward in the meeting was that the soaring levels of job creation and economic activity in Cata meant that the labour-intensive requirements of the project are now regarded as too onerous and not worth the return.

In terms of analysis, data from documents can be used in the same manner as data from interviews or observations. The data can offer descriptive information, verify emerging hypotheses, advance new categories and offer historical understanding and developments. The documents I used, for example, assisted me in contextualising each case study site as well as in understanding the development of rainwater harvesting and food gardening practices in the sites. Analysis of documents also helped me understand what contextual processes were mediating and shaping these practices and to know from there, what to look for and what to investigate further through other research methods of interviews and observations.

4.5.2 Semi-structured interviews

As part of Phase One of my data collection process I conducted semi-structured in-depth interviews with women who practised rainwater harvesting and food gardening. Semi-structured in-depth interviews are a qualitative data collection tool that allow a researcher to deeply explore a respondent's attitudes and feelings in detail about a particular topic (Guion, Diehl, & MacDonald, 2001). Patton (2002: 340-341) added that interviews are a conversation the researcher has with research participants to find out what is on their minds:

We interview people to find out from them those things that we cannot directly observe ... we cannot observe feelings, thoughts and intentions, we cannot observe behaviours that took place at some previous point in time ... We cannot observe how people have organised the world and the meanings they attach to what goes on in the world. We have to ask about things. The purpose of interviewing, then, is to allow us to enter into the other person's perspective.

Through these conversations, interviews usually produce "rich" data (Gillham, 2000). The flexibility of semi-structured interviewing allowed me to obtain relevant data from different

participants and I often found that respondents' 'tangents' produced rich data. This format also allowed me to respond to the situation at hand and to investigate broader contextual issues within the respondents' lives. During interviews I also used an electronic voice recorder which enabled me to give my full attention to my research participants and made conversation flow easily as I was not hindered by taking notes. From these recordings I was also able to transcribe these interviews verbatim.

In designing interview questions Wengraf (2001:63) offered the CRQ-TQ-IQ (II) algorithm. Following this algorithm I used my Central Research Question (CRQ) (*What are the mediating processes evident in and surrounding the learning of rainwater harvesting and food gardening practices in the context of women's water and food security in rural communities?*) to design several Theory Questions (TQ). I used the CHAT framework to develop my central Theory Questions, focusing on how the mediating tools, community, division of labour and rules mediate learning in each activity system. From these Theory Questions I then designed Interview Questions (IQ). It would have been unfruitful to pose a Theory Question to an interviewee of how, for example, the mediating tools or division of labour mediate her learning. Instead, I designed an appropriate set of Interview Questions from this Theory Question such as, "Do you have any problems with your water tank?" or "Who helps you in the garden" (see Appendix 6)? The point of this algorithm is to avoid the effects of couching informant questions in researcher language which will almost always result in the interviewee not understanding the question and providing flat or irrelevant responses (Wengraf, 2001). The aim of these interviews was to elicit my respondents' accounts of their own practices of rainwater harvesting and food gardening so as to enable them to investigate their own understanding of how they learn and what factors mediate this learning. I also used certain techniques to ensure rigour and depth, such as asking open-ended questions, probing, immediately cross-checking important details and audio recording interviews.

I conducted a total of 22 interviews in Phase One with various research participants. In my coding of data (Section 4.6) I categorised my interviews into 'primary interviews' and 'contextual interviews'. Table 4.2 shows a summary of the interviews conducted in each case study site. Within the Cata case study there were five activity systems (refer back to Figure 4.2.). These are the rainwater harvesters and food gardeners in Cata themselves (Cata

rainwater harvesters and food gardeners' central activity system), the Border Rural Committee (BRC) the Water for Food Movement (WfF), Umhlaba Consulting and Earth Harmony Innovators.

For the Cata case study site, I conducted ten interviews, four primary and six contextual. I do not include in this total number of interviews the initial pilot interviews I conducted with several other research participants in order to select primary research participants. As mentioned above (Section 4.4.2) on my first field visit to both sites I interviewed about ten to fifteen women in order to get a good selection of people to choose to work with as my primary research participants. The four primary interviews were with the four primary female rainwater harvesters and food gardeners that I selected to work with for reasons discussed earlier (Section 4.4.2). I also conducted follow-up interviews (see Appendix 7) with each primary research participant which is why interviews 1-4 for both sites in Table 4.3 below are marked A and B. I then carried out interviews with residents of Cata and organisations working in the area such as the Border Rural Committee (BRC), the Water for Food programme, Umhlaba Consulting and Earth Harmony Innovators in order to gain a contextual understanding of the village as well as how rainwater harvesting and food gardening practices emerged there.

Within the Glenconnor case study there were three activity systems (refer back to Figure 4.2). These were the rainwater harvesters and food gardeners in Glenconnor themselves (Glenconnor rainwater harvesters and food gardeners' central activity system), the Khanyisa Education and Development Trust and the Kouga Urban Harvest garden training project. In the Glenconnor case study site I conducted a total of twelve interviews, four primary and eight contextual. As with the Cata case, the four primary research participants in Glenconnor were the female rainwater harvesters and food gardeners I chose to focus on for the central activity system. As in Cata, I also conducted follow-up interviews with these four women. I then conducted a further eight more contextual interviews with residents of the town and organisations such as Khanyisa and Kouga Urban Harvest to gain a contextual understanding of the area as well as the development of rainwater harvesting and food gardening practices.

Included in the contextual interviews for both sites were organisations and individuals that were not central to the study but nevertheless contributed to my contextual understanding of each site. These included an interview with Monde Ntshudu, the Xhosa interpreter in this

study (see below) and who previously worked as a manager for Bird Life South Africa in Cata for two years. He therefore had valuable local knowledge and insight about the village. I also interviewed the Cata Irrigation Scheme manager to investigate the sustainability of development projects in the area. For the Glenconnor case study I interviewed a Grahamstown-based NGO called the Umthathi Training Project in order to gain another perspective on factors that mediate training around rainwater harvesting and food gardening. Umthathi also conducted training in the Sundays River Valley several years previously.

Table 4.3: Summary of interviews conducted in Phase One

Cata case study			
Interviewee	Gender	Designation	Date of interview
Int.1CA, B (primary Int.) Nothemba Languva	F	CCAS/WfF	March/ October 2012
Int.2CA, B (primary Int.) Castina Gcilitshama	F	CCAS	March/ October 2012
Int.3CA, B (primary Int.) Bolekwa Ntusi	F	CCAS/WfF	March/ October 2012
Int.4CA, B (primary Int.) Sisiwe Khiba	F	CCAS/WfF	March/ October 2012
Int.5C (contextual Int.) Boniswa Tontsi	F	BRC (Support Officer)	March, 2012
Int.6C (contextual Int.)	M	Cata Irrigation Scheme (manager)	March, 2012
Int.7C (contextual Int.) Monde Ntshudu	M	Bird Life SA (previous Cata manager)	March, 2012
Int.8C (contextual Int.) Phumzela	M	WfF (Cata chairperson)	March, 2012
Int.9C (contextual Int.) Jonathan Denison	M	Umhlaba Consulting	August, 2012
Int.10C (contextual Int.) Tim Wigley	M	Earth Harmony Innovators	October, 2012
Glenconnor/Kleinpoort case study			
Int.1GA, B (primary Int.) Elizabeth Flip	F	GCAS	May 2012/ January, 2013
Int.2GA, B (primary Int.) Mieta Plaatjies	F	GCAS	May 2012/ January, 2013
Int.3GA, B (primary Int.) Anna Armoed	F	GCAS	May 2012/ January, 2013
Int.4GA, B (primary Int.) Evelyn Jackson	F	GCAS	May 2012/ January, 2013
Int.5G (contextual Int.) Mr Plaatjies	M	Community Development Worker	May, 2012
Int.6G (contextual Int.)	M	Glenconnor resident	May 2012
Int.7G (contextual Int.)	M	Glenconnor resident	May, 2012
Int.8G (contextual Int.)	F	Glenconnor resident	May, 2012
Int.9G (contextual Int.)	F	DA Ward Councillors (Kirkwood)	May, 2012
Int.10G (contextual Int.) Gerald Mkele	M	Khanyisa Educational Trust	July, 2012
Int.11G (contextual Int.)	M and F	Umthathi Training Project	October, 2012
Int.12G (contextual Int.) Jakkie Botha	F	Kouga Urban Harvest Garden Training	February, 2013

Key: CCAS-Cata Central Activity System; GCAS-Glenconnor Central Activity System. (Where no names are provided for certain interviewees, these were not documented).

Language barrier

One constraint in conducting interviews and listening to people's stories was the language barrier. In Cata most people speak isiXhosa with a few people having a very basic understanding of English. I worked with Monde Ntshudu, a very experienced interpreter however, which made conducting interviews a pleasure. Monde had a wonderful rapport with people and was skilled at posing questions and then translating and relaying information back to an English speaker such as myself. As mentioned earlier, Monde also used to live and work in Cata for Bird Life SA so some people already knew and trusted him, making entry into the field and building rapport with research participants that much easier. I did find it frustrating however not being able to hold conversations directly with some research participants and build my own rapport with them. As a partial solution to this problem I chose to pose questions directly to research participants in English however, saying for example, "Where did you collect water in the past?" as opposed to posing the question to Monde first and asking him, "Where did she collect water in the past?" It was strange at first asking a question directly to a person who could not understand me but it helped in making me feel more part of the conversation. When we did more practical things, like walking through food gardens or observing rainwater tanks I found there was more opportunity to make a human connection by sharing a joke or commenting on the weather for example. Monde was very skilled at maintaining a balance between aiding me where I needed it and providing me with the space to guide the interview process. In the beginning of 2012 I enrolled in a five-month conversational isiXhosa course at Rhodes University in order to gain a basic grasp of the language. My knowledge after the course allowed me to exchange greetings and information about work, studying and family but nothing that would allow me to conduct in-depth interviews. This did, however, help me build a better rapport with participants and demonstrated that I was willing to make the effort to learn their language.

Conducting interviews in Glenconnor was a bit more of a challenge. Most people in this area either speak isiXhosa and Afrikaans or a bit of both and some research participants could speak English fluently. A fellow SANPAD researcher accompanied me on my first field visit to Glenconnor and was a fluent isiXhosa speaker but was not practised in translating to English. As a result, I felt that I missed out many nuances in the pilot interviews. As these interviews were recorded however I asked Monde to listen and translate them for me afterwards which resulted in further useful data. In our initial interactions with people in

Glenn Connor we discovered that most people were more comfortable speaking Afrikaans. I attempted conducting interviews in my broken Afrikaans which made people feel uncomfortable and stunted the interviews. In the Second Phase of research, an Afrikaans translator, Ewald Kruger, accompanied me in the field which made a marked difference in communicating with participants. Because of the language barrier in both study sites, socio-cultural phenomena at the linguistic level (metaphors and proverbs that mediate learning) were not my primary focus.

Another concern was suggested by my supervisors: perhaps because my research focus was on women the interpreters I worked with should be women as well. The logic was that perhaps female participants would feel more comfortable talking to another woman. Although I was very happy working with Monde I worked with a female interpreter for a day to see if there was a significant difference in responses from research participants. Monde and I then interviewed two women from the Cata community recommended by a BRC representative at the Cata museum. The first woman we interviewed was extremely nervous and did not fully understand the concept of interpreting. The second woman was better at understanding English and appeared to understand the concept of translating. I worked with this woman for a morning, recording interviews as we went. During our interviews with other people I found out that the lady translating for me was also part of the Water for Food programme. This introduced complications during interviews as she tried to answer questions herself as opposed to translating and posing the questions directly to the women we were interviewing. I asked Monde to listen to the interviews I conducted with this woman in order to judge how competent she was at translating. After listening to these, Monde recommended in a report:

I seriously think Nina should use another person as a translator next time, as this translator could not understand some of the questions that Nina asked (e.g. Question asked: Is water in Cata a concern? Translator: Is Cata water a concern?) Also the fact that her current translator is a member of WfF will not enable the interviews to be as open as they would if it was somebody outside the WfF.

After some consideration it was agreed with my supervisors that because the research content was not of a sensitive nature, working with an experienced male translator such as Monde would be more beneficial for the data collection than a female translator who was uncomfortable with interpreting or unfamiliar with field work in general. I decided then to continue working with Monde as we worked well together.

Ethical concerns

In terms of conducting interviews in an ethical manner I aimed to be sensitive to both ‘procedural ethics’ and ‘ethics in practice’ (Section 4.3). Before beginning each interview I asked either Monde or Ewald to explain to each interviewee the research study we were engaged in, why we had chosen them to interview, that they were under no obligation to take part in the study and were welcome to withdraw from the study at any time if they felt uncomfortable. As discussed above with regard to anonymity (Section 4.3.3), initially I assured people their identities would remain anonymous but when I later went back to conduct respondent validation or member checking (Section 4.3.2.3) with participants they were content to have their real names used as they felt the information was not of a sensitive nature. Some research participants, after seeing themselves in the QBLR, were excited to have their real names and photographs appear in the learning resource (see Section 8.2.1.2). As a result, I have used the real names of my research participants.

In terms of ‘ethics in practice’ the researcher must also be mindful of the power dynamics at play within the research process. One thing that struck me during interviews was that some people, usually younger women and men, were very self-conscious and shy about being interviewed or contributing during focus group discussions. In some instances perhaps they saw themselves as uneducated and therefore felt that what they had to say was of little value. In other instances I tried to imagine how two researchers from a well-known tertiary institution could potentially be intimidating when requesting an interview. While conducting interviews therefore I tried to make the research participants feel respected and at ease by being friendly and humble and communicating how we hoped to learn from them. This was in accordance with Gillham’s argument (2000) that a researcher must establish credibility and earn the trust of people first.

Another ethical issue I had to negotiate was the expectations of research participants in terms of what my research study would offer back to their communities. One of my key research participants, when describing the socio-political problems in her town commented, “People like you encourage me now” (Int.6Ga). The presence of researchers taking interest in small communities and their daily struggles can lead to false expectations. I was clear with the people I worked with that all I was doing was inviting them to be part of a knowledge project that would hopefully benefit others around similar food and water security practices. As a small token of appreciation for their time and energy I gave small food parcels of essential

food such as rice, sugar, oil and maize meal to participants in both sites. I also took a gift of beetroot seeds to participants in Glenconnor who were starting up a community food garden.

The issue of researchers giving back to research communities was again raised in an interview with a field officer from the Khanyisa Education and Development Trust working in Glenconnor. After finishing off my interview, I ended by asking him if he had any questions or further comments. He then respectfully challenged me by asking what I was giving back to Glenconnor and how I was working with them. I first responded by explaining that as researchers we have to be very careful about introducing misguided expectations into communities. I then explained that ours was a knowledge project and that all we were realistically doing was inviting people to participate building knowledge around their practices. After this conversation I saw this NGO worker and I as existing within a system of accountability where a civil society actor and a research institution hold each other accountable for ethical conduct in the field. This is an illustration of ‘ethics in practice’ in the research field.

Each interview was transcribed word for word. Although this was a time-consuming and onerous task I found it immensely useful for becoming acquainted with my interview data. Transcribing prepared me for the analysis stage of the research processes in that as I listened to interviews again, I could already identify patterns across interviews and select relevant information. For some transcriptions I edited the written versions in order to make the ‘untidiness’ of informal, spontaneous speech more accessible. For example, where a transcript recorded: “... it’s all good and well but you’re basically then targeting the ... because it’s the most vulnerable people and that’s an important target group” (Int.9C), I would quote this as: “...it’s all good and well but you’re basically then targeting the ... most vulnerable people and that’s an important target group...” I kept editing to a minimum and I do not believe that these minor editorial changes compromised the validity of the data because I never changed the content or meaning of what was said.

4.5.3 Participant observation

While conducting interviews I also carried out participant observations as another part of Phase One and Two of the data collection process. One of the main aims of participant observation is to understand and look into the social world from an insider’s perspective (Foster, 1996). Social situations are also approached with a wide-angle lens where the

participant observer takes in a broader spectrum of information and becomes more introspective about what is observed (Spradley, 1980). Observation gives direct access to social interactions and insight into those events that are so familiar to members of an activity system that they are never commented on, questioned or made explicit (Simpson & Tuson, 2003: 16). Often what is not said and what is done amongst communities is extremely significant and revealing about practices and beliefs. Participant observation was thus an appropriate method to identify how people interact with each other, the division of labour, rules that govern certain communities and the implicit and explicit mediating artefacts and tools that influence learning within these water practices.

Gold (in Bryman, 2008) identified four participant observer roles: complete participant, participant-as-observer, observer-as-participant and complete observer. My role as a researcher fell within the observer-as-participant: I was mainly an interviewer who used observation but this did not involve actual participation in the daily lives of my research participants. I did try to establish friendships with my key participants though, walking around their gardens, having a drink in their houses, asking after their families and the general and specific challenges they were facing in their lives. Unfortunately Monde, Ewald and I did not have the time nor the budget to spend long weeks in the field. In Glenconnor I attended church one Sunday morning with three of my four key research participants which was helpful in gaining a broader understanding and insight into their daily lives and activities. It was a Christian church and as I am also Christian I felt I was playing the role of participant-as-observer (Bryman, 2008). The congregation prayed for my family before the closing of the service and I prayed for them as a community. Even though I was participating in the service I also had my camera there as a researcher to document the experience. By the end of my second field trip to Glenconnor, I felt more part of their community compared with Cata. This is partly due to the fact that in Glenconnor we held focus groups in people's houses which made interactions more intimate and personal. The risk of the observer-as-participant role is that without satisfactory immersion in the field the researcher could make fallacious assumptions and conclusions about participants' lives and practices. I overcame this by triangulating my data (Section 4.3.2.2) and using respondent validation (Section 4.3.2.3).

In order to observe their rainwater harvesting and food gardening practices and the learning surrounding these activities, I spent time with research participants at their homesteads and observed the outcomes of their learning through the productivity of their food gardens. For

each site I took detailed photographs of rainwater harvesting systems including rainwater tanks, gutters and catch pits as well as other techniques used such as trenches and swales. I also took photographs of food gardens and various food gardening techniques. I kept a detailed field journal (see Appendix 3) in which I wrote down full field notes each evening after a day in the field. Lofland and Lofland (in Bryman, 2001) identified three types of field notes: mental notes, jotted notes and full field notes. While walking around with research participants I would often make mental notes and then write them down as soon as I had a chance. During interviews or focus groups I would jot down notes as people were speaking and then I would record my impressions in my field journal, noting initial ideas of interpretation. At each site I looked for both the explicit and implicit mediating processes influencing learning. An example of the kinds of detail I often noted were the materials houses were made of, the furnishings inside the houses, if participants owned livestock, the number, if any, of rainwater tanks around the house, how many people were around the household at the time of my visit and if the household owned a car.

4.5.4 Focus group discussions

During Phase Two of the research process I conducted focus group discussions to pilot the question-based learning resource (QBLR) in both my research sites of Cata and Glenconnor (see Chapter Eight). The focus group method is a form of group interview where questioning revolves around a tightly defined or *focused* topic and the emphasis is on “the joint construction of meaning” (Bryman, 2008: 474). Focus groups are used across a wide field of disciplines within academia including sociology, education, communication studies and public health (Morgan, 1996). The nature of these focus groups lay between focus group interviews and workshops as not only were we attempting to gain people’s views on the QBLR but we were trying to pilot and observe people’s responses to the booklet and each other in this context. The advantage of focus groups is that participants both query each other as well as explain themselves to each other, thus building meaning together (Morgan, 1996). Similarly, Kitzinger (in Bryman, 2008) distinguished between two types of interactions between group participants: complementary and argumentative. In complementary interactions, participants generally agree with each other and reach a consensus on a topic while in argumentative interactions they are forced to question their own grounds for certain beliefs. Arguments, contradictions and tensions that emerge during these discussions are revealing of certain frames people hold and why they hold them.

The aim of the focus groups was to observe how participants engage with the QBLR as well as to see how they interact with each other (Lambert & Loiselle, 2007). In using the focus group method we tried to observe if and how the learning resource generated a dialogue between people. The QBLR itself was divided into two sections: the first was called ‘Harvesting rainwater’ and the second ‘Food security and rainwater harvesting’ with accompanying questions under each section (see Appendix 8 for draft question-based learning resource). These questions ranged from ‘Why are rainwater tanks so important?’ to ‘How can I harvest ground water?’ and on to ‘How can we support each other to have water and food all the time?’ The QBLR can be considered the first level of dialogue with the focus groups the second level of dialogue. Table 4.4 below summarises the focus groups conducted in each case study site.

Table 4.4: List of focus group discussions (Cata, Glenconnor and Kleinpoort)

Focus group	Reason for focus group	Location and date
FG1C (focus group 1 Cata)	To pilot the question-based learning resource with community members	Cata 30 September - 2 October 2012
FG2C (focus group 2 Cata)	To pilot the question-based learning resource with community members	Cata 31 September - 2 October 2012
FG1G (focus group 1 Glenconnor)	To pilot the question-based learning resource with community members	Glenconnor 26 - 29 January 2013
FG2G (focus group 2 Glenconnor)	To pilot the question-based learning resource with community members	Glenconnor 26 January, 2013
FG3K (focus group 3 Kleinpoort)	To pilot the question-based learning resource with community members	Kleinpoort 29 - 30 January 2013

4.5.4.1 Focus group discussions: Cata

Monde and I were in the field from Monday, 28 October to Friday, 2 November 2012. We recruited people on the first day of our field trip and were careful not to set up expectations as to what we were not offering, i.e. rainwater tanks or money. Focus group participants included people we had worked with in Phase One of the research process as well as others who gardened, either had rainwater tanks or did not, or who were part of Water for Food movement (WfF) or were not. This selection of research participants may appear to constitute a rather loose association of people but the aim of the focus groups was to pilot and test how

people learn together and dialogue around a learning resource, with those who are familiar with and do these practices and those who are not. The aim was to observe how people responded to each other's views and how certain views are built upon through this dialogue (Bryman, 2008). Focus group discussions were run in isiXhosa by Monde, who was interpreter and group facilitator, as all of the focus group participants were isiXhosa speakers. I made notes and aided him in the general facilitation of the sessions including handing out pens and booklets, making coffee and tea for people and taking photographs. We conducted interviews in the Cata museum housed within the community hall so as to be in a neutral space. In the beginning of the first focus group sessions, Monde introduced the reason for the focus groups, the reason for recording the sessions and the format of the focus group sessions. I also asked participants to fill out forms which contained socio-demographic information such as age, gender, level of education and occupation (see Appendix 9). At the end of each focus group session we would confirm who could attend the following day and arrange collection times.

Monde and I ran two focus group sessions each day for four days. Due to time and resource constraints we only had two focus groups (Group A and Group B) which we worked with but this proved sufficient to generate enough data. I thought it was important to have the same groups come in day after day as we needed people to become familiar with not only the structure of the QBLR but also with the structure of the focus group sessions as well as each other. The data from only these two focus groups was still significant in that the aim was to observe how people respond to each other's views and to dialogue around the resource. It took time to organise and get members of a group together and sometimes sessions would go beyond the one hour time frame set if participants had much to say about a certain section or topic.

In terms of size of the groups we decided that we should have no more than six people in each group for the sake of helping people feel at ease with sharing opinions. During focus group discussions it was also discovered that people preferred working in smaller groups and one participant even noted that people learn better in smaller groups (FG1C). The first focus group (Focus Group 1 Cata or FG1C) was held in the mornings and consisted of five people (four women and one man). On occasions we only had three participants due to some people not being able to attend due to other commitments. This group was actively engaged in the learning process and dialogued with Monde and each other. The second focus group (FG2C),

held in the afternoons, was comprised of four people (we did recruit five but the fifth person never came): three women and one man. On some afternoons we only had three people and this group was much more reserved and more difficult to work with in terms of engaging with the QBLR, the facilitator and each other. There are many factors that could have contributed to this: shyness, literacy levels, boredom, the fact that the sessions were in the afternoons or that people perhaps felt that the QBLR was not relevant to them.

Both groups were comprised of mostly older community members (aged between 30 and 80 years) who were gardening and collecting rainwater or were interested in gardening and rainwater harvesting. Most of the people in the group knew each other or knew of each other as Cata is a small village. Some researchers prefer to have participants who are unknown to each other so as to eliminate pre-existing ways of interacting or status differences but because I was also interested in how knowledge is mediated and shared among communities, it was good to have members who belonged to the WfF programme, for example, in the same focus groups (Bryman, 2008). We did not include younger generations in the focus groups as the focus discussions were held during school hours. It would have been interesting to observe how they engaged with the QBLR and to see if they were involved in gardening and rainwater harvesting practices.

In terms of the level of involvement of the facilitator it was decided with the help of my supervisor that group participants should choose the questions to discuss in which they were most interested. Not only did this allow people to feel like they 'owned' the discussions but it gave us an idea of what resonated with people the most and what linked most directly to their experience of gardening and rainwater harvesting. This structure allowed participants to exercise a fair degree of control over their own interactions (Morgan, 1996). While people were still becoming acquainted with the QBLR and structure of the focus group sessions, I observed that Monde would do most of the talking. By the second and third day however, conversation around the different topics was animated and Monde would often sit back and allow conversations to unfold. While Monde gave as much freedom to participants as possible to steer the focus groups themselves, he did try to cover questions in both sections. Where focus group participants were not as ready to engage with the QBLR and each other, as in the second focus group, Monde patiently went through different sections of the resource, prompting them with questions. When sessions were strained and people were not interested, we decided not to exasperate people by continuing and on one occasion Monde cut a session

short. We learned that researchers have to be flexible when working with groups of people and the dynamics that accompany these. At the last focus groups Monde and I thanked the participants for their time and for agreeing to participate. As discussed earlier, I gave gift packages of food stuff to focus group participants to thank them for their time.

4.5.4.2 Focus group discussions: Glenconnor and Kleinpoort

I conducted focus groups in my second research site, Glenconnor, at the end of January 2013 (Friday 25 to Wednesday 30). Unlike in Cata where Monde and I sought out and asked focus group participants ourselves, I sought the help of an active member of the community to invite people to focus groups in Glenconnor. In this sense, my access to some of the focus group participants was mediated by another. Participation in all groups was voluntary however. Knowing that some people would have to go to work during the week we arrived on the Friday to set up focus groups over the weekend. We ran our first focus groups on Saturday morning and afternoon, one on Sunday, one on Monday, two on Tuesday and one on Wednesday morning.

As in Cata, we had a total of seven focus group sessions. We also made the purpose of the focus group discussions clear to participants as well as what they could expect. Ewald facilitated the focus group discussions while I aided him as I did Monde with the logistics of the sessions and documentation. We ran three focus groups over this period: two in Glenconnor and one in Kleinpoort. Originally we planned only to work in Glenconnor but we were unable to find enough people for two *consistent* focus groups so we worked in Kleinpoort for our third focus group.

The people in our first focus group in Glenconnor (Focus Group 1 Glenconnor or FG1G) were very enthusiastic and eager to work with the QBLR. We ran four sessions with this focus group and gained much positive and constructive feedback from these individuals. We found that even though we explained to people that we would like to have the same people in each focus group for consistency's sake, their lives and daily schedules did not permit this. In two of the three focus groups we had two or three core participants and then found that we were missing people from the previous session or new people had joined. Ewald did an excellent job including new members in the group however.

The second focus group (FG2G) was only run once in Glenconnor (Saturday afternoon) as there were only three members, two of which lived away from Glenconnor during the week

and were thus unable to attend further. We were then left with only one focus group in Glenconnor and invited the one remaining woman from focus group 2 (FG2G) to join focus group 1 (FG1G). The first and only session with this group went well though. People were interested and engaged in the subject.

The third focus group (FG3K) was held in Kleinpoort. This group ranged from nine to five participants. Although we did nothing different with this group compared to the others, the dynamics of this group were very different to the previous two. People were reserved and shy to speak and did not seem that enthusiastic about the QBLR. We unfortunately were only able to conduct two focus group sessions with them due to time constraints but both Ewald and I felt that given more time, the dynamics of the group would probably not have changed. There are many possible reasons for the difference in the dynamics of this group. Ewald thought that perhaps it had to do with the fact that this community was not as cohesive and close as the Glenconnor community (he was told that there was some fighting going on between neighbours). Several young people in the first session were quite shy and not confident in their reading and speaking abilities. This was also true for some of the older people in the group. Alternatively, perhaps people found it intimidating to speak in a large group, or were not particularly interested in the focus. Although Ewald did try to persevere with this group, he, like Monde, cut the session short when he saw that people were losing interest.

When introducing people to the QBLR we worked in the same way Monde did with the groups, allowing them to choose sections they were interested in and therefore gaining insight into what issues around rainwater harvesting were most pertinent to them. Ewald worked very creatively with the booklet, using different methods of engaging people in their learning (see Section 8.2.2). During the first session he usually eased the group into the topic of water and rainwater harvesting by asking how they learned about and used water in the past and where, how and who they learned this from. Ewald was also very practical, taking groups outside to learn about their tanks and gutters. Another technique he used was to split focus groups up into reading groups to see if they could work with the booklet independently from him. They would then re-group to discuss a particular section.

Many people in these towns are bilingual and speak both Afrikaans and isiXhosa and several people speak English as well. The predominant language spoken in these two towns is Afrikaans. It is interesting to note that on my first field visit to Glenconnor and Kleinpoort I

invited an isiXhosa speaker with me to interpret during interviews. Because I had an isiXhosa translator, most people spoke isiXhosa to us. There were several people who could only speak Afrikaans in which case I tried to converse with them in my limited Afrikaans but I made the assumption, incorrectly, that most people would speak isiXhosa. In Phase Two of the research process, I invited both Ewald and Monde as I thought we would have to conduct focus groups in Afrikaans and isiXhosa. We quickly found out however that most people spoke Afrikaans in this area. So Monde returned home and Ewald, an Afrikaans speaker, facilitated focus groups in Afrikaans as well as aided me in my follow-up interviews. It was interesting to hear focus groups run in Afrikaans as my Afrikaans is far better than my Xhosa and I could actually follow conversations in Afrikaans. I could therefore make more notes on what was being said and could join in on jokes within the group, for example, which made me feel more part of the group and closer to the research. When Monde conducted focus groups in isiXhosa I unfortunately felt quite removed from the whole process.

Having two different facilitators such as Monde and Ewald also produced data on different facilitation and teaching styles and ways to work with the QBLR. Unfortunately Monde did not have the opportunity to carry out practical demonstrations with the groups as the weather at the time was extremely wet and stormy in Cata. This both aided in our research and detracted from it. People commented that if the weather had been better they would probably have chosen to stay at home and work in their gardens but at the same time this prevented us from going outside and doing practical things with the groups as well. The weather in Glenconnor and Kleinpoort also impacted on the groups. Most days were extremely hot and we could therefore only take groups out for short periods for practical demonstrations. Despite the hot weather FG1G and FG2G were still very engaged and lively in their conversations. As in Cata, we gave focus group participants in Glenconnor thank you gifts when the focus groups were finished.

Limitations of focus groups

The focus group method I employed for Phase Two of the research process produced a considerable amount of relevant and useful data. There are several limitations to focus groups however. They can be difficult to organise as Monde and I discovered (Bryman, 2008). One not only has to secure the agreement of people to participate but one has to trust that people will arrive at a specific time and place. Stormy and wet weather made it difficult

to organise focus groups in Cata and even prevented us from running a session on one occasion.

Running focus groups is also challenging because of the need to coordinate participants' daily schedules. Most of our participants were either retired or unemployed so were able to attend our focus groups. One problem however was that focus groups fell over the beginning of the month when pensioners collect their monthly pensions and government grants. Several participants were unable to attend focus group discussions on two occasions for this reason. Another lady had a job and was unable to attend the morning focus group so we gave her a resource booklet and a questionnaire to answer at home. In Glenconnor most people worked which is why we started the focus groups over a weekend. During the week the groups varied but we tried to accommodate people by conducting sessions in the afternoon when more people could attend.

Another perceived limitation of focus groups is that the researcher or facilitator has less control of the proceedings of the discussion than in an individual interview (Bryman, 2008). This however is often seen as an advantage by many researchers as the structure of group discussions allows participants more freedom and ownership of the interviews. As discussed earlier, focus group participants needed more encouragement in Cata to take control of the sessions than in Glenconnor. The first focus group in Glenconnor, for example, was extremely enthusiastic and at times had to be brought back to the topic. The tangents did however give immense insight into what issues concerned these communities the most so we did not overly restrict digressions (see Section 8.2.2.2).

Another limitation or difficulty with focus groups is that a large amount of data is generated very quickly which is often difficult to analyse in terms of developing a strategy to account for what people say as well as the interactions that take place between them (Bryman, 2008). Transcribing focus group discussions are also challenging as they are time consuming, there are sometimes inaudible elements and it can be difficult to know who is talking because participants may speak over each other. Because focus groups were conducted in isiXhosa and Afrikaans I had to ask Monde and Ewald to transcribe and translate so I could analyse which was very time-consuming for them. Table 4.5 below provides a summary of the data corpus for this study.

Table 4.5: Summary of data corpus

Data type	Date and place of collection	Reason for field visit
Field visits and duration in field (10 field visits)	Cata: 5 field visits 1. October 2011	Introduction into field, scoping and contextual profiling
	2. 20-24 March 2012	Preliminary interviews and field observations
	3. 10 December 2012	Attended initiate ceremonial celebration
	4. 20 June 2012	One-day contact session with participants
	5. 29 October - 2 November 2012	Follow-up interviews, observations and focus group discussions
Glenconnor and Kleinpoort: 5 field visits	1. 9-12 May 2012	Introduction into field, scoping, contextual profiling and preliminary interviews
	2. 16 May 2012	Workshop in Addo, SRV: <i>Sharing GIS resources in the Lower Sunday's River Valley</i> . Organised by Institute for Water Research (IWR) and Agricultural Research Council (ARC)
	3. 15 July 2012	Port Elizabeth for interviewing and contextual profile of Khanyisa Educational and Development Trust
	4. September 2012	Port Elizabeth for meeting with WRC team and Khanyisa to discuss participation in Mediator's Pilot Course
	5. 25-30 January 2013	Follow up interviews, observations and focus group discussions
Documents (1-20 documents reviewed)	October 2011 - present	Historical, educational, political, social and cultural information; activities performed and reports by organisations and municipalities
Interviews (22)	Location and date	Reason for interviews
Cata - 4 primary, 6 contextual	Cata: October 2011 - November 2012	Collection of narrative detail and contextual information
Glenconnor/Kleinpoort - 4 primary, 8 contextual	Glenconnor/Kleinpoort: May 2012 - January 2013	Collection of narrative detail and contextual information

Focus group discussions (14: 7 Cata, 7 Glenconnor/Kleinpoort)	Location and date	Reason for focus group
FG1C (focus group 1 Cata)	Cata 30 September - 2 October 2012	To pilot the question-based learning resource with community members
FG2C (focus group 2 Cata)	Cata 31 September - 2 October 2012	To pilot the question-based learning resource with community members
FG1G (focus group 1 Glenconnor)	Glenconnor 26 -29 January 2013	To pilot the question-based learning resource with community members
FG2G (focus group 2 Glenconnor)	Glenconnor 26 January 2103	To pilot the question-based learning resource with community members
FG3K (focus group 3 Kleinpoort)	Kleinpoort 29 - 30 January 2013	To pilot the question-based learning resource with community members
Observations	Location and date	Reason for observation
Cata: Field journals: 1 Photographs: 1(A-E), 2, 3, 4(A-B) and 5	Cata: October 2011 - November 2012	Collection of primary data material around rainwater harvesting and food gardening practices and contextual information
Glenconnor/Kleinpoort: Field journals: 1 Photographs: 1(A-C) and 2	Glenconnor/Kleinpoort: May 2012 - January 2013	Collection of primary data material around rainwater harvesting and food gardening practices and contextual information

4.6 Data analysis

Data analysis is the process of making sense of collected data which involves a process of consolidating, reducing and interpreting what research participants have said with what the researcher has seen and read (Merriam, 2009). Loosely described, the analytical process is thus about attaining “knowledge about the general from knowledge about particulars” (Danermark et al., 2002: 75). From a critical realist perspective Danermark et al. (2002) identified three forms of complementary analytical processes that enable this knowledge of the general from a study that looks at specific contexts: inductive, abductive and retroductive. Inductive analysis allows a researcher to make sense of data by clustering it into categories. Abductive analysis is employed when one uses theoretical lenses to make sense of and recontextualise data. It is understood as a process of moving from concrete, lived experience

to the abstract. Retroductive analysis involves seeking the basic or establishing explanations for what conditions must exist in order for a certain phenomenon to exist. Retroductive analysis thus includes historical analyses, counterfactual argumentation and thought experiments (Danermark et al., 2002). Danermark et al. (2002: 76) explained that thought experiments in retroductive analysis “are neither formalized nor strictly logical conclusions, but suggest a form of argument advancing from one thing to something else”. This study used a combination of inductive and abductive and retroductive analysis as will be shown below.

The analysis in this study took on a phased analysis approach in that collection of data and analysis took place simultaneously which called for different modes of inquiry at different stages in the study (Miles & Huberman, 1994). Data analysis took place in three phases: Phase One A constructing narratives (Chapter Five and Six) and Phase One B identifying mediating processes (Chapter Seven); Phase Two exploring how the QBLR extended learning (Chapter Eight); and Phase Three exploring the interactions between implicit and explicit mediation processes in rural water and food security practices and identifying structures and mechanisms that constrain and enable these practices (Chapter Nine).

Although data generation and analysis occurred simultaneously both in and out of the field, analysis became more intensive in Phase One B and Phase Two, and once all the data was in, that is, in Phase Three at the end of the study as shown in the research design diagram in Figure 4.1.

Intensive data analysis is usually preceded by data organisation and management. To facilitate analysis, I indexed all the interviews and focus groups. Interviews that were held for the Cata case study had an index of C and those of Glenconnor had an index of G. For example the first interview for Cata was index coded as Int.1C while FG1C stood for ‘Focus Group 1’ for the same case study. Table 4.6 below illustrates how the different sets of data generated through the different methods were indexed.

Table 4.6: Data index

Method	Cata case study	Glennconnor case study
Document analysis	Doc.1 (see Table 4.1)	Doc.17 (see Table 4.1)
In-depth interviews	Int.1CA, B-Int.10C (see Table 4.2)	Int.1GA, B-Int.12G (see Table 4.2)
Observations	See Table 4.4	See Table 4.4
Focus group interviews	FG1C, FG2C (see Table 4.3)	FG1G, FG2G, FG3K (see Table 4.3)

4.6.1 Phase One A

The analytical process of this study began with Phase One A and involved document analysis first in order to gain a socio-cultural, historical, ecological and political understanding of each site. I then constructed narrative accounts for each primary research participant (four from each study site) (as discussed in Section 4.2.2.1). Constructing these narratives helped answer the analytical guiding question of “Who is learning?” according to the CHAT framework. In order to do this I transcribed interviews and while I listened to these interviews, I identified themes which were emerging from each story such as ‘Water in the past’, ‘Water at present’ and ‘Food gardening: A family affair’. At the end of each narrative account I then wrote a brief description of the most prominent mediating factors in each participant’s life for example, social or financial constraints to their practices and learning. I found this part of the analysis enjoyable as it was essentially telling someone else’s story, albeit in a structured manner through themes. From this analysis and data analysed through documents, I constructed contextual profiles for each site as well as central activity systems for each case study and their respective interacting activity systems using the descriptive language and framework of CHAT (Engeström, 2001). The narratives and interacting activity systems for each case study site are reported in full in Chapters Five and Six.

4.6.2 Phase One B

Phase One B of the analytical process required even more systematic analysis and can be understood as taking place in two sub-phases. The first sub-phase of analysis aimed to answer the analytical guiding questions of “Why do female rainwater harvesters and food gardeners learn?”, “What do they learn?” and “How do they learn?” (refer to Section 4.4.3 for analytical sub-questions). In answering the ‘why’ question I analysed primary research participant

interviews as well as drew on broader discussions of water issues from the focus group discussions to gain insight into the motivating factors behind the practices of female rainwater harvesters and food gardeners. In order to answer the ‘what’ and ‘how’ questions I analysed participant interviews, contextual interviews from trainers and NGOs, for example, as well as training manuals and project reports in order to identify what was learned and how (see Appendix 10 Kouga Urban Harvest workshop programme).

The second sub-phase of analysis within Phase One B answered the guiding question of “What are the prominent factors shaping their learning?” In order to identify these implicit and explicit mediating factors I analysed not only primary research participant interviews but the contextual interviews as well, especially with workshop trainers and community leaders. I also analysed documents pertaining to development programmes research participants were involved in as well as reports (annual and project-related) from NGOs working in the area (see Appendix 11 for sample of BRC report).

In order to identify why, what and how participants learn their practices and the mediating factors that shape these I used a method of category construction by using open coding (Merriam, 2009). A category is a theme, a pattern or an answer to a research question. Open coding can be understood as the first level of abstraction in terms of forming concepts and then categories. During open coding written data from field notes or transcripts are coded line by line and this usually generates many concepts initially as all incidents in the data are coded (Merriam, 2009). For example, as I read the first interview transcript or field notes, I made notations next to pieces of data that had the potential for answering the analytical sub-questions for each phase. Segment 4.1 that follows is an example of how I used open coding when searching for the mediating factors that shape participants’ learning and practices:

1:11:49 Jonathan-Ja I think the technical side of it in terms of maintenance, I don't think that we we held one maintenance session with people and went house to house to house, showed them how to drain the pipe and close it, explained...how to clean the tank. But it's not like tanks are unfamiliar to people, I mean in a way it's like you know, telling people that they harvest water off the roof, like teaching granny to suck eggs, whatever that means, I don't really understand what that means but whatever it means...um but the maintenance programme I think we should have had more follow up, it would have been good to have say for three months a visit with people each month and checking with people; have you drained, why not, do you know why you should be, because what happens is you and visit and somebody's there like some auntie, you know, the householder is gone and the relative is there and then you talk to the relative and the relative doesn't really get it because they weren't involved and I mean and even when you're interviewing you've gotta be quite cautious like who're you getting information from, were they actually involved or did they come in afterwards, so then it's like second hand, third hand, rumour...

Maintenance confirmed by another body → one check-up + then nothing!

1:13:00 Nina-And it gets so confusing as well...

1:13:02 Jonathan-Ja so you gotta kind of try and filter that out, who you're talking to...but I think...and then probably a 6 month follow up would have been ideal and then a one year follow up, so like the first quarter month, and then a six month, and then a one year. And then in that one year you do an assessment. And we pushed for Water Affairs, we said people, you're spending however many...I think it was R40 million on the programme around the country. You've got to have a small research component, just a small research component, just to identify how much people are

follow-up research have to do follow-up research in implemented projects to see what works + what doesn't!

→ but no \$

(22)
51

Segment 4.1: Example of open coding in category construction in data analysis

After open coding I went on to perform axial coding or analytical coding (Strauss & Corbin, 1998). Axial coding is “a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories” (Strauss & Corbin, 1998: 96). This means that notes and comments that seem to fit under the same categories are grouped together. For example, in Segment 4.1 above I grouped ‘lack of funding for follow-up support and evaluation’, ‘too much success’ and ‘dependency on funding’ into one category: ‘funding’. This then became a theme or category into which subsequent items were sorted. I went on to establish other categories such as ‘training’, ‘material tools’ and ‘agricultural policies’ which I used to present the mediating factors shaping rainwater harvesting and food gardening practices (the mediating factors shaping these practices are reported in full in Chapter Seven). Marshall and Rossman (2006: 159) imagined categories as “buckets or baskets into which segments of text are placed” and as I analysed data I sorted it into established categories. Corbin and Strauss (1998) argued that axial coding goes beyond descriptive coding and it comes from interpretation and reflection of meaning.

Merriam (2009) raised some criteria for category construction which I found useful.

Categories should be:

- Responsive to the purpose of the research: all the categories I produced from the data answered the research questions in one way or the other.
- Exhaustive, though not simple and straightforward: I made an effort to produce categories that captured all the data.

The category construction in both Phase One A and B followed an inductive process in that I used different sources of data (information from documents, interviews, observations and discussion groups) to build towards concepts, hypotheses and theories. Figure 4.12 below shows the inductive logic used in this qualitative study.

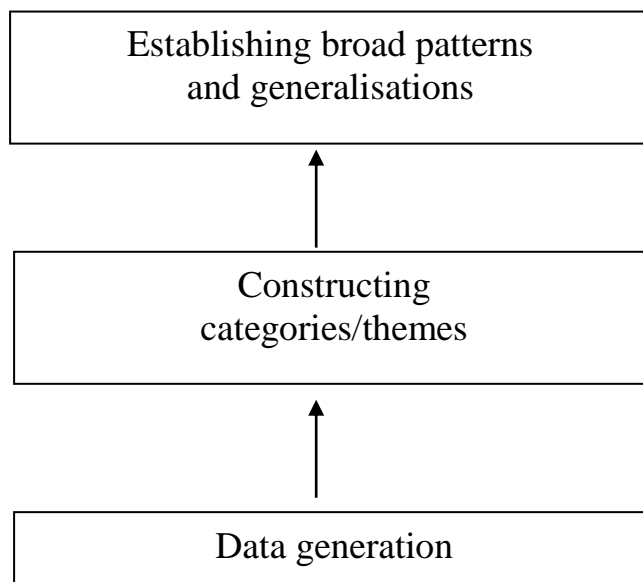


Figure 4.12: Inductive logic process used in the study (Adapted from Chikunda, 2013)

4.6.3 Phase Two

In Phase Two of the analytical process I critically analysed the focus group discussions to identify how the question-based learning resource both *mediated* people's learning and was *mediated* by two different contexts, Cata and Glenconnor respectively. Phase Two of the analytical process was concerned with answering the second research question: "How can a question-based learning resource (QBLR) *extend* the learning of practices A) out of a specific

context and practice (Cata) and B) into a different context but same practice (Glennconner)?” As discussed earlier (Section 4.4.3.2) in order to answer this question I was guided by several sub-questions:

1. **How** was the resource developed and **why**? What are the **links** between the **context, practice** and the **resource**? What is the value of developing a resource out of a context/in line with the mediational processes?
2. **How** was it **piloted**? How did people respond? What questions were people interested in and why? What broader discussions developed around these questions? What questions did people not understand?
3. How did it **extend** their **learning**? What questions did it not address? How can it be adjusted for different contexts?

In order to answer sub-question (1) I considered the development of the QBLR by our WRC team and drew from the project reports, discussions, reviews of the booklet as well as the different edited versions of the booklet over a period of several months. Through document analysis and by being part of the process of developing the QBLR, six different phases of development emerged: 1) ‘understanding the context’, 2) ‘developing the draft resource’, 3) ‘reviewing the draft resource’, 4) ‘translating the resource’, 5) ‘review by research participants’, and 6) ‘the final re-write’ (a full account of this process is found in Section 8.1).

To answer sub-question (2) I drew from my field journals (see Appendix 3) and facilitator reports (see Appendix 12) in order to explain the way in which we piloted the QBLR. As discussed earlier (Section 4.5.4) the facilitators worked differently with the learning resource and as a result I also analysed their different approaches during the piloting of the QBLR. I then analysed the different focus group discussions from each study site for the responses of the focus group participants to the QBLR. For this phase I also used an inductive approach in that I produced categories around the analytical sub-questions that guided data generation as well as new categories that surfaced during open coding: ‘Questions people were interested in’, ‘Motives for choosing these questions’, ‘Broader discussions out of questions chosen’, ‘Questions not fully understood’ and ‘General feedback from groups’. During my analysis in this phase I also identified different categories of questions contained in the QBLR: ‘Systems/deep knowledge’, ‘Practical/ technical’, ‘Personal well-being/safety’ and ‘Societal’. I then constructed tables for each site using these categories to illustrate in a quick and visual way which questions each focus group was interested in (see Section 8.2).

In answering sub-question 3 I also drew from the focus group discussions and my own observations in identifying how the booklet extended participants' learning. I focused on the questions they did not understand and the way in which the facilitators, their fellow group participants and practical demonstrations helped to teach and clarify concepts for them. In this phase I also produced categories around the analytical sub-questions that guided data generation as well as new categories that surfaced during open coding: 'Previous knowledge confirmed', 'New knowledge learned' and 'Questions not asked by the QBLR'. In order to identify how the learning resource could be better tailored to participants' specific contexts I searched for and coded data that supported the category of 'Adjusting the QBLR for a different context' (see Section 8.3.2).

4.6.4 Phase Three

Phase Three (Chapter Nine), the final analytical stage, synthesised the findings across Phase One and Two in order to explore the relationship between implicit and explicit mediation processes. The aim was to explore the implications for learning and development in contexts where rural water and food security practices are carried out. In order to do this I drew from the different mediating factors identified in Chapter Seven as well as from the different questions people were interested in in Chapter Eight. This was to show how a learning resource, developed from people's questions around their water practices, responds to their daily experiences and practices, thus linking the QBLR to the socially mediated nature of learning and practice and thus linking implicit mediation with explicit mediation.

The analysis process described in Phases One and Two is largely inductive, that is analysis that lets data speak for itself. Phase Two analysis also drew on abductive analysis which includes the use of theoretical lenses to make sense of the data. Abductive analysis can be understood as the interpretation of data using a pattern or system of classification (Danermark et al., 2002). Abductive analysis is "theoretically guided redescriptions" of data and "in this way we introduce new ideas of how individual phenomenon are part of the structure and internal relations" (Danermark et al., 2002: 96, 150). Abductive analysis in this study was informed by the theoretical approach of social learning theory, Vygotsky's (1978) theory of mediation and CHAT and Wertsch's (1995) theory of mediated action as discussed in Chapter Three. Abductive reasoning, using CHAT for example, was employed in Phase One A to identify elements of and construct activity systems (see Sections 3.8.6).

In Phase Three I used both retroductive and abductive analysis. As discussed earlier retroductive analysis is a thought operation (a way of reasoning, arguing and relating the individual to the universal/general) through which the researcher “moves from knowledge of one thing to knowledge of something else” (Danermark et al., 2002: 96). The central question in a retroductive analysis is “How is any phenomenon, like an action or a social organisation, possible?” Explaining how retroduction as an analytical process complements a relational ontology Danermark et al. (2002: 97) explained that: “Social phenomena are what they are by virtue of the internal relations they have to other phenomena”. Taking this as one’s starting point, retroduction becomes a matter of trying to attain knowledge about what internal relations make a certain phenomenon what it is.

Analytical Phase Three was thus a broad level analysis and made sense of both the explicit and implicit internal relations that mediate water and food security practices of rural Eastern Cape women. Using Wertsch’s (1998) ten claims of mediated action (see Section 3.7.1) helped me understand, for example, that mediating tools have the power to both enable or constrain action, that power and authority are inherent tools in mediated action and that mediated action may have conflicting goals. As an underlabourer to this study, a critical realist framework (Section 3.9) then aided toward an understanding of how implicit and explicit mediating processes interact in the central rainwater harvesting and food gardening activity system, the characteristics of structural constraints and enablements and how agents (female rainwater harvesting and food gardening practitioners) work with and around these in order to determine their life projects. The internal relations within the central rainwater harvesting and food gardening activity system were thus explored to understand what the implicit and explicit processes are that drive the activity, or make it what it is. Table 4.7 below summaries the data analysis process in this study.

Table 4.7: Summary of data analysis processes (Adapted from Chikunda, 2013: 203)

Type of analysis	Mode of inference	Research question addressed and guiding questions
<p>(Phase One A)</p> <p>Interviews, observations and document analysis</p> <p>Activity system analysis in each case study</p>	<ul style="list-style-type: none"> • Inductive analysis • Initial categories from field work interviews and documents • Abductive using second generation CHAT • Historical analysis 	<p>Research question 1: <i>What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women’s water and food security practices in rural communities?</i></p> <p>What is the history of each study site? Who is learning rainwater harvesting and food gardening in each study site? How did rainwater harvesting and food gardening practices develop in each study site? (Chapters Five and Six)</p>
<p>(Phase One B)</p> <p>Interviews, observations and document analysis</p>	<ul style="list-style-type: none"> • Inductive analysis • Initial categories from field work interviews and documents • Abductive using second generation CHAT 	<p><i>What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women’s water and food security practices in rural communities?</i></p> <p>Why are they learning? How are they learning? What are they learning? What are the prominent mediating processes shaping their learning? (Chapter Seven)</p>
<p>(Phase Two)</p> <p>Focus group discussions and observations</p>	<ul style="list-style-type: none"> • Inductive analysis • Initial categories from field work interviews and documents 	<p>Research Question 2: <i>How can a question-based learning resource extend the learning of practices A) out of a specific context and practice (Cata) and B) into a different context but same practice (Glennconnor)?</i></p> <p>1. How was the resource developed and why? What are the links between the context, practice and the resource? What is the value of developing a resource out of a context/in line with the mediational processes? 2. How was it piloted? How did people respond? What questions were people interested in and why? What broader discussions developed around these questions? What questions did people not understand? 3. How did it extend their learning? What questions did it not address? How can it be adjusted for different contexts? (Chapter Eight)</p>

<p>(Phase Three)</p> <p>Synthesis, implications and recommendations</p>	<ul style="list-style-type: none"> • Abductive and retroductive analysis based on research outcomes for each case study and discussing how the theories applied in the context of change oriented learning and mediation case study worked and what could be improved 	<p>Research question 1 and 2.</p> <p>How is learning embedded in context? How do implicit and explicit mediation processes interact? What are the implications of this interaction for learning and development in rural water and food security practices?</p> <p><i>(Chapter Nine)</i></p>
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4.7 Conclusion

This chapter has provided an overview of the study’s mode of inquiry and the complementary techniques used for data generation, recording and analysis. It placed the study within a critical realist research framework and considered the case study approach adopted as well as the nature of each case study in terms of their respective activity systems. The narrative enquiry approach used as well as the construction of narrative accounts of research participants were outlined. Techniques used to validate the data and ensure ethical research practice were also described. Qualitative data collection methods for different phases of data collection were also presented as well as various challenges I encountered during the research journey. An account of the four phases of analysis was presented following the CHAT methodology which formed the foundation of the data presented in Chapters Five, Six, Seven and Eight. This chapter is central to the study in that it illustrates how methods were used for generating data to respond to the research goals set out in Chapter One and how the analysis of data was approached. These methods were also informed by the literature reviewed in Chapters Two and Three.

As discussed before (Section 3.2-3.8.) mediated action cannot be analysed outside the context in which it occurs and the following chapters (Five, Six, Seven and Eight) expand on the broader contexts in which mediational processes within the learning and practice of rainwater harvesting and food gardening occur.

PHASE ONE A

CHAPTER FIVE

LEARNING RAINWATER HARVESTING AND FOOD GARDENING PRACTICES IN CASE ONE: CATA, EASTERN CAPE

5.0 Introduction

The previous chapter presented the methodology used to generate data about the learning and practice of rainwater harvesting and food gardening in the two case study sites. The following two chapters (Five and Six) present data aimed at answering the first research question in Phase One:

- 1) *What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security practices in rural communities?*

This question was guided by the following sub-questions that were informed by CHAT methodology (Section 3.8):

Phase One A (Chapters Five and Six)

- Who is learning?

Phase One B (Chapter Seven)

- Why are they learning?
- How are they learning?
- What are they learning?

What are the prominent mediating processes shaping their learning and practice? Chapters Five and Six present data aimed at answering the first guiding question (Who is learning?) while Chapter Seven answers the remaining four guiding questions. In line with the CHAT methodology, Chapters Five and Six present the individual histories of each case study, their respective activity systems and the narrative accounts of each primary research participant from each case study. I begin this chapter by providing a brief description of a typical

rainwater harvesting and food gardening activity system (Section 5.1) followed by a historical account of Cata which is central to understanding the factors that mediate and shape practices (Section 5.2-3). With this contextual history providing the background, the development of rainwater harvesting and food gardening practices in Cata are presented along with the central and interacting activity systems in the case study (Section 5.4). These activity systems are constructed from semi-structured interviews, observations as well as data from documents reviewed. The subjects of the central or primary activity systems are then brought to life through narrative accounts of each female rainwater harvester and food gardener from Cata (Section 5.5). The data presented in this chapter serves as the first phase of analysis of the mediating processes within the learning of rainwater harvesting and food gardening practices.

5.1 Description of a general rainwater harvesting and food gardening activity system

The following two case studies (Chapters Five and Six) have been documented as activity systems using a second generation activity system framework as described by Engeström (2001) (see Section 3.8.3). Here a typical rainwater harvesting and food gardening activity system consists of *Subjects*, *Objects*, *Mediating tools*, *Rules*, *Community*, *Division of labour* and *Outcomes*. See Figure 5.1 below:

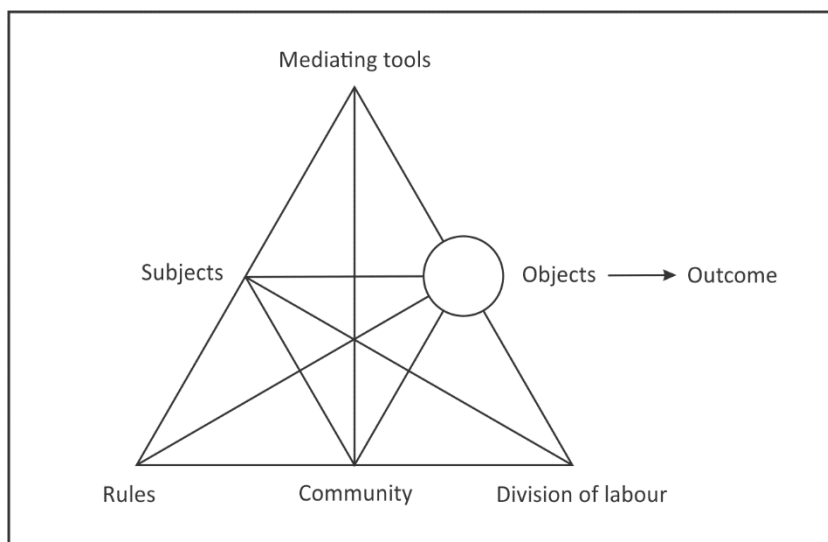


Figure 5.1: Typical rainwater harvesting and food gardening activity system

The **subjects** are the female rainwater harvesters and food gardeners either as individuals or as a collective who are involved in the learning of rainwater harvesting and food gardening. The subjects have an **object** or a purpose as to why they are learning rainwater harvesting and food gardening such as to have water closer to their homes or to meet household food requirements. Where the rainwater harvesters and food gardeners participate in training workshops or interventions, there will be an **outcome** such as achieving sustained water and food security. In order for rainwater harvesters and food gardeners to learn these practices and to achieve their objects and outcomes, there are **mediating tools/artefacts**. These include either conceptual or methodological processes such as the knowledge they have, the experience of fellow neighbours and friends in harvesting rainwater and/or gardening or rainwater harvesting and food gardening training manuals and workshops. Material or physical tools or resources are also used such as rainwater tanks themselves, gutters, spades, buckets, rain and soil. These female rainwater harvesters and food gardeners exist in a community with collective or individual **rules** which govern their practices. Such rules are informal, such as taboos, norms or values such as expectations within a household that every member assists in the food garden. Other rules may be ecological such as climatic conditions like drought or heavy rainfall. Some rules may be formal such as the guidelines stipulated by donors or government legislation which inform rainwater harvesting and food gardening practices.

Subjects interact within a **community** which is either a collective or individuals with an interest in the object of the activity system. Community members of these rainwater harvesting and food gardening activity systems include the stakeholders who are interested in addressing issues of food and water security such as government departments and non-governmental organisations, while individuals are those whose lives are affected by the practice but are not rainwater harvesters or food gardeners themselves such as the community members who buy surplus vegetables or who use water from others' rainwater tanks.

Rainwater harvesting and food gardening practices involve a number of work practices and roles, and these include maintaining rainwater tanks and food gardens, harvesting rainwater and vegetables and selling vegetables. These roles and duties are horizontally or vertically allocated to an individual or a collective of rainwater harvesters and food gardeners through the **division of labour**.

Described above are the elements of a typical rainwater harvesting and food gardening activity system. The descriptive language provided by the CHAT framework is used consistently throughout the following chapters in order to explicate the findings. As will become evident through the historicisation of the Cata activity system (Section 5.2-3), all the mediating tools, the rules, the subjects, community and object have a history and are embedded in cultural practices.

5.2 Historicising rainwater harvesting and food gardening practices in Cata

The following sections present a socio-cultural and historical background to the Cata activity system in order to explain why rainwater harvesting and food gardening practices have developed in this community. In order to understand the mediating processes impacting upon learning in these activity systems it is necessary to situate this community in its rich social, political and historical context, thereby gaining an understanding of the cultural and historical factors underpinning and driving these activity systems and the practices they represent. The relevant sub-questions for the contextual understanding sought after in Chapters Five and Six are: *What are the mediating processes emerging out of an exploration of the historical, cultural, social, political and economic contexts of these areas?* and *How have these influenced how people learn their rainwater harvesting and food gardening practices?* This is by no means an exhaustive history of these areas but instead provides broad brushstrokes to give a sense of the different layers comprising the historical landscape of these activity systems.

The following section provides a brief historical sketch of life in Cata before apartheid policies of betterment¹² were implemented and then focuses in detail on the effects and restitution settlement of betterment in the village.

¹² Betterment planning was implemented in the former homelands and other so-called black areas of South Africa from the 1930s onwards in order to control the people living there as well as land use. Under betterment, land was divided and designated for residential, arable and grazing usage and all people were forced to move into the demarcated residential zones. The impact of betterment policies on the people it affected were devastating and far-reaching: people were not only dispossessed of their lands and homes but the policies were also responsible for a breakdown in the social fabric of their lives (BRC, 2007c). The impact of betterment is discussed further in Section 5.2.2.

5.2.1 Cata before betterment

Life before betterment in Cata was largely organised along territorial lines and land was distributed under the communal land tenure system (de Wet, 1997: 6; Westaway, 1997: 18). This meant that land was owned by the state and people had rights of use but not of ownership. In theory land was meant to revert back to the commonage on death but in practice land rights were passed along the male line in families (de Wet, 1997: 4). People's identities were largely constructed around their relationship to the land (de Wet & Mgujulwa, 2010: 2). Politics in the village were organised around the headmanship or *inkundla* (headman's council) and until betterment the headman had the authority to allocate land (Westaway, 1997). Village sections were made up of several residential hamlets or kinship clusters, as sons would inherit land from their fathers and set up their homesteads close by (de Wet, 1997: 5).



Figure 5.2: A reconstructed model of village life before betterment in the Cata Museum (March, 2012)

Most social activity centred round these kinship clusters such as agricultural cooperation, political mobilisation and ceremonial celebrations (de Wet & Mgujulwa, 2010: 2). Thus when people were dispossessed of their land under betterment, individuals experienced loss of dignity and a fracturing of their identities. This is supported by the accounts collected of betterment in Cata which illustrate and speak to “the sense of outside imposition and loss of autonomy” experienced during the actual moves (de Wet & Mgujulwa, 2010: 2).

In terms of food security no families at the time of the first Keiskammahoeek Rural Survey KRS (1946) made a living from farming although some had enough land to do so (de Wet, 1997: 7). Reasons given were shortage of land, not enough male labour and lack of financial capital (de Wet, 1997: 7). During 1949/50, a rainy year, people produced on average 9.67 bags of maize when they actually needed 20 bags per year for a family of six people (de Wet,

1997: 7). Livestock also brought in minimal income. Most people thus made a living from cash earnings and migrant labour, essentially depending on outside sources (de Wet, 1997: 8). Interestingly, the different land tenure systems affected the length of absence of male family members. Conditions determining the length of absence of men on communal and Trust areas were far more restrictive than on freehold or quitrent areas.¹³ In terms of figures, far more men on freehold and quitrent land tenure not only stayed away longer without the threat of losing their land but also often took their wives and children with them to the cities. Men on communal lands on the other hand were forced to leave their wives and families at home to secure and work the land (de Wet, 1997). In this way land tenure to a large extent determined household size and had adverse effects on family life as families were separated through migrant labour.

In the late 1940s in Keiskammahoek and the surrounding villages, most people lived in poverty. Although most people were relatively poor, degrees of poverty varied. This is attributed to education levels as household heads with higher education levels usually brought more income into the family and were also more likely to obtain employment closer to home (de Wet, 1997). Kinship networks were also drawn on to support family members who were in particularly desperate situations, with the household being the locus of “emotional identification and economic co-operation” (de Wet, 1997: 9). This interdependence also led to much tension and conflict where scarce space and resources had to be shared. Gender and age usually determined levels of status and division of labour. Women were regarded as inferior to men and seniority in both sexes determined superiority. Land ownership as well as generational history in a village also determined status. With the advent of education, wage earnings and Christianity however, these measures of status were challenged (de Wet, 1997). The Keiskammahoek area, like many other rural areas in South Africa, experienced marked changes over the decades as it interacted with modernisation processes and trends. Of particular relevance to the village of Cata was the impact of the implementation of betterment planning and agricultural schemes introduced by the Apartheid government from the 1960s.

¹³ Communal land was owned by the government and until betterment, was allocated by local headmen. In freehold and quitrent tenure, land was purchased and title deeds issued to individuals. In this form of land tenure, land was inherited so the key site of land politics was the homestead and lineage (Westaway, 1997).

5.2.2 Cata under betterment

Betterment planning was a form of social engineering implemented in the 1930s in the former homelands and other so-called black areas (BRC, 2007c). It was an attempt by the Apartheid state to regulate these areas and control land usage (BRC, 2007c). The international discourse of conservationism exported into the South African colonies from America and Europe in the 1930s was one of the factors that led to betterment policies being introduced in South Africa (Westaway, 1997: 40). Conservation at the time was concerned with the problem of erosion and the attitude and approach was that experts knew best and that land users should merely comply with their recommendations. Initially this approach only applied to white farmers and was concerned with stock control and improvement (Westaway 1997: 20-21). By the 1950s and 60s this form of conservation was applied to the homelands in the form of 'betterment' and was used as a tool of control and domination. Betterment planning was introduced in Cata in October 1958 and land deemed unsuitable for cultivation was taken away, without the offer of other land for people living on this land (De Wet & Mgujulwa, 2010: 2).

One of the main results of betterment then was that people lost a large percentage or all of their land with holdings being drastically reduced in size. Village residents were allocated sites in new residential areas, arable fields were re-demarcated and grazing grounds were redefined and fenced off (Westaway, 1997: 29). In 1958 ten per cent of homesteads were landless with this figure rising to 50 per cent due to new residential areas opening up (De Wet & Mgujulwa, 2010: 2). In Cata specifically this affected food security in that post betterment residential sites became half or quarter of their original size and areas for growing food were much smaller (De Wet & Mgujulwa, 2010: 2). Livestock was also confined to smaller areas and working days were less productive as people had to walk longer distances to grazing and farming lands (Westaway, 1997: 29).

Social relations between neighbours became tense as village residents were forced to acquire new neighbours and to live closer to each other, resulting in less privacy. Where village settlements used to be organised patrilocally, the imposition of betterment brought new and unknown neighbours to people's doorsteps. Neighbours were suspicious of each other, not knowing where they stood religiously or politically. New neighbours were seen as observers and villagers had to keep their private and public lives in check. The breaking up of neighbourhood lineage patterns was also a severe blow to the authority of the *inkundla* (Westaway, 1997: 29-32). Commenting on the effects of betterment in rural areas, Tim

Wigley, a permaculture trainer, has argued that it made people forget their old ways of being and therefore affected practices like farming which are integrally connected to identity and land:

When I was working in villages around Cata I was able to observe just how destructive the Betterment scheme was. People had been living in scattered homesteads in the mountains with highly productive food production systems. They had lots of fruit trees in their fields and in fact in previous times the area was renowned for its peach trees. My father used to tell me how as a child his family would travel by ox wagon from Nqamakwe where they lived to Cata to buy peaches! When people were resettled in villages they were told the altitude was too high for fruit trees, so most people did not plant trees any longer. They were also told that without chemical fertiliser it was not possible to grow maize. So if they had no money for fertiliser they would not plant! Part of the Natural Framing Programme I was involved with there was to reintroduce fruit trees and to use kraal manure instead of chemical fertiliser. Both these initiatives were very successful. People started to praise me and sing songs making out that I had brought light to them. I said, 'No I am just reminding you what you already knew. As children you ate fruit grown in these mountains. Your parents grew bountiful crops of maize beans and pumpkins using manure to feed the soil.

There was widespread resistance to betterment in Keiskammahoek however which varied according to land tenure systems and how people deemed their lives would be affected (Westaway, 1997: 24). In Gwili-Gwili, a communal land tenure village near Cata, residents resisted betterment on the grounds of villagisation, arguing that their scattered settlement patterns ensured harmony among residents and that being placed close together would be detrimental to social cohesion. The government diverted decision making power away from the headman, thus breaking down this opposition (Westaway, 1997: 24-25).

5.2.3 Betterment restitution

Under Betterment policy the Cata community suffered pervasive poverty resulting in loss of land, loss of livestock and weakened social networks. After it came into power the democratic government failed to develop an adequate rural development strategy, concentrating instead on development in urban areas (BRC, 2007c: 7). This led to rural areas being sidelined for growth and the gap between the poor and rich has continued to increase (BRC, 2007c: 7). At the turn of the century poverty was worsening in Cata and civil society was weak (BRC, 2007c: 8). In 1998 a non-profit organisation (NPO) called the Rural Border

Committee (BRC)¹⁴ advocated for the inclusion of betterment dispossession in restitution programmes. Restitution is one of government's land reform programmes providing various forms of redress (restoration of land rights, acquisition of alternative land, developmental assistance and financial compensation) to people who were dispossessed of land rights in terms of racially-based laws such as betterment (BRC, 2007c). The BRC defined betterment as dispossession that lead to contemporary poverty and under-development (Westaway, 2008: 186). They selected Cata village as the case to bring before the Land Claims Court in 1998 (Westaway, 2008: 187).

5.2.4 The Cata Agreement: A contested space

In October 2000 the Cata Settlement Agreement was signed and was a landmark case as it was the first betterment claim in South Africa to be settled in terms of land restitution (de Wet & Mgujulwa, 2010: 4). Each household forced to relocate during betterment in Cata during the 1960s received R31 697.50 calculated on the basis of loss of arable land, dwellings and residential land (de Wet & Mgujulwa, 2010: 4). It was then agreed, with much debate, that each claimant would only receive half (R15 848. 50) of the restitution monies in order for the remaining half to be used for development in the community. Approximately R5.2 million was ring-fenced for development in Cata. In December 2000 the matter was finally settled and the people of Cata received their restitution cheques and spent their money on building houses, sending their children to school and on rituals for their ancestors (de Wet & Mgujulwa, 2010: 4). The money set aside for development was transferred to the Amathole District Municipality (ADM) to manage funds which then set up the Project Steering Committee (PSC) to guide resulting development projects (BRC, 2007c: 10).

The decision to use restitution funds for development was contested and much debate and argument over the 50/50 dispensation ensued (de Wet & Mgujulwa, 2010: 4). By 2001, after the restitution funds had been paid out, a group formed under the former Dlamini headman who vehemently opposed setting aside any money for development. This group argued that the Cata people did not want any development projects and that the decision to half their

¹⁴ The BRC is an NPO (non-profit organisation) based in East London and operating throughout the Eastern Cape. It focuses on marginalised groups in rural areas, specifically in the former homelands, such as women, children and farm workers. Its vision is to implement land reform and integrated rural development as a path to encourage sustainable economic development for all. The BRC seeks to work alongside rural communities to secure and extend their land rights. They work in the areas of restitution, farm-dweller land reform, land tenure administration, redistribution, land use planning and livelihoods and gender issues. They help people drive their own development through information dissemination, community mobilisation, institution building, community-based research, networking and brokering and facilitation (BRC, 2004a).

restitution monies had been imposed against their will (de Wet & Mgujulwa, 2010: 5). One respondent from de Wet and Mgujulwa's (2010: 5) enquiry argued, "They did not discuss the money. People were threatened into accepting the projects". The debate also formed along political lines with those in favour of the 50/50 dispensation mostly belonging to the African National Congress (ANC) and those supporting the headman being members of the United Democratic Movement (UDM) (de Wet & Mgujulwa, 2010: 5).

The Project Steering Committee (PSC) was the immediate face of the restitution process and therefore came under much criticism from some groups in Cata. Violence even ensued when the former headman and his supporters intimidated a group of forestry workers concerning one of the development projects. Acts of vandalism, attacks on houses and assaults also took place. People were thus ambivalent toward the proposed development projects and felt that government taxes should pay for growth in the area. Some were positive about the proposed development projects but these were people who were already part of the Community Property Association (CPA) and stood to gain from related development projects (de Wet & Mgujulwa, 2010: 6). The Cata community was thus divided about the terms of the restitution agreement but eventually the 50/50 dispensation was agreed to and villagers adopted a development strategy for the funds.

5.2.5 Development discourse informing Cata: A rights-based approach to rural development

By setting aside money for development, the BRC aimed to guide a new process of a rights-based approach to rural development. The Cata community was given an absolute majority on the Project Steering Committee which pioneered a new model for rural development where the community is not merely consulted, with the government making decisions, but the government is accountable to and serves the people (BRC, 2007c: 10). The BRC sought to apply this new development model in Cata by (1) securing resources at the village level, (2) realising potential through integrated planning and implementation, and (3) building capacity at local level to take charge of development (BRC, 2007c: 10).

According to the BRC the Cata community has been successful in these three areas. With regard to the first goal, from 2007 the Cata community has invested its own resources in its own development and doubled the funds it was given through restitution (BRC, 2007c). This model of development changes the power dynamics between communities and local government in that communities have more say in the way funds are spent. They also have

more bargaining power in that they own their resources (BRC, 2007c). A critique or reservation of this model however argues that government is ‘let off the hook’ with regard to its constitutional responsibilities in that communities end up funding their own development instead of government (BRC, 2007c: 10). Some individuals in Cata certainly felt this way. As one of the major stakeholders in favour of the 50/50 dispensation however, the BRC argued that critiques of this model of development overlook important factors, namely that former homeland areas are often bypassed by government in favour of developing urban areas which are assumed to be more strategic (BRC, 2007c). Another implication for the Cata model of development is that it offers its beneficiaries the opportunity to broker public resources, so the Cata community “is no longer a beggar at the table of government, it is a public-sector investor” (BRC, 2007c: 11).

In terms of the second goal of realising potential through integrated planning and implementation, the Amatole District Municipality (ADM) adopted a three-phase process of situation analysis, planning and implementation (BRC, 2007c: 12). Service providers thus analysed the areas of environment, engineering, village layout, land survey, agriculture and forestry in Cata. By late 2002 however there was growing disillusionment among community members with the development process as a long time had passed (two years after receiving restitution funds) without delivering anything. The Amatole District Municipality thus fast-tracked some short-term development projects such as the construction of a primary school, upgrading of internal roads and the building of a multi-purpose community hall (BRC, 2007c: 12). In mid-2003 the Cata community and the Amatole District Municipality adopted an integrated development plan (IDP) covering infrastructure, forestry, agriculture and tourism sectors and based on a common set of principles such as promoting local employment, building partnerships and seeking underlying sustainability (BRC 2007c: 13). A Communal Property Association (CPA) was also established in 2004 to manage development on communal land (BRC, 2007c: 13).

In terms of building capacity at the local level in order to take charge of development the Communal Property Association (CPA) and the Project Steering Committee (PSC) were entrusted with the co-ordination and management of the development process. This meant they had to take responsibility for labour recruitment and selection and consulting and communicating with communities about their grievances (BRC, 2007c). In order for projects to be sustainable the BRC facilitated the development of local businesses in the forestry,

agriculture and tourism sectors (BRC, 2007c). The idea behind running development projects as businesses was that they should, in theory, sustain themselves through making a profit. From my (and others') observations and research, the success and sustainability of these projects have been brought into question however (de Wet & Mgujulwa, 2010; Kinghorn, 2013).

Sustainable development projects?

The success of development projects set up in Cata has been varied and illustrates the challenges faced by implementing sustainable development programmes. A great success was the building of the Cata museum in 2006 along with a community hall (BRC, 2007a: 18). As the Cata case was a 'historic watershed' in terms of favourably settling under the restitution programme, the Integrated Development Plan (IDP) motivated for a community museum to capture this process and provide Cata residents with a renewed sense of identity. A permaculture practitioner having worked in Cata commented on the significance of this memory project: "Some sort of restoration has happened at Cata which is really unique to their sense of self and some kind of healing took place by getting that restoration; whether it was very wisely used or not is a debate but they did get it and it changed their notion of themselves" (Int.10Ca. 2012). A toposcope¹⁵ funded by the BRC was also constructed as part of a heritage trail in Cata to commemorate the forced removals under betterment and to attract tourists (de Wet & Mgujulwa, 2010: 11; BRC, 2007a: 18). A primary school was built, roads were repaired and a forestry project was established and continues to employ several people who grow plant and sell seedlings (de Wet & Mgujulwa, 2010: 11; BRC, 2004a, 2004b, 2007a, 2007b). Along with chalets for tourists and birding trails in the surrounding forests, a fly fishing project was also established but with minimal success as it caters to a very specific niche market of fly fishermen (Kinghorn, 2013).

A community irrigation scheme was also established but illustrates the challenges of the sustainability of development projects as it is not as self-sufficient as was hoped. Revived in 2006, the initial strategy for the scheme was not only to provide food security for the village but to operate as a multifaceted agricultural business, making a profit and paying salaries from those profits (BRC, 2007c: 18).

¹⁵ A toposcope is a monument that is dedicated to people or past events and is usually located on top of hills or mountains. It indicates directions and distances to certain landmarks around the area.



Figure 5.3: The Cata Community Irrigation Scheme (March, 2012)

Until 2012 salaries were still paid out of Communal Property Association (CPA) funds (Int.5C. 2012; de Wet & Mgujulwa, 2010). A profitable market for selling the vegetables grown by the scheme has also not been found, leading to unsold, rotten vegetables and several hectares of the scheme lying fallow. The manager of the scheme laments, “We have a problem with the market so we decide to plant a few less fields than we use to plant then all these vegetables are rotten” (Int.6C. 2012). At present the few vegetables grown are sold to surrounding *spaza* shops and to the closest Fruit and Veg stores (Irrigation Manager, Int.6C. 2012). The support officer for the Communal Property Association (CPA), Boniswa Ntusi, explained:

But now we ask those people we need to change now that idea of food security to a business where we can plant some crops and sell those crops and bring money to buy another seedling so the people can get salaries. But it’s a big challenge. When we are changing the food security you need to think of the market to sell those things. So now we have to think broader. So now it is a big challenge. (Int.5C. 2012)

An engineer from a consulting group (Umhlaba Consulting (see Section 5.4.4)) in nearby East London who has worked extensively in Cata and with irrigation schemes around South Africa, similarly argued, “... it’s not driven by the realities of market forces and that’s the context that it situates itself in. It’s intending to be a commercially viable scheme but the motivators to respond to the markets are not there” (Int.9C. 2012). The BRC also failed to take advantage of available research conducted by Umhlaba on the reasons for failure of smallholder irrigation schemes in South Africa: “smallholder irrigation is my main area of work and ... They didn’t look at the guidelines that we had developed, which had been taken up nationally...” (Int.C9).

Interviewing the manager of the scheme in 2012, he explained the difficulty of running the scheme as a business without having a market to sell to:

The future is unknown. If we get a strong market then we can do better here. We depend on the market. And we depend on the workers. The main challenge is ... where to sell these cabbages, you are wasting bos [because] you need that input of that money so you can get a profit. So if you are selling without profit then you just losing. (Int.6C. 2012)

The success and sustainability of development projects implemented in Cata have thus been varied.

The purpose of this historical overview therefore is to draw attention to the fact that development projects are always introduced into a context thick with history. Cata is an exceptional case in the sense that it was earmarked for development and the BRC guided the development process. Its history was also captured for its residents, thus giving them back not only a sense of history but identity as well, empowering them with the knowledge and support to demand compensation. As de Wet and Mgujulwa (2010: 13) argued, “Cata is a special case and we need to be clear about what is replicable and what is not”. Caution must therefore be exercised in assuming that similar models of development can be used and be successful in other villages in South Africa. Within the context of this study, the same applies to learning and introducing learning resources in communities. Researchers and organisations wishing to implement learning programmes in communities must therefore first understand the context from which practices develop.

5.3 Socio-cultural, economic and ecological context

The following sections provide a socio-cultural profile for the people of Cata Village, taking into consideration their amaXhosa origins and culture. Educational and health factors within the village are also considered as well as local economic aspects and the ecological context in terms of land use and water resources in the area.

5.3.1 Ethnicity and language: The people of Cata

In terms of ethnicity in Cata Village, most people are of amaXhosa origin, part of the larger sub-group of Bantu speaking groups spread across various regions of Africa (Fox, 2005: 110; Bernard, 2010: 98). While space does not permit a thorough exploration of the history and culture of the amaXhosa of the Eastern Cape I will attempt to provide a rough sketch of their history as well as their traditional beliefs and ties to the natural world, specifically related to water. The Xhosa people fall under a broad linguistic grouping known as the Nguni-speakers

and when referring to the Xhosa this is a reference to a group who speak a certain language rather than who share a common, self-ascribed culture. Contemporary ethnic identities or classifications are largely products of the colonial era, with 'Xhosa' groups emerging when British administrative geographical boundaries were drawn (Bernard, 2010: 99). These classifications were further entrenched by apartheid policies when the Bantustans, or 'self-administration' units were set up (Bernard, 2010: 99). As a result, it has been assumed that ethnic groups such as the 'Xhosa' and 'Zulu' have each been broadly uniform in their culture, language and institutions (Bernard, 2010: 100). Bernard (2010: 100) argued that in reality however there is as much diversity between these groups as there are similarities between and within them and that these boundaries are largely "porous and indistinct".

The Xhosa are usually associated with former Transkei and Ciskei regions of the Eastern Cape (Bernard, 2010: 100). The main mode of production for the Xhosa was based on pastoralism and hunting by men and cultivation, largely undertaken by women. As mentioned earlier, the Xhosa had and still have a strong dependence on and tie to the land and their identities are inextricably linked to it. Cattle and the owning thereof was extremely important to the Nguni groups, affecting most institutions including religion and marriage (Sansom, 1974: 153). Cattle were significant because they allowed for greater differentiation between the rich and poor as well as created more opportunity for capital investment through owning cattle (Sansom, 1974: 153). People lived in homesteads (*imizi*) with agnatically related male kin and their wives and families (Bernard, 2010: 102). These household clusters were usually scattered across the territory on hillsides, as in Cata, rather than in valleys. In terms of administrative systems of law and order, most groups were ruled through the chiefs (*amakhosi*) and their subsidiaries, the sub-chiefs and the headmen (Bernard, 2010: 103).

5.3.2 Religion: Traditional Xhosa and Christian belief systems

In terms of belief systems, the Xhosa revere the ancestors (Hammond-Tooke, 1974; Bernard 2010). They believe in a Supreme Being, the ancestral shades and in spirits, often connected to the natural world (Hammond-Tooke, 1974: 321). The Supreme Being is usually not concerned with the everyday workings of the living whereas the ancestors are called upon for daily problems (Bernard, 2010: 102). The ancestors are the spirits of the dead of a lineage or clan (Hammond-Tooke, 1974: 323).

The natural world, especially sources of water, and the spirit world are also closely linked in Xhosa cosmology. The Xhosa believe in ‘people of the river’ who are spirits who live in lakes, rivers and deep pools and who have the power to do harm to people, often by drowning or causing illness (Hammond-Tooke, 1974: 322). Diviners are said to be initiated by these ‘river people’, often depicted as a snake or fish-tailed woman (mermaid). They are submerged under water for several days and emerge, having been taught the art of healing and the ability to communicate with the spirit world (Hammond-Tooke, 1974: 322; Bernard, 2010: 117). This ‘River Myth’ is called the ‘*abantu bomlambo*’ or the ‘*abantu basemlangjeni*’ to the Cape Nguni and these water beings are often said to reside in deep pools in rivers, below waterfalls where the water is fast moving and sometimes described as ‘angry waters’ (Bernard, 2010: 253). In the Eastern Cape, the ideal pools are those that are deep, difficult to access, with steep banks and surrounded by dense indigenous forest (Fox, 2005: 125). The forest and the ocean are also regarded as being residences for spirits as well as ancestors (Bernard, 2010: 255). Taboos are observed at these sites such as people not being allowed to swim in these pools, extraction or use of natural resources around the pools being prohibited or killing or injuring the messengers of the water (crabs, snakes frogs or birds) (Bernard, 2010; Fox, 2005). When staying in Cata, I was warned by my host not to swim in the river below the village from fear of being bitten by snakes or drowning. She did not however explicitly refer to the river divinities. Transgressions of these taboos can result in illness, drowning or these water sources drying up. Rituals are dedicated to these water divinities. Bernard (2010: 251) argued that rituals are ‘belief in action’ and are often concerned with social regulation of behaviour around issues of identity, agency and social control.

The above can be regarded as an ‘idealised’ notion of Xhosa and more broadly, Nguni, social organisation and identity. As European colonisers moved into Southern Africa, the Nguni social system was drastically affected by Christianity, urbanisation, industrialisation, the migrant labour system and land appropriation (Bernard, 2010: 104). As discussed earlier, the apartheid system with its divisive Betterment policies left many families without land and cattle, the main currency of their cultural exchange. As a result, families were fragmented with a shift in gender relations and marriage institutions (Bernard, 2010). Many more female-headed households became common as men left home in search of work. Formal western education and Christianity resulted in many beliefs and rituals for the ancestors being abandoned as well as traditional governance systems being undermined (Bernard, 2010). At

present in Cata village when asked to what religion people ascribe to, many answer that they attend church. It can thus be inferred that many consider themselves Christian. Currently there are eight churches in the village, mostly of Christian denomination: two Methodist churches, one Catholic church, three Zionist churches, one Apostolic church and another called Sabatha. When speaking to people they were not explicit about their beliefs. Once or twice, when probed, some would mention certain rituals performed in honour of their ancestors. This was linked to cultivating food gardens and this allowed households to provide enough food for these rituals and celebrations.

Despite the influence of westernised belief systems, globalisation and modernised culture, traditional beliefs and practices are still widely performed among the Xhosa. Male adolescent circumcision, for example, is still an important institution among the Xhosa and a marker of identity and social status (Bernard, 2010: 103; Van der Vliet, 1974). Initiates enter into Initiation Schools where they are physically separated from the rest of society for part of their schooling, symbolising their separation from their former state as children (Van der Vliet, 1974: 229). They build lodges away from the villages where they live together as a group for up to two to three months after circumcision. During this time certain taboos are observed such as separation from women, being painted with white clay as well as using special words for common objects and actions. During this time they undergo certain hardships such as routine beatings, eating unsavoury food, bathing for long periods in cold streams, sleeping on the floor and not being able to drink water for a certain period of time. Important to this period of seclusion is the formal teaching the initiates receive from the men of the tribe including tribal values and the obligation and rights of a citizen. The end of the seclusion period is often marked by the initiates washing off the white clay and burning their seclusion huts as well as their old clothes as a symbol of leaving their past behind them. After being released, the initiates return to their villages to much feasting and celebration. Often the initiates will not return to their homesteads immediately but are expected to spend a few days in the kraal of the 'father' of the school or of the chief of the village (Van der Vliet, 1974: 230-231).

I was privileged to be invited by a family I stayed with while carrying out research in the village to attend their son's initiation celebration in December 2012. The initiate was still in the bush and not at the celebration however.



A lodge, or hut, is built separately away from the village for the initiates to stay in during their separation period.



Goats are slaughtered for the celebration and the host family must cater for the whole village.



Women cook traditional food for the celebration in large cast-iron pots at the back of the house.



The homestead is separated according to gender and age during the festivities. Here the older 'mamas' wait outside the front of the main house for the meal to be served.



The younger women wait outside the front of the second half of the house



Young men wait outside the 'kraal' at the back of the house



Older men, including the initiate's father, celebrate inside the 'kraal'



Gifts of alcohol are brought before the family to be shared with the guests



Women sing traditional songs and dance

Figure 5.4: Initiation ceremony (Cata, December 2012)

Initiation does not confer instant adulthood on the initiate but stands more as a qualification to be accepted into adult status (Van der Vliet, 1974: 241). Through this brief sketch of the beliefs and ethnic origins of the Xhosa, one is able to gain a slightly deeper understanding of what informs the practices of women in Cata.

5.3.3 Local economy: Income and unemployment

Cata is serviced by the Amahlathi Local Municipality and falls under the Amathole District Municipality (ADM, 2013). Economic activity in the urban areas surrounding Cata is dominated by industrial development in the automotive and textile industries in the East London area specifically (NWRS, 2004). If they are able to secure formal employment, people in the area work in the public services, manufacturing, trade and agriculture sectors (ADM, 2013). In most rural areas across the country however the main sources of income are social grants and remittances (BRC, 2007a). According to 2007 statistics, 39 per cent of the

Cata population relied on welfare grants while 8 per cent relied on remittances (BRC, 2007c: 23). In 2011 the unemployment rate for the Amahlathi local municipality in which Cata is found was 36.1 per cent compared to 61.2 per cent in 2001 (Statistics SA, 2011e). Youth unemployment was 47.1 per cent in 2011 compared to 73.4 per cent in 2001 (Statistics SA, 2011e). In 2007 the BRC reported that with the implementation of development projects in the community, 41 per cent of income in Cata derived from locally-generated wages and 10 per cent was generated from local businesses (BRC, 2007c: 23). This was confirmed in interviews with research participants as not nearly as many from Cata claimed to be living off welfare grants as participants in Glenconnor (see Sections 5.5.1 to 5.5.4 and Sections 6.2.3 and 6.4.4). Most people work for government initiated public works programmes, government departments such as the Department of Health and/or generate their own income by growing and selling vegetables. One participant and her husband work for the Community Public Works Programme (CPWP) and explained, “We work eight days a month, that brings in about R500.00 a month” (Int.1C). As with other people in Cata, this couple also sell their own vegetables as a secondary source of income. Some are employed by the Cata Irrigation Scheme while others work as public health workers for the local clinic or as teachers in the village schools.

5.3.4 Literacy and education

Before and during apartheid, spending on rural education was considerably lower than in urban areas and the discrepancies between expenditure between white and black education was even greater with white education receiving the lion’s share of the funds (Coughlan, 1997). Since 1994, education budgets were designed to achieve equitable outcomes and overcome, in principle, the racial disparities during apartheid (Chisholm, 2004). In the Keiskammahoek area during this period girls and boys attending primary and secondary schooling were fairly evenly represented (Coughlan, 1997: 156). Economic duties of boys such as tending to livestock and cultivation led to low attendance levels at school and during the winter months of male initiation ceremonies, attendance also dropped. During the 1990s rural black schools continued to be dismally under-facilitated, lacking electricity, sporting facilities, libraries and science laboratories despite increased educational expenditure (Coughlan, 1997: 157). In a 1997 survey conducted in Cata and two other villages in the area it was determined that 9.7 per cent had no education while 60 per cent had between six to nine years of education. On average, women had a year’s more education than men. Most of

those claimed they could read with only 13.4 per cent claiming to be illiterate. Those who were non-literate were usually older, being over the age of 67. This is a dramatic change from the 1950s when 70 per cent of fathers and 50 per cent of mothers of school-going children were illiterate (Coughlan, 1997: 165). Coughlan (1997: 165) argued that at the time of the survey “the written word as a vehicle of personal development still seems to have achieved only a limited foothold in these communities”. In the more recent past in Cata, people that had less than Grade 7 fell from 50 per cent in 2001 to 35 per cent in 2007 (BRC, 2007c: 24). This is an important achievement and step toward nurturing the skills base in Cata for further development. In 2011 it was reported that 9.6 per cent of those aged twenty and above in the Amahlathi local municipality had matric compared to 13.6 per cent in 2001 (Statistics SA, 2011e).

5.3.5 Health and welfare

One of the key research participants from Cata, Bolekwa Ntusi (Section 5.5.3), who is a health worker as well as an avid gardener outlined the health and social problems in her village. Social problems range from drug abuse, domestic violence, alcoholism and unemployment. Mrs Ntusi commented on social issues she witnessed on a daily basis in her village:

These problems range from drug related problems – especially the youth and also domestic violence and diseases such as diabetes, hypertension, HIV. And also the youngsters who are supposed to be at school but who are at home. And also the households that get social grants from government but do not have a funeral policy. So all these problems I come across on a regular basis and then I deal with them. They don't only affect the households but also the community. (Int.2Ca)

In terms of food security it was reported that 99 per cent of the households in Cata ate twice a day or more in 2007 (BRC, 2007b: 25). In 2011 it was reported that in the Amahlathi local municipality 48.8 per cent households were female headed with 15.5 per cent classified as agricultural households.

For Mrs Ntusi food security and health is very much linked as she explained:

And also some households will complain that they don't have food, so I encourage them to have a garden. Even if you don't have money but you have land. It doesn't matter how big your garden but the thing is that you will be able to get some food there so you can't say that we don't have money but you have land. So I push people to have their own gardens when they have their own land. (Int.2Ca)

Mrs Ntusi thus encourages households to plant vegetables, even if they only have a limited amount of space in their yards because she has seen the benefits herself as a gardener.

5.3.6 Land use in the area

Cata is geographically situated in an area that covers about 350 square kilometres of hilly terrain, surrounded by an almost complete ring of the Amathole Mountains. The area experiences a humid sub-tropical climate and has been described as having an erratic rainfall pattern varying between 632 mm in the low lying areas and 107.4 mm on the mountains nearby. The vegetation consists of Acacia Savannah in the south and Dohne Sourveld in the north (Viljoen et al., 2012: 21). In terms of wildlife and natural resource utilisation, land in the Cata area is predominantly used for livestock farming and subsistence agriculture. As discussed previously, the local irrigation scheme in Cata was revived in 2005 with an aim of becoming a multifaceted agricultural business (BRC, 2007). Timber is grown commercially in the higher rainfall areas and a forestry project has been established in Cata where pine and wattle trees are grown for a commercial and local market (BRC, 2007). Ecotourism has also been encouraged in Cata with birding trails set up as well as a fly-fishing programme (BRC, 2007; Kinghorn, 2013).

5.3.7 Water sources in Cata Village

Cata is found in the Mzimvubu to Keiskamma water management area, the twelfth of nineteen management areas in South Africa (NWRS, 2004: 57). These areas were established in 1999 after a countrywide public consultation to form catchment management institutions to manage South Africa's water resources (NWRS, 2004: 1). For the Amthahli local municipality it was reported that only 15.6 per cent of the population have piped water and 18.7 per cent have flushing toilets connected to a sewage system (Statistics SA, 2011e). Even though Cata overlooks Cata Dam, the village of Cata receives no water from this dam. Cata Dam services the Keiskammahoek Irrigation Scheme. According to Jonathan Denison from the Umhlaba Consulting Group (Section 5.4.4), Cata village

...gets nothing from the dam. The irrigation scheme [in Cata] draws from the river. I think there's a little bit of storage somewhere but it's not significant. The Cata Dam actually supplies Keiskammahoek's Scheme – the irrigation scheme around Keiskammahoek ... so they [Cata residents] get their water from the waterfall up in the mountain, close to the mountains. And there's a pipeline system, there's an intake in the mountain stream. It's incredibly good quality water. The BRC did water quality studies and all sorts and it gravitates down to some storage tanks, Jojo tanks at the top of the village and then from there into a pipe system. But it was not in great repair I

mean they did a roads job – apparently they did a lot of damage to the pipes and stuff.
(Int.9C)

Problems with the system of pipes from the stream were confirmed by a Cata resident who now has rainwater tanks on her property. She explained:

There will be a call from one community member that the water in the taps is available and we all go line up for that water but some of us will not be able to get that water. The water will stop before all of us actually get into it. So in my case I don't really use tap water because now I have enough water on my property... We were never really told what exactly the problem is but the rumour is that the problem is ... whatever collects the water from the source is sometimes shifting or moving....
(Int.2C)

Although not always reliable, the quality of water that Cata residents receive from the spring in the surrounding mountains is very good. Harvesting rainwater at their homes however is an efficient way for residents to respond to this unreliable water source.

The contextual profile presented above stands to highlight the uniqueness of Cata, layered with its particular history, culture, economic, social and ecological aspects. Such insights are necessary for exploring the processes mediating learning and practice in this context. The following section presents the different interacting activity systems in the Cata case study.

5.4 Development of rainwater harvesting and food gardening practices in Cata and interacting activity systems

The historicised account of the Cata activity system as well as that of rainwater harvesting and food gardening in Southern Africa (Section 2.2.3 and 2.2.4) serves as a background to situate the current rainwater harvesting and food gardening practices in Cata and the socio-ecological risks to which they respond. The section below discusses the introduction and development of rainwater harvesting and food gardening practices in Cata as well as presents the different activity systems within this case study using second generation activity theory (Section 3.8.3). Although I am aware that these activity systems interact with neighbouring activity systems within the third generation activity theory framework (Section 3.8.4), I highlight them using second generation activity theory because the second generation allows representation of all the elements of the activity system, thereby preventing conflation between them.

Learning rainwater harvesting and food gardening in Cata involved five interacting activity systems. The section begins with a description of the central activity system which is the Cata rainwater harvesting and food gardening activity system. The remaining four are the object and rule producing activity system of the Border Rural Committee (BRC), the tool and rule producing activity system of the Water for Food Movement (WfF), and the mediating tool producing activity system of Umhlaba Consulting and the tool and rule producing activity system of Earth Harmony Innovators, respectively. Sections 5.4.1 to 5.4.5 represent and describe the second generation of these five interrelated, yet separate activity systems.

5.4.1 Cata rainwater harvesting and food gardening central activity system

Referring to Figure 5.5 that follows, in the central Cata activity system the *subjects* of the Cata rainwater harvesting and food gardening activity system as studied in this research are four female rainwater harvesters and food gardeners. Three of the four women were members of the Water for Food (WfF) movement (Section 5.4.3). The subjects have tanks and food gardens and harvest rainwater to water their gardens, grow vegetables, and provide for domestic household needs such as drinking, cooking, cleaning, washing clothes and watering domestic livestock.

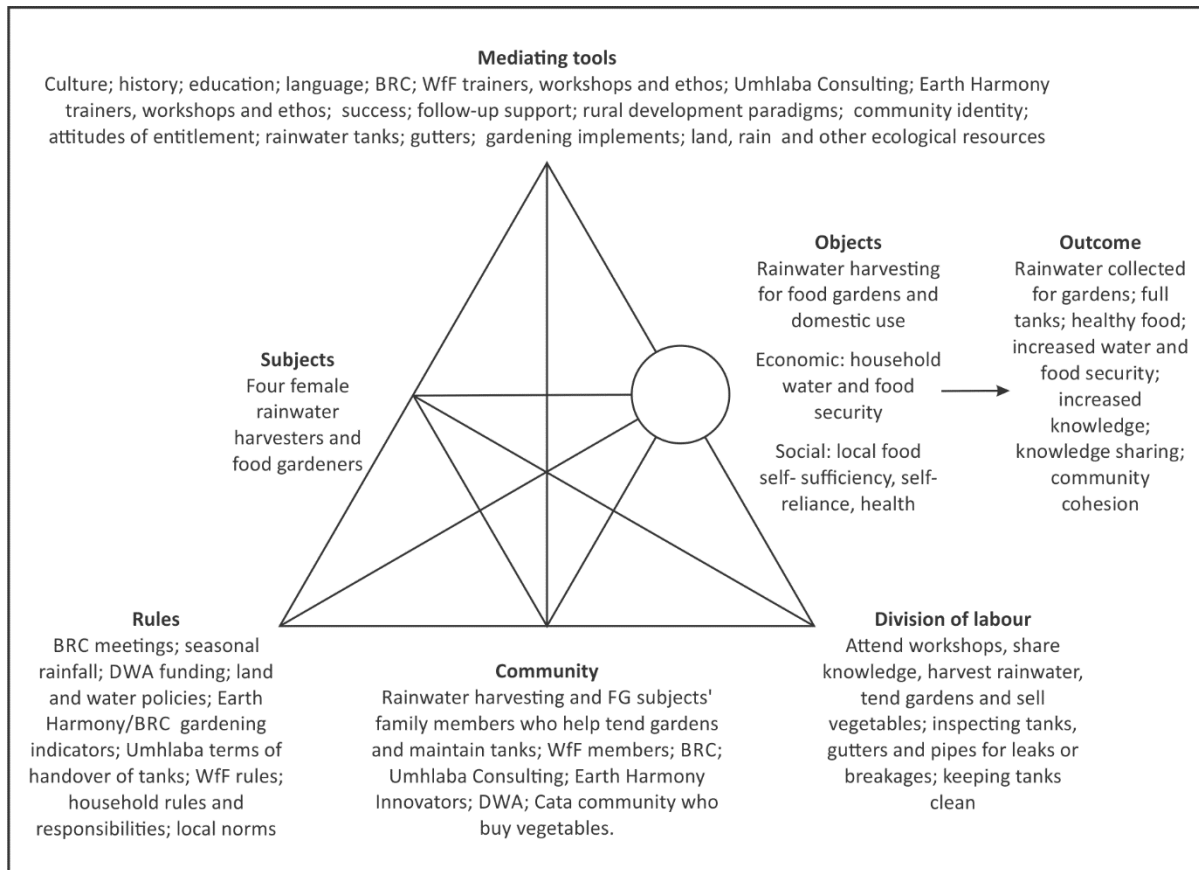


Figure 5.5: Cata rainwater harvesters and food gardeners' central activity system

The *object* of this activity system is to collect or harvest rainwater from roofs into plastic rain tanks or from groundwater runoff into cement reservoirs for the purpose of domestic and food gardening needs. The harvested runoff water from the ground is used for watering their gardens while the rainwater harvested off the roofs is used for household needs. The motives behind harvesting rainwater and growing food gardens was for household water and food security and also for social reasons such as food self-sufficiency, self-reliance and health (discussed in detail in Section 7.1).

The *mediating tools* in this activity system include the history and culture of Cata which influenced the introduction of rainwater harvesting and food gardening practices. Another tool which mediates the learning of rainwater harvesting and food gardening practices is the educational level of the rainwater harvesters and food gardeners and how this impacts upon their learning of these practices (Section 7.3.1.10). Language is another tool which mediates learning and practice (Section 7.3.1.11). The involvement and ethos of organisations such as

the Border Rural Committee (BRC) (Section 5.4.2), the Water for Food Movement (Section 5.4.3), the Umhlaba Consulting Group (Section 5.4.4) and Earth Harmony Innovators (Section 5.4.5) all introduced tools (both mental and material) which mediate the learning and performance of these practices. Factors such as success, follow-up support, rural development paradigms, community identity and attitudes of entitlement also play an important mediating role in this activity system and are addressed in more detail in Chapter Seven. The actual rainwater tanks and reservoirs used by rainwater harvesting and food gardening as well as the accompanying gutters, catchpits, mesh covers and gardening implements were also mediating tools which people had to learn to maintain on their own. Ecological factors such as land and rain as well as different seasons that affect the ability to harvest rainwater and grow food are also tools to consider in this activity system.

The *rules* of this rainwater harvesting and food gardening activity system are broad, ranging from donor funding guidelines from Department of Water Affairs (DWA) to constraining seasonal rainfall. The BRC's rural development approach (addressed in Section 5.2.5) is an example of rules that are imposed on communities, such as meeting regularly in groups to discuss successes as well as challenges within their practices. An example of donor rules is illustrated in the terms of the 'Rainwater Harvesting Tank Installation Statement of Responsibility and Maintenance Guidelines' handover form (see Section 5.4.5 below and Appendix 13). Some of these terms include: 1) Safety of the tank installation which stipulated that the tank lid should always be on to avoid accidental entry and drowning by children, 2) Maintenance of the tank installation to maintain the tank and the guttering at one's own expense, 3) Re-sale of the tanks which stipulated that the donated tanks were not for re-sale and were specifically for the purpose of storing water and growing food in homesteads, and 4) Water quality not for drinking which stipulated that the water collected from ground runoff is not safe for drinking. Other rules of this activity system include the Earth Harmony Innovators trainers' indicators for garden success (see Appendix 14). Examples of these include: 1) throughout the year the soil is kept covered and healthy; 3) rainwater is being harvested and utilised; and 8) the family is self-sufficient in vegetables and fruit. At a national level, government land and water policies are examples of rules which mediate the learning and practice of rainwater harvesting and food gardening practices. At the local and community level, local norms and taboos are examples of rules that mediate learning and practice and at the household level, household rules and responsibilities, such as who is

responsible for watering the garden, mediate rainwater harvesting and food gardening practices.

The *community* in this activity system, or the different voices that either constrain or enable rainwater harvesting and food gardening practices, is broad and ranges from national to household level stakeholders. The Border Rural Committee (BRC) (Section 5.2 and 5.4.2) guides the development process in Cata and introduced another activity system, the Water for Food movement (Section 5.4.3). Another organisation forming part of the community element is Umhlaba Consulting (Section 5.4.4) who rolled out a rainwater harvesting piloting programme in co-operation with the Department of Water Affairs (DWA). The DWA thus also forms part of the community of the Cata central activity system. Umhlaba Consulting invited Earth Harmony Innovators (Section 5.4.5) to provide training on food gardening and permaculture methods, making it a member of the community of this activity system as well. At the individual level, the female rainwater harvesters and food gardeners participated in training workshops. At the household and village level the individual family members who help tend to the food gardens, maintain the rainwater tanks or sell vegetables are part of this activity system as well as village members who buy the fresh produce from the rainwater harvesters and food gardeners. There is thus a chain of facilitation, donation, installation, training and participation.

In terms of the *division of labour* within this central activity system, the role of the four female rainwater harvesters and food gardeners was to attend workshops, share knowledge, harvest rainwater, tend gardens and sell vegetables and inspect and maintain their rainwater tanks, gutters and pipes. In the presentations of the following activity systems their roles and division of labour will be made clear. In terms of the *outcomes* of this central activity system, both water and food security was achieved, rainwater was collected for gardens and tanks were full. Healthy food was grown and the subjects increased in knowledge, shared knowledge and grew as a community of practice.

5.4.2 The Border Rural Committee (BRC)

The BRC activity system is presented below. Its role is overall facilitator of any development projects carried out in the village.

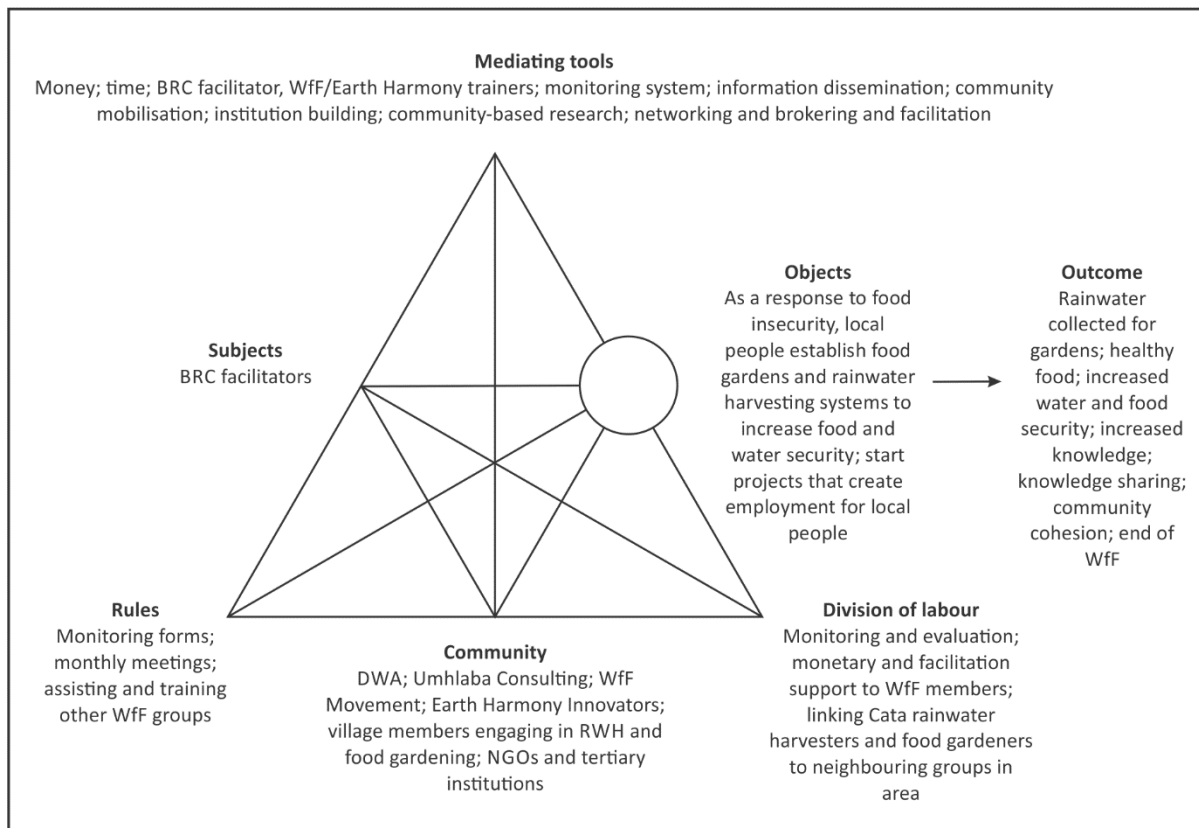


Figure 5.6: Border Rural Committee's activity system

The *subjects* of the BRC activity system included BRC facilitators who introduced the WfF movement (Section 5.4.3) in order to create opportunities for food security in the village as their *object*. Donor funding, time, WfF and Earth Harmony trainers were *mediating tools* in this activity system as well as indicators for gardening success (addressed in Section 5.4.3). In terms of *rules* the BRC instituted monthly meetings with the WfF and a monitoring form to evaluate WfF members' gardening progress. WfF were also asked to assist and train other WfF groups in surrounding villages. As will become clearer in the following sections below, Umhlaba Consulting Group (Section 5.4.4) made up part of the BRC *community* as well as members of the WfF movement, trainers from Earth Harmony Innovators (Section 5.4.5) and other local NGOs and tertiary institutions invited to learn from and support the WfF movement. In terms of the *division of labour* the BRC stood in as a facilitator to and funder of the WfF group. It also took on a monitoring role and helped the group network with other neighbouring WfF groups in the area. Along with increased food and water security due to introducing the WfF, the BRC also witnessed the graduation of the WfF from the village as the *outcomes* of the activity system.

5.4.3 The Water for Food Movement (WfF)

The Water for Food movement (WfF) was introduced and implemented by the BRC in April 2004 (BRC, 2004a).

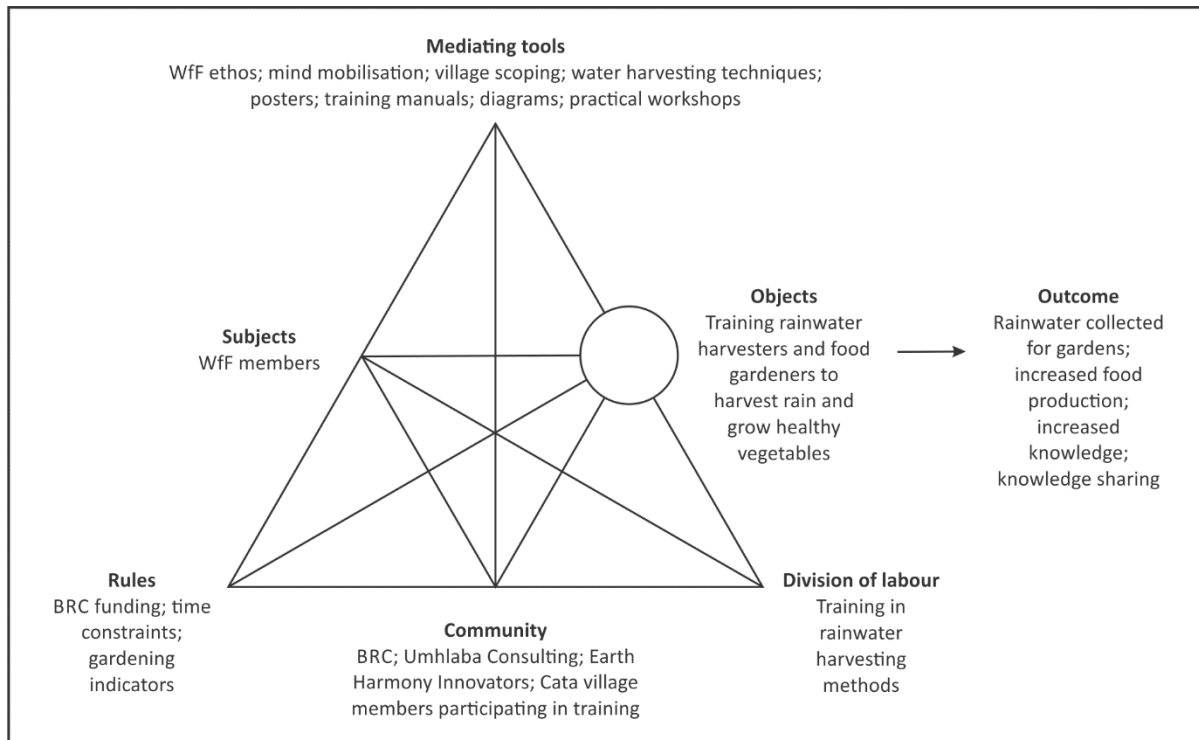


Figure 5.7: Water for Food (WfF) activity system

The *object* of the WfF movement is “sustainable development and poverty eradication” (BRC, 2004a: 18). The WfF movement believed that the main problem with poverty is hunger and by using simple low-cost gardening methods the affected people can change their circumstances for the better. The movement tries to change people’s thinking from relying on handouts which stands in the way of sustainable development. A 2004 BRC annual report explained the impetus for introducing the WfF to Cata:

The development plan was predicated on an assumption that homestead gardening would be boosted through the installation of drip irrigation systems into all gardens. However, in February, we were exposed to an alternative approach that has been pioneered by the Water for Food Movement... We decided to test this approach through practical engagement at Cata. BRC was in Cata from 19 to 21 April with a development activist from the Water for Food Movement. Five very poor members of the community were invited to a sharing session with the activist. (BRC, 2004a)

The activist the report refers to is Mama Tshepo Khumbane, a dynamic leader and social rights activist who started this movement in 2002 in Pretoria and along with other WfF trainers is the *subject(s)* of this activity system (Hart & Baiphethi, 2011). Mama Tshepo’s

interests as an activist on both local and international soils have been based on nutrition and home food production. She saw that one of the major problems plaguing the poor was food insecurity. Water is one of the main limiting factors in small-scale food production and other domestic enterprises, especially during the mid-winter months of May to September. By harvesting rainwater people can produce food all year round, thus breaking through the food insecure barrier (Goldin & Gordon, 2010). WfF's approach is holistic and aims to achieve food security for poor communities by educating people on rainwater harvesting and soil moisture management methods as well as empowering people by promoting self-esteem and land use rights (Goldin & Gordon, 2010).

Figure 5.8: Mama Tshepo Kumbane talking at a WRC function (Image from: <http://www.wrc.org.za/News/Pages/Ourbiodiversityisourheritage.aspx> (Accessed May 7, 2013))



Indigenous knowledge practices informing Mama Tshepo's philosophy

Mama Tshepo grew up in a small village in the Limpopo Province where people lived according to traditional practices and values (Hart & Baiphethi, 2008). People lived off the land, were conscious of the need to respect and take care of the natural resources they used and socio-cultural systems acted as safety nets and socialised future generations in the ways of the community (Hart & Baiphethi, 2008: 158). Communities lived and worked according to a farming calendar which included traditional rites, festivals and ceremonies. These fostered social cohesion and taught children the value of the land and each other.

Like the people in Cata, Mama Tshepo's village also suffered from forced removals under Betterment policies where land was lost and livestock numbers were drastically reduced. People were no longer able to live off the land and were forced to migrate to urban areas to eke out a living. Women became overburdened with responsibilities at home as men left to

find work. One of the major consequences of Betterment that Mama Tshepo has witnessed while working in various communities across the country is that people have lost a sense of self-worth and have slid into deep apathy about their impoverished situations. She observed a pattern of food insecurity, malnutrition and despondency in many of the places she worked as a social worker and sought a solution to combat this (Hart & Baiphethi, 2008: 159).

Mind-mobilisation: Knowledge creation and agency

The ethos behind the WfF movement is to empower people to lift themselves out of poverty and to take responsibility for their own lives. Mama Tshepo's aim is "to shake people up so that they shape their own destinies and make their own decisions" (Goldin & Gordon, 2010: 5). This ethos is in line with the PRA (Participatory Rural Appraisal) model of participation discussed in Section 2.3.1 which understands participation as 'empowerment' (Crawley, 1998). When she trains others she seeks to combat inaction and passivity and to inspire people to dream and envision a different future for themselves. Envisioning is one of Tilbury's (2007) key pathways to change-oriented learning (Section 2.4.5). Envisioning or 'futures thinking' helps people discover their preferred futures and link these goals with their immediate actions. In contrast to doomsday projections, envisioning offers direction and impetus to people's aspirations (Tilbury, 2007). In terms of Mama Tshepo's teaching style, Goldin and Gordon (2010: 3) explained that "she adjusts and adapts her strategy, always adept at ensuring that the pupil benefits from a 'best fit' knowledge transfer".

The first thing Mama Tshepo and her fellow trainers did when they trained in a village is to identify the poorest of the poor to work with. In activity theory language this is as a *rule* of their activity. When asked why she joined the WfF movement one member responded, "Because before that I was really struggling in terms of getting food. I would ask around the community and beg. So now because I planted I had my own garden, things were much better" (Int.1C). It was interesting to note that this research participant identified herself as being poor and was proud of the fact that by joining the WfF movement, she had become a successful food provider for her family.

After community members have been identified to work with, Mama Tshepo and her team performed *village scoping* where the history, relationships, major problems and organisations working in that village are mapped (Goldin & Gordon, 2010: 16). Village scoping is thus one of the *mediating tools* in this activity system. According to BRC reports five members who

were living in relative poverty in Cata were invited to a sharing session with Mama Tshepo. The workshop was structured such that participants were encouraged to share their present situations at their homesteads (BRC, 2004: 19). Mama Tshepo then conducted a *mind mobilisation* workshop, another mediating tool, with participants where skills and knowledge are shared around the following areas: land and water design to capture rainwater in food beds, an holistic approach to food security that encourages multi-cropping and the use of indigenous seeds, food storage and processing and recycling household organic waste (Goldin & Gordon, 2010: 16). During the mobilisation workshops participants were encouraged to draw up *weather and time management charts* to plan for future food production on their homestead plots (Goldin & Gordon, 2010: 18). Some of the guiding principles for this plan included harvesting rainfall, using low-cost food production methods, considering family time management and education about nutrition (Goldin & Gordon 2010: 18). This planning exercise was designed to give the food gardener a good sense of the past, present and future needs of his or her household. This was a useful mediating tool that allowed people to respond and build up resilience to changes in the future as opposed to merely focusing on present needs.

During the sharing session participants from Cata were asked specifically if groundwater runoff was a problem during the rainy season and had to be drawn away from the homestead as reported: “The workshop was arranged such that participants shared their present situations at their homesteads. They were asked to indicate specifically if there is water that is a problem and has to be drawn away from the homestead during the rainy season” (BRC, 2004a: 19). Cata participants were taught and shown how to capture the water by using furrows and trench systems for planting. The participants redrew their plans to indicate how the runoff water in their homesteads could be harvested and these plans were used as the basis for practical demonstrations in two homesteads in the village. Participants were left to make trenches in their gardens (BRC, 2004a).



Figure 5.9: A member of the WfF movement steps over her trench beds (Cata, October, 2012)

The WfF movement allowed for a two-month implementation period where participants planted and managed their homestead gardens on their own. After this period Mama Tshepo and her field officers, or in the case of Cata, the BRC, performed *follow-up support visits* (mediating tools). BRC carried out visits to members the same month as the programme was implemented as well as provided intensive follow-up support until the end of 2007 (BRC, 2007b). By the end of 2004, 14 households were part of the movement with a total of 30 members at the end of 2005 (BRC, 2005b). During follow-up visits field officers troubleshooted any problems in the implementation process as well as encouraged interaction with the broader community and leaders to acknowledge the achievements of the participants (Goldin & Gordon, 2010). Important to this study and the ethos of how knowledge is mediated and education is transferred, was the ethos of WfF not to dictate or prescribe but to let people use their own creativity and do-it-themselves strategies to solve their specific problems.

Mama Tshepo also developed a five year food security action plan or '*helicopter plan*' (mediating tool) with individuals where the emphasis was not only on an action plan but on self-analysis and sharing personal struggles with people in similar situations (Goldin & Gordon, 2010: 18). Of particular interest to this study is the fact that Mama Tshepo shared the "real-life accounts of women just like themselves who have fought and won the struggle against hunger" (Goldin & Gordon, 2010: 18). Goldin and Gordon (2010: 18) argued that this "is a powerful tool that mobilises people to take action". Part of the ethos of the WfF movement is that people share their knowledge and Mama Tshepo's students are described as becoming "teachers" (Goldin & Gordon, 2010: 13). This is the approach that this larger WRC project has taken by working with people and their accounts of their rainwater harvesting practices and the challenges they face. These real-life accounts resonate with others in similar situations and encourage them in seeking solutions and taking action (see Chapter Eight).

Four participants from the Cata WfF group were also sent on a week-long follow-up visit in June 2004 to Mama Tshepo's home in Pretoria as a form of follow-up training (BRC, 2004a: 19). The visit was for observing, sharing, learning and practising. Food gardeners had built dams for storing water for their vegetables. In Cata rainfall is much higher and the soil is loam-clay which retains water well. Learning was extended around digging trenches for their gardens as they learned how to keep, sort and fill their trenches with rubbish. Filling trenches with old blankets and tin cans (mediating tools) was a common theme when interviewing

WfF members in Cata. One participant explained “It does rain and then those tins retain water and on top of the water that you water so your plants always have water. As you water your garden that water doesn’t quickly go away. So that is why we no longer planting in summer where there is a lot of rain. So we actually plant throughout the year because of that technique” (Int.1C, 2012). At the end of the visit, participants received seedlings, seeds and three trees (mediating tools) and returned highly motivated to plant and produce food (BRC, 2004a: 19).



Figure 5.10: Tin cans in a WfF member’s food garden

The BRC actively supported this movement for four years until 2008 by facilitating, implementing and following up on the progress of WfF members (BRC, 2007b). They performed follow-up visits, assisted with problems of members, organised events such as field visits with universities, colleges and NGOs to canvas for financial and technical support (*community*), supplied additional seeds and seedlings as well as supplied other inputs and support (BRC, 2005a). With the help of the BRC, for example, WfF in Cata received seedlings from Fort Cox College as well as the DoA (Department of Agriculture) (BRC, 2005b). At the end of 2004, homestead farmers were producing food for their households and membership was growing (*outcomes* in CHAT terminology). In 2005 the BRC reported that, “Members believe that the project is bringing change to their lives in that they can see that in winter they are able to plant and have vegetables, which they could not do before. The pride of having enough food was also expressed” (BRC, 2005a: 28). A monitoring system (*mediating tool*) was also introduced in mid-2005 in order for members to keep track of their

inputs and outputs (BRC, 2005a) (also discussed in Section 5.4.5 and Section 7.3.1.10). Some members initially struggled with the concept of monitoring so the BRC had to continue training people on how to fill out the monitoring forms as well as encourage people to be consistent. These different activities (facilitation, implementation and follow-up) performed by the BRC can be understood as forming part of the *division of labour* within the Cata activity system.

By the beginning of 2007 the BRC initiated a move for WfF members to draw up business plans for their household gardens (BRC, 2007a). The plans included the family profile, reasons for joining the project, vision, steps to achieve the vision and an operational plan (BRC, 2007a). The BRC struggled to get people interested in the business plans however. In its final report on the WfF programme in Cata, the BRC reported that levels of commitment and interest had been flagging, resulting in low attendance at project meetings and slow progress with completion of family business plans (BRC, 2007b). At the end of 2007 the BRC commented that lack of interest and slow progress was due to “the soaring levels of job creation and economic activity in Cata meant that the labour-intensive requirements of the project are now regarded as too onerous and not worth the return” (BRC, 2007b: 29). This analysis was confirmed in an interview with a primary research participant and active WfF member in 2012:

This CPWP (Community Public Works Programme) could be the reason why we are no longer meeting on a regular basis because this programme is diverse in terms of what is happening. For example I work in the school. I plant a school garden there. I cut grass. And when the school needs to be renovated or painted I also do that. Some people plant pine seedlings in the forest, so they are trying to develop our community forests so some CPWP members are working there. (Int.1Ca)

In 2007 a census in the village reported that food security had been achieved in Cata and in a sense, Cata had thus graduated from the WfF programme (BRC, 2007b: 29). In light of this the BRC suspended its proactive involvement in the project and in 2008 only took on limited involvement by monitoring levels of activity sustained without BRC support (BRC, 2007b).

A focus on women empowerment

Within Mama Tshepo’s work it was usually women who played a more active role in home food gardens. This was confirmed in a study on rainwater harvesting and homestead food gardens as it was seen that older women in women-headed households “are the group most amenable to and most capable of combining rainwater harvesting and homestead food

farming in sustainable and productive ways” (Viljoen et al., 2012: 80). According to Mama Tshepo all women should be able to feed themselves and their families and there should be no reason for lack of water and food (Goldin & Gordon, 2010). Explaining how women are custodians of water, Mama Tshepo stated:

They are using it, not regulating it, but using it daily. It affects them because they are custodians and caretakers. Every single, every household, women must be there to be able to manage the livelihoods of the family. So they are a critical part of water allocation as well and the water use. And water conservation as well. (Khumbane in Goldin & Gordon, 2010: 13)

The WfF did not discriminate however and actively worked with men in their movement as well. Mama Tshepo did not advocate that people return to traditional practices as some may not be able to respond to the rapid change and complexities of the present. She did however argue that people should apply traditional principles to the way they see themselves and interact with others and the environment (Hart & Baiphethi, 2008: 162). From this introduction of the WfF movement one is able to understand more fully the context in which women and men in Cata are learning and sharing knowledge around food and water security practices, particularly with regard to rainwater harvesting. Of course not everyone in the village was part of WfF and knowledge was not always as broadly shared as might be assumed.

Mama Tshepo’s struggle was against the “inertia and passivity of people who looked to external responses and solutions outside themselves instead of accepting that they themselves could change and shape their own lives” (Goldin & Gordon, 2010: 19). The following is an example of Mama Tshepo’s emotive and poetic language as she encouraged and inspired the people she worked with:

And I am saying, here, I have got no gold or silver. Neither do I have any bags of mielie [corn] meal, nor a bag of sugar, nor a loaf of bread. I have nothing. I have got ten fingers. I have a got a very strong wind that pushes my emotions out to say, I see you my dear you are like me. I am stretching my hand to hold your hand. And I say if you can accompany me and go and share and see what I am able to do to silence the drums that are beating and confusing me and disempowering me every day. So I am focused. And I must march to the road that I say is never ending. And I have got a vision out there that poverty can be tackled. We can do it, and all of us can do it, if only we start. (Kumbane in Goldin & Gordon, 2011: 3)

5.4.4 Umhlaba Consulting Group rainwater harvesting and food production pilot programme

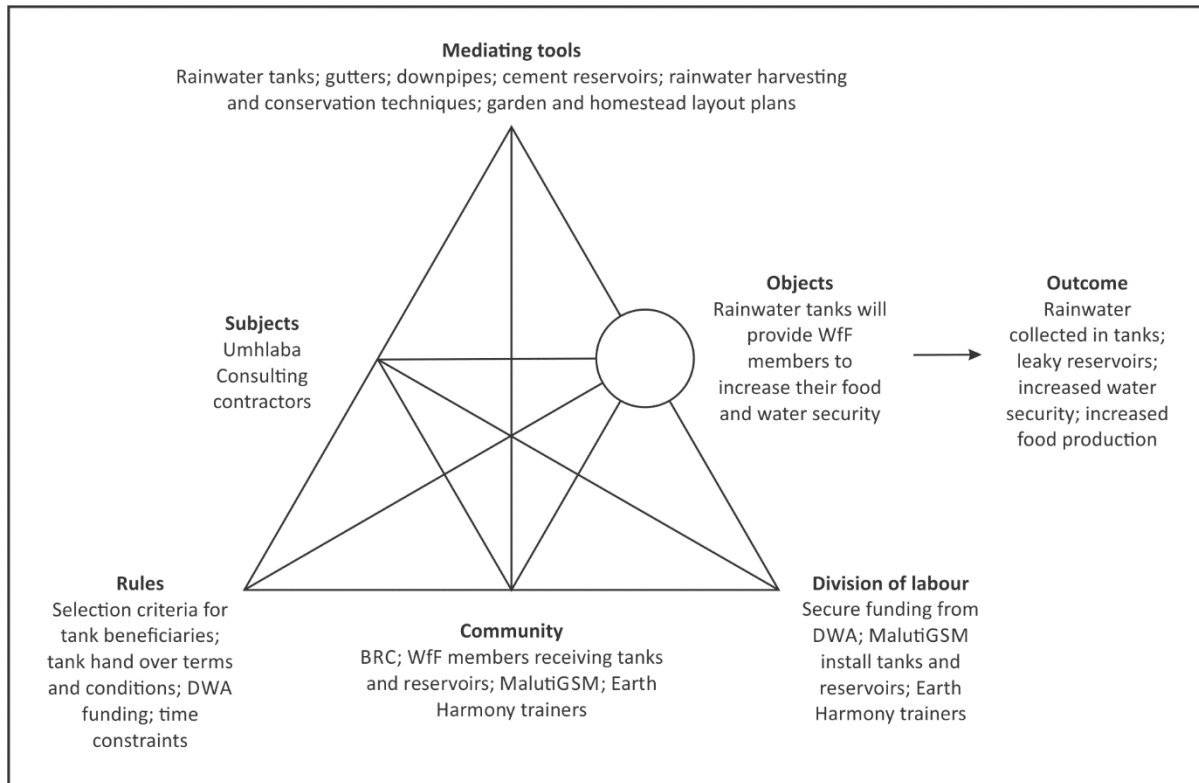


Figure 5.11: Umhlaba Consulting activity system

Rainwater harvesting using Jojo tanks and cement garden reservoirs was introduced into the Cata community through a rainwater harvesting and food production pilot programme by the Umhlaba Consulting Group. Umhlaba is a specialist research consultancy group working in the areas of town planning and development, GIS mapping and water and agriculture and were appointed by the Independent Development Trust (IDT) to implement the project (Denison, 2010). The project was funded by the then Department of Water Affairs and Forestry (DWAF) (now the Department of Water Affairs (DWA)) and came from Ministerial approvals in relation to the DWA subsidies for resource-poor farmers. The sixth subsidy pertains to a subsidy for rainwater harvesting tanks (Denison, 2010). Preliminary research conducted for the project by Umhlaba found that resource-poor households typically experience food shortages three to five months out of the year, usually during the dry winter periods of May to September (Denison, 2010). Motivation for the project included several local and global realities impacting water and poverty:

- The high levels of material poverty and general lack of resource development in the former homelands;
- The adoption of the Millennium Development goals by the South African government;
- The water-related challenges facing a growing population in South Africa, manifested in rising pollution and more frequent water shortages; and
- The current and future impacts of climate change. (Denison, 2010: 7)

In light of these realities the *object* of this project sought to address the problem of food insecurity during dry winter months in rural Eastern Cape communities by adopting three main rainwater harvesting and conservation techniques or *mediating tools*: firstly, the use of rainwater tanks which collect water from the roof; secondly, grey water re-use such as redirecting bath and kitchen water into infiltration pits in the garden for increased water for plants; and, thirdly and with the greatest volumetric impact, harvesting surface runoff from roads, hardpan areas and yards and then storing this in reservoirs or ponds sunk into the ground (Denison, 2010: 8).

The project objectives were twofold: the first was to increase the amount of water available to resource-poor homesteads for household and productive use and the second was to increase the level of food security in these homesteads through the introduction of a range of rainwater harvesting methods as well as training in intensive, low-risk agricultural methods (Denison, 2010: 9). In 2007 Umhlaba approached the BRC with an offer for four WfF members to be chosen for the pilot programme and receive cement reservoirs for homestead gardening (BRC, 2005b). The BRC had a meeting with the group to make a decision about which households would benefit from the first three dams:

On 28 November...BRC also announced a meeting to discuss the building of household dams and monitoring. (Cata has been identified as a pilot site by DWAF for the building of dams for homestead gardening). (BRC, 2005b)

The initial idea was that after the first three dams, 30 other dams would be budgeted for and built in other households. One of the four primary research participants in this study, Nothemba Languva, was chosen as a recipient of one of these reservoirs. A BRC report confirmed this:

On 5 December, BRC had a meeting with the group to make a decision about which households will benefit from the first three dams. After the first three dams other 30 dams will be budgeted for and built in other households. The chosen households were

those of Nothemba Languva, Phumzile Mboso and Mzwakhe Nopakela. (BRC, 2005b)

Participants thus received training and were then selected to receive rainwater tanks. The homestead reservoirs were rolled out at the end of 2008 (Denison, 2010). A main component of this project was to train people in a range of low-cost rainwater harvesting techniques even if they did not have rainwater tanks for storage. Other methods of rainwater harvesting included trench beds, infiltration pits, swales and tied-ridges (Section 2.2). The training was based on existing training materials as well as the Guideline for Rainwater Harvesting and Home Food Production (Denison, 2010). Denison (Int.C9) described the aim behind the training:

The essence of the training was to try and facilitate knowledge networks through learning groups. Self-assessments, um that kind of thing where people had a checklist of a range of things ... you know they check: Are people using rainwater harvesting? How many of their areas are planted? Are they using mulching? Have they planted trees and veggies? Uh ... what's the general condition? You know there were a bunch of indicators and then people come look at the assessment ... So the group, every month they go and assess another one or two households and they share – So okay I had this problem, you've got that problem. This is what I did ... so it was to try and set up those learning groups.

In terms of the selection criteria or *rules* for choosing beneficiaries of tanks, participants who already gardened were eligible to receive tanks and reservoirs (Denison, 2010: 13). As WfF members in Cata were already gardening and producing food, Umhlaba worked with these members in partnership with the BRC. Denison (Int.C9) explained:

So Water for Food ... because it was the local base of interested people doing home gardening, it was the natural, I mean it was natural that you were going to work with them rather than some other arbitrary group who are not interested in food gardening.

WfF members, in negotiation with the BRC, decided amongst themselves who would receive tanks and reservoirs (BRC, 2005b). General criteria set out by the project for communities and NGOs included:

- Child headed households;
- Single women headed households;
- Household living with HIV/Aids;
- Poor households;
- Productive and active gardeners;

- Households distant from a water source; and
- Time of involvement with the grower's group. (Denison 2010: 17)

Once selections had been made, Umhlaba used the *mediating tool* of sketching garden and homestead layout plans with the beneficiaries (Denison, 2010: 22). Four plastic rainwater tanks (mediating tools) were then installed in each household by a water design, operations and maintenance consultancy called MalutiGSM which forms part of the *division of labour* of this activity system (Denison, 2010). One tank was to be filled by runoff from the roof. Each tank connected to the roof came with guttering, a tank base as well as a brass tap (Denison, 2010) (some recipients said they did not receive bases with their tanks however (Section 5.5.3)). Flexible U-round gutters (mediating tools) were used to accommodate the circular structure of some thatched roof houses. The three other plastic rainwater tanks were installed at each household to collect surface runoff from the ground (Denison, 2010). These tanks were partly buried in the ground and filled from surface runoff according to an Umhlaba/ MalutiGSM design which makes maximum use of slope to avoid burying tanks completely (Denison, 2010). Maintenance workshops were held to train beneficiaries in looking after their tanks and the project was handed over at the same time with beneficiaries signing handover forms (rules) for their tanks and reservoirs (see Appendix 13 for tank handover forms) (Denison, 2010).

As follow-up training for this programme Umhlaba contracted out Tim Wigley from Earth Harmony Innovators to carry out food production training. Wigley has 40 years' experience in organic food and permaculture methods and is based near East London, Eastern Cape (Denison, 2010). His training methodology and tools are described below.

5.4.5 Earth Harmony Innovators

Another activity system interacting with the central Cata rainwater harvesting and food gardening activity system is the Earth Harmony Innovators activity system.

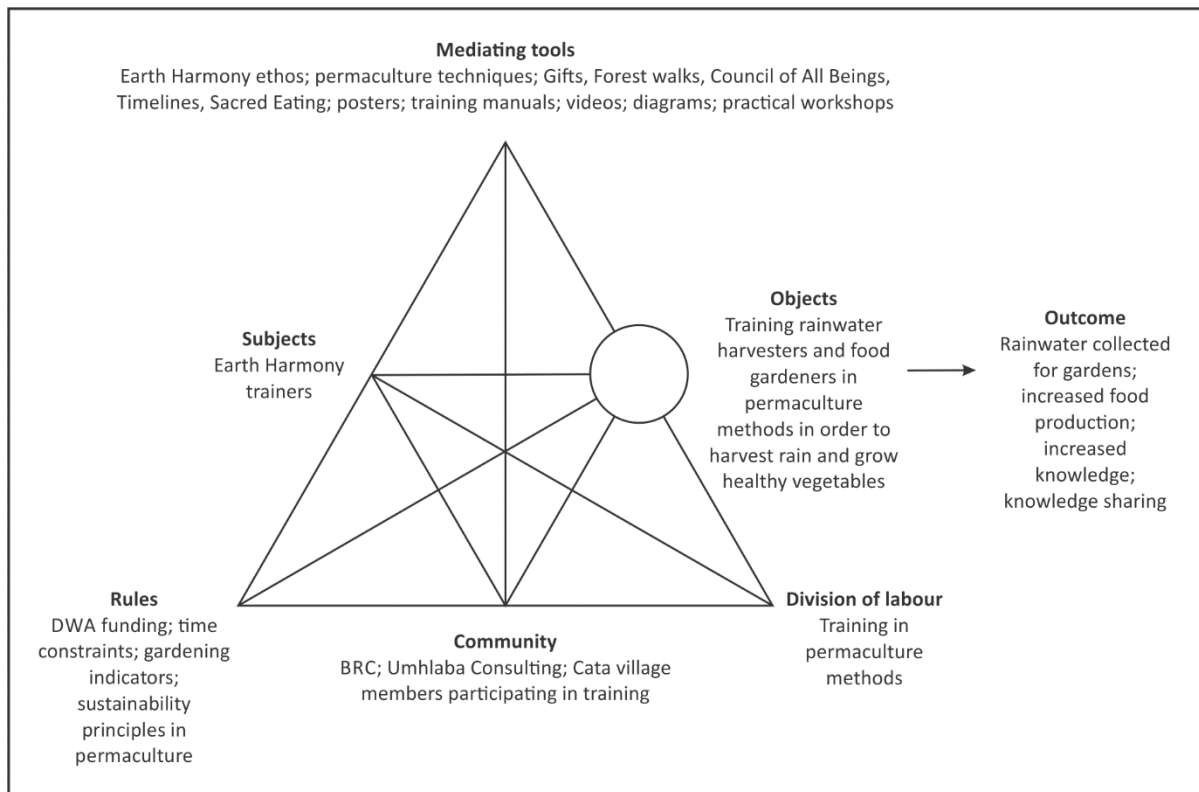


Figure 5.12: Earth Harmony Innovators activity system

Earth Harmony Innovators was founded by Tim Wigley with the *object* of training people in holistic permaculture methods. Wigley was invited by Umhlaba Consulting in 2009 to run training workshops in Cata around rainwater harvesting and food gardening techniques. He undertook seven workshops which commenced with a five-day training session and ended with two follow-up workshops. The ethos (*mediating tool*) of Earth Harmony Innovators, as described by Wigley, (Int.10C) was:

to help people make a shift from being raiders to co-creators with nature ... There is a strong emphasis in my training on reconnecting with nature, with seeing how ecosystem processes operate in a healthy natural system and also to see how we have disrupted these processes so we can see how to restore these processes ... I call myself Earth Harmony Innovators to get back into harmony with the earth.

Enacting this ethos are the knowledge tools or *mediating tools* which Earth Harmony utilises for training groups which includes concepts and exercises such as constructing timelines, playing games, pretending to be elements in nature and going on forest walks. Wigley usually begins his training with a simple remembering exercise where training groups construct a *timeline* together of the socio-ecological condition of their village. Wigley (Int.10C) explained:

A timeline is just a simple thing and you just discuss how far back people can remember their situation, back to 1950 or 1960 or whatever the case may be and you just make a line on the ground and depending on how long the time is you might take five year intervals or ten year intervals and they will discuss each ten year interval and they'll use seeds or stones or something to put on that interval to indicate it's as good as it could be. So ten would as good as it could be – it just doesn't get better than that. And if you get down to one then it's so bad that there is nothing left. And we did that for human health, we did it for livestock production, we did it for crop production and almost without fail, it started at ten and ended with one. I'd say without fail, I don't think there was a single village I did in the Transkei and the Ciskei that didn't, in their own memory, move down from ten to one which is pretty bad which means there has been a major collapse in everything in these villages.

The *Council of All Beings* is another tool Wigley uses where the facilitator asks people to go and

'let something in nature speak to you'. Something will if you go out there asking. So they go out in silence and spend half an hour walking around and allowing something to touch them, speak to them. On returning they speak as that thing, whether it's a stone or a rock or grass or an animal or insect. Speaking from the perspective of that being or that object is very moving. (Int.10C)

Another tool which Earth Harmony uses is **forest walks** in which Wigley or his fellow trainers take groups

into the forest as treating it like a teacher and how does the forest protect and build the soil, how does the forest utilise the rain, how does the forest utilise sunlight. So we'll discuss and look at those things and you can see it and answer those questions and they can see how effective it is. (Int.10C)

The forest in Xhosa culture is understood naturally as a place that bestows spiritual health and well-being (Dold & Cocks, 2012: 17). The forest as a teacher is adopted from the Xhosa culture as one Xhosa man stated, "Children must go to the forest to learn everything about *isithethe* [the manner of doing things; the way of life] of amaXhosa" (Dold & Cocks, 2012: 17).

Sacred eating is another tool Wigley uses to invite people into the holistic ethos Earth Harmony adopts. He explained:

We called it sacred eating but it's really looking at the reasons we eat and we ask people and they very quickly come up with a list of physical reasons for eating and if you push them a little bit they'll start coming up with emotional reasons for eating ... After analysing together with people in the villages the explanation that especially the older people come up with is because of what we're eating now. We used to be eating food from our own land and now we're eating chicken pieces, we don't know where

they come from ... And then to take that kind of awareness a step further and say well we eat to remind ourselves who we are. In every tradition we come from the earth, in the Christian one, we come from the earth, we are the earth, so how do you remember where you come from other than eating live food that comes from healthy soil. And when you discuss this you get nods all round and that's what Ubuntu was when we knew who we were and where we came from and the terrible things that happen now is because we've forgotten and we've lost touch with that. And the only thing that will feed our spirits and who we are and where we come from is living food from living soil. Dead food can't do that ... And that evolved out of a lot of discussions and a lot of workshops; that's why we call it sacred eating. (Int.10C)

Another exercise Wigley performed with training groups is the concept of giving to the earth *Your Gift* and recognising the creator being in oneself. Wigley explained:

Again I just ask people what their gift is, everyone has some special gift that they bring and this exercise helps people get in touch with their special gift which they bring into the world and we'll go somewhere outdoors to do this. They go out finding their gift and we'll agree where we go, and people pick up some small natural object as a symbol of their gift and then we'll stand in a circle and people will share what their gift is and then you ask one other person in the group to witness and say yes, I see that gift in you in this and this way. And then I get them to compose a little chant beforehand to say, 'I thank God for you and may the creator in you continue to be blessed in you'. That they actually find hard, they do it but to prepare the chant beforehand, they are so used to thinking of God's responsible for everything and not themselves so it's that shift of the creator being blessed in you. But they all do it and the depth of that shift often brings people to tears when that gift is affirmed or just sharing their gift with other people. (Int.10C)

Besides these concepts Wigley also made use of other mediating tools such as practical demonstrations and posters and videos to train his groups (see Section 7.2.5).

Wigley explained further:

It's specific exercises like the Council of All Beings and the forest walk which allows us to reconnect with the Earth; now we understand our interconnectedness and can work from that in a constructive way, in a way that isn't damaging the rest. We're not separate from nature, so I try to weave that in. Then there are the more straightforward permaculture techniques: the rainwater harvesting techniques, the mulching, the soil, the making of compost, the planting for the diversity, creating little nurseries. (Int.10C)

The training sessions Wigley carried out with groups in Cata focussed on a range of permaculture techniques including:

- Trench beds;
- Swales;

- Fertility pits;
- Diversion furrows;
- Construction and use of an A-Frame for contouring;
- Mulching; and
- Tree-planting. (Denison, 2010: 17)

Wigley also helped the BRC develop a monitoring system (Section 5.4.3) to help WfF members to keep track of the production in their gardens. He developed a list of indicators for gardening success (see Appendix 14 for list of indicators for gardening success). These indicators included:

That the soil is covered. That they ensure diversity in the garden; That they are harvesting and using rainwater; they are planting and caring for trees; that they are using organic matter to fertilise and feed the soil; they are using natural methods for pest control; they've become self-sufficient for vegetables and fruit, they don't have to buy; and they are saving their own seeds (Int.10C).

As was discussed above, the BRC (as one of the interacting activity systems) then took over collaboration, facilitation and monitoring of this training (BRC reports 2004-2007). The above account thus serves to highlight the introduction of rainwater harvesting and food gardening practices in Cata and the socio-economic factors they were responding to as well as the different interacting activity systems in the Cata community. The following section of this chapter presents further the interplay between context and mediation through the narrative accounts of the primary research participants from Cata.

5.5 Narrative accounts of rainwater harvesting and food gardening practices

This section presents the case stories or narrative accounts of the four research participants from Cata and their rainwater harvesting and food gardening practices. The narratives are constructed along several common threads, namely water in the past, water at present, and learning about water and food security, amongst others. Although commonalities exist within these narratives, they are not all the same and instead reflect the dominating mediating factors in each participant's life in terms of their learning around rainwater harvesting and food gardening practices. These narrative accounts are based on eight individual semi-structured interviews (two interviews per participant) as well as observations during each interview (Section 4.5.2 and 4.5.3). These narrative accounts

comprised the first phase of analysis (Phase One A) and can be understood as the first attempt to skim the surface of the mediating processes inherent in the learning around these practices. A summary of the main mediating factors influencing each participant's rainwater harvesting and food gardening practice is found at the end of each narrative account.

5.5.1 Nothemba Languva (Skafu, Cata)



Figure 5.13: Nothemba Languva standing in her thriving food garden (Cata, 2012)

General profile

Nothemba Languva is an elderly woman living in the Skafu settlement of Cata village. She lives with her husband in a house and garden situated on the edge of the settlement as one enters Cata from the town of Keiskamma. She was born in Cata then moved to Stutterheim for work where she met her husband, Mowetu. Nothemba explained to me that she did not attend school as she never had the opportunity. In 1957 she and her husband moved back to Cata where their three children were born. Their children now live in Cape Town where the two eldest work on a temporary basis and the youngest still attends school. Nothemba and her husband work together as a team to bring money into the household. She explained, "I am the head of the house, but he also assists me in the garden". Besides successful gardeners, they are both currently employed by the Community Public Works Programme (CPWP) where they perform small projects such as cutting grass, planting gardens and painting and renovating the primary school in Cata. "We work eight days a month, that brings in about R500 (USD USD \$43.68/ €35.56) a month". Her sister also brings in money to the household through her social grant. Nothemba commented, "We support each other". She and her husband are not yet old enough to qualify for pension; he has one year left and she has three. "I am longing," Nothemba exclaimed at the thought of receiving a steady monthly income. In terms of religion and wider social groups Nothemba is a member of the Methodist church in Cata.

Food security: Helping herself and helping others

Nothemba was a successful gardener before she joined the Water for Food (WfF) programme in 2005, a year after it was established in Cata. She was and is the main food provider in the family and decided to start gardening because of the need for food. She explained, “Because before that I was really struggling in terms of getting food. I would ask around the community and beg. So now because I planted I had my own garden, things were much better”. She was already a member of a developmental committee (a restitution fund project) which is how she was introduced to the WfF programme. She liked the concept so joined the programme and has been a successful member ever since.

The ethos of the WfF programme can be summed up as helping yourself and helping others which can be seen in Nothemba’s life. As a member of WfF she has the opportunity to grow diverse crops such as mealies, potatoes, beans, green peppers, spinach and other vegetables in order to feed to her family. Nothemba went from begging for food to being one of the main vegetable sellers in the community. She explained that “People actually come here; I don’t go around and sell”. She sometimes shares her vegetables with the poorest families and also with households that are HIV infected: “Even if someone doesn’t cry out for help I can see where the help is needed and actually I share what I have”. When asked how much she brings in from vegetable sales per month she says, “Ja [Yes], well I make about R300 (USD\$ 26.21/ €21.33) a month if I have enough in my garden. But there are those that come and ask for credit, and those hardly pay back. That money actually in many circumstances I lose because if someone comes and asks for something that I know I have, I can’t say no”. From this statement it is easy to see that Nothemba respects and upholds the sense of community around her and seeks to help those less fortunate than herself, even if it means running at a loss for herself. Adding to the benefits of her garden Nothemba explains, “My garden does not only help me to get money but it also contributes to my own health because I am diabetic but because I eat fresh vegetables my diabetes is always controllable”. In terms of monthly grocery shopping Nothemba explains that, “I never buy any vegetables in town”. She spends R700 (USD\$ 61.15/ €49.78) a month on groceries for the five people in her household.



Figure 5.14: Nothemba Languva and her husband pulling up spinach and cabbage to sell from their garden (Cata, 2012)

Small business skills

Nothemba is an enterprising woman and besides selling vegetables she also started a chicken breeding business from her home. She cleared out two rooms in her house and converted them into breeding rooms: one for chicks and the other for older chickens ready for eating. Nothemba explained, “... it was my business when I started breeding these chickens and I know I buy chicks and within a month they are chickens that people they will come and get the chickens for credit but they never pay back, so that discouraged me. But I will do it again in the future but not for people but for myself. I will just breed them and as soon as they are ready, I’ll slaughter them and put them in the fridge. And I have these ones for eggs and meat”. Breeding chickens contributes to the food security in her home; “Ja as soon as they are ready to lay eggs then I can sell and I will also consume in my household”.



Figure 5.15: Nothemba converted two rooms in her house to raise chickens (Cata, 2012)



Figure 5.16: Nothemba’s adult chickens (Cata, 2012)

Water at present

As a member of the WfF programme Nothemba was given four Jojo tanks and one cement reservoir. These were donated to her through the rainwater harvesting and food

production pilot programme introduced by Umhlaba. Nothemba received one of these cement reservoirs in her garden as she was already an active gardener and in 2008 she and her husband were given four Jojo tanks as well. The remaining WfF members who did not receive reservoirs were given four Jojo tanks. Nothemba explained, “The seventeen [WfF members] that didn’t get the reservoirs were given four Jojo tanks each.” Fifty other families not belonging to the WfF were also given one tank on the grounds that they were either poor, had elderly people living in the household, communal taps were too far from houses to collect water or because they did not receive compensation from the restitution process in Cata. Her reservoir and tanks were installed by Umhlaba using local labour. Many people in Cata who did not receive donated tanks have seen the benefits of owning a tank and wish to invest in one or several when they have the financial capital to do so.

Rules and problems with reservoir

Certain conditions were stipulated in terms of the use of the reservoir and tanks. The water in the reservoir was only for watering the garden and not for mixing mud to plaster houses or any other activity. In terms of the Jojo tanks, “That water is for domestic use” and Nothemba also drinks the water in the Jojos and does not chemically treat it, commenting that, “The quality is good”. Although her reservoir was very useful and helpful, she did have one problem: The reservoir is set low in the ground and is quite deep, making it difficult for her to scoop water from it. She commented that, “It’s very hard work to get the water” and that it hurt her back. As a result she used two-litre bottles to haul the water from the reservoir and then fills drums standing around her garden to water from these. Her tanks also overflowed when the rains were heavy in which case she explained, “As you will see I also have huge drums, 200l drums outside, which I use to fill up from the Jojo tank water. It actually floods out so some of the water I take to those 200l drums and then for actually watering the garden”. Sometimes when the water level was low in the reservoir she would go to the community taps for water. She explained that what she really needed was “a pump, anything that would assist me to get the water easily”.

Interviewing Nothemba several months later she explained that her only problems were again the issue of getting the water out of her reservoir when the water level was low. She has experienced no problems with her four Jojo tanks as they are still relatively new and

:they help her considerably with water. If her tanks break she said she would fix it as “I can’t look any further for help”.



Figure 5.17: Nothemba demonstrates how difficult it is for her to get water out of her rainwater reservoir as it is so deep (Cata, 2012)

Water in the past and managing water in the present

Before harvesting rainwater with a reservoir or tanks Nothemba relied on rainwater to water her garden. She explained, “I relied on rain entirely because we knew when the rain was coming. So we would plant just before because we know for example that the rain comes before December/January so we plant before that”. There was a serious drought during 2005/2006 which influenced her decision to join the WfF project as members were promised tanks. After she received her tanks and reservoir she was and is able to manage her water much better. During dry seasons if her tanks run empty the alternative is to get water from the communal taps situated around the village. Nothemba explained:

Ja [Yes]well during drought the alternative is to get water from the taps cause it does get dry sometimes. Even the reservoir gets dry, even if the water goes down, it’s really difficult to get water from the reservoir cause you have to put the ladder and someone has to scoop it out.



Figure 5.18: Nothemba and her husband left drums out in their garden to collect rainwater in order to water their vegetables (Cata, 2013)

Mama Tsepho's ethos

The ethos of the WfF programme and Mama Tsepho's encouraging attitude toward life is heard in the way Nothemba views her problem with her reservoir: "And then we might just be chatting about my problems but I know in many cases where I raise issues that I eventually get help, so I'm hoping to get help with whoever is ready to assist. I'm patient and I know that other people want to join the WfF programme because they see now we are being rewarded for our patience – to be patient on the road that you are travelling. When you know where you are going then you stand up again, get yourself together and keep moving until you get what you want. I am looking forward to getting supported with that reservoir".

Gardening techniques

Through the WfF programme Nothemba and other members were taught certain gardening techniques by Mama Tshepo. Nothemba was taught to dig up her garden, taking out the top soil. She then buried old tin cans and blankets underneath, covering these with soil and top soil and planting seedlings over this:

It does rain and then those tins retain water and on top of the water that you water so your plants always have water. As you water your garden that water doesn't quickly go away. So that is why we no longer planting in summer where there is a lot of rain. So we actually plant throughout the year because of that technique.

Speaking of her gardening techniques Nothemba explained, "I haven't had any problems with the rains and I plant throughout the year. When I go to King William's Town I bring seedlings to fill up the other side of my garden with me because I rotate some crops like cabbage. When that one is ready to be harvested the other one should be fully growing. That is the process I use in my garden."

Gaining and sharing knowledge: Furrows and pesticides

In terms of harvesting rainwater, Nothemba dug small furrows that lead to the reservoir which was how the rain was collected: "I have a small reservoir located in my garden. I dig small water tributaries that direct water to that reservoir. It's the water from the reservoir that I use to water my garden". She has to maintain these furrows, cutting away weeds and grass that may hinder the flow of rainwater. She placed old cattle bones at the base of her fruit trees which retains water very well. She learned this technique from her father. She

also used natural pesticides such “as aloe and mix it with other medicinal plants such as *umlujamo*. Well I put those into a 20l and process those and use a broom to spray over”. She learned this from the WfF programme. When asked if she shares her gardening and water knowledge she said, “I do tell them. Knowledge is not that difficult anymore”. When asked if other methods of rainwater harvesting were taught through the programme she explained that people are taught to dig furrows even if they do not have Jojo tanks.

The WfF community: Supporting each other

In terms of functioning as a community, the WfF group used to meet once a month to discuss problems. “We share ideas and help each other. If you are no longer motivated or seem to lose interest in your garden, one member will visit you and ask what is wrong. We also, each member, contributes R10 (USD \$0.87/ €0.71) a month to a communal fund, where at the end of the year, we sit down and use that money to buy potato seeds. We share these among members and then plant these”. They use these meetings as a platform to bring their needs to the fore “such as the need for garden tools. These are really lacking amongst the people and this really demotivates people”. At first they had communal tools and then they had to return them to the hall. When she took them back that was the last time she saw them. The WfF programme does not provide money for tools. She thus took it upon herself to invest in her own tools: “I decided to go buy my own with the money that I get from selling vegetables”.

Other development programmes in tension with WfF activities

Of late the WfF community had not been meeting regularly as a group. Nothemba wondered:

This CPWP [Community Public Works Programme] could be the reason why we are no longer meeting on a regular basis because this programme is diverse in terms of what is happening. For example I work in the school. I plant a school garden there. I cut grass. And when the school needs to be renovated or painted I also do that.

Other members of the WfF work for the CPWP on pine seedling and wattle clearing projects which is another way for people to diversify their income. As a result people are busy and do not necessarily have time to meet and discuss WfF matters. Speaking to her the following

year however, the WfF community was still strong and continued meeting together, even if not regularly each month.

The Cata WfF programme was initially funded by the BRC but now no longer receives financial support from them. Nothemba thought that the programme had the same momentum as when it first started. They started as 21 members and initially the membership was not growing because the budget could only provide for those 21 committed members. Coming second in a national gardening competition last year and receiving the cash prize however will allow the members to apply and register their WfF group for official recognition and perhaps take on more members. During focus group discussions held in October 2012 non-WfF members showed interest in joining.

Future aspirations

In terms of her aspirations for the future Nothemba would like to leave a sturdy house behind for her children. Like many residents who live in mud houses, Nothemba longs to build a brick house which will last longer and stand as an investment for her children:

Ja [Yes] well my main wish in the future is to replace these buildings by bricks. At least for my children because maybe, they are in Cape Town, such buildings now if I die and they are still in Cape Town then the rain and wind comes, by the time they come back there is no house and they have to rebuild it. But if I build with bricks they can withstand for three, four, five years and when they come back there is hope waiting for them.

Summary: the most prominent mediating processes within Nothemba's rainwater harvesting and food gardening practice and learning

Nothemba had a strong sense of community (*community/implicit mediation*), sharing food with neighbours and others in need, even when it meant a monetary loss to herself. The ethos (*tool/implicit mediation*) of the WfF also influenced how Nothemba engaged with her broader community and how she viewed the problems she faces and their solutions. One of her greatest challenges was to draw water out of her reservoir (*tool/explicit mediation*) when the water level is low, making gardening difficult. She and her husband worked closely together (*division of labour/implicit mediation*) however, sharing their knowledge (*tool/implicit/explicit mediation*) on plants, soil and water (*tools/explicit mediation*). Nothemba also invested in her own gardening tools so as not to be constrained in her practice by relying on tools from others (*tools/explicit mediation*). As a group, WfF members

(community/implicit and explicit mediation) were also active in supporting each other and problem-solving together. Other activities in the community such as working for the Community Public Works Programme (CPWP), offer monetary incentives and sometimes drew her away from her involvement in the WfF activities.

5.5.2 Castina Gcilitshama (Skafu, Cata)



Figure 5.19: Castina Gcilitshama standing in her vegetable garden (Cata, 2012)

General profile

Castina Gcilitshama is an elderly woman who lives on the farthest edge of Skafu settlement at the foot of one of the many mountains that encircle Cata. “I was born here, but you know the resettlement process brought me here to this piece of land, but I was born here.” She is a mother of two grown-up children, a son and a daughter. Both live and work in Port Elizabeth and visit her on a yearly basis. Her grandchildren live with her. Her son “doesn’t support at all whereas he has a child here and I’m keeping his child. But the married lady [her daughter] keeps her child here and sends money on a regular basis”. Besides supporting her son’s child Castina also adopted a young girl. Castina was thus the main breadwinner for not only her son’s child but for this young girl as well. “I don’t have a husband, he passed on. The person that is at my house is my helper – making sure the fence is not falling and other little small repairs that need to be done. So I am a pensioner”. Five people, including herself, made up her household.

Food gardening and knowledge: “It’s in my blood”

Unlike many residents in Cata who are active gardeners, Castina was not a member of the WfF programme. When asked why she chose not to join the WfF programme she explained, “Ja well I don’t know, I didn’t want to rely on anyone because I grew up planting gardens and planting crops. It’s in my blood. Even when this project came around I felt why cause I can do this myself.” She explained further that she gained her gardening knowledge from “my mother when we were ploughing, removing weeds, we were there ... so now we just do

it cause we use to it”. From observing and working with her mother she thus learned how to garden.

Water in the past and present

Castina used to rely on a stream for her domestic water needs and direct rainfall to water her garden. In 2008 she bought a Jojo tank however and explained her motives: “Before the tank and the tap I had the garden and I was using the spring water to do the gardening. I fetched water from the stream”. When asked why she decided to buy a tank she explained:

Where I used to fetch water, it was very far so as soon as I got money, it was pension money, then I decided to buy this tank. Bos [because] I used to take the washing to the stream, put it on my head and it is far. So I thought if I could buy a tank it means that I would have water here and don’t need to go down there. That is the reason why I bought this tank.

Her helper used to be a builder so installed the tank himself on a concrete base. When asked if she has had any problems with it she explained:

Only one problem, even before I could use it because I suspect the person who was installing the tap into the tank did not install it properly because it was leaking where the tap joins the tank. But I asked someone to fix it for me and it hasn’t leaked. The rainwater tank collected rain off the roof.



Figure 5.20: Castina explaining how her tank was installed (Cata, 2012)

Watering the garden and division of labour

Castina’s Jojo tank was used for domestic purposes only (washing, cooking and cleaning) while she used the communal tap and rain to water her garden. The tap is about 200 metres from her house and she explained, “I go fetch water two times daily, in the morning and in the evening before I plant. I collect water twice up until I see that at least now that what I planted can grow”. She explained that she waters seedlings until she can see that they “hold the ground, then I don’t need to water it. Now I am no longer collecting water”. She

explained that “onions and spinach need a lot of water. When I see that it has grown enough. It is not easy to get water to the garden”. She watered the whole garden by hand except for the maize crop. These were watered by the rain. Besides using water from the communal tap and harvesting rainwater for domestic purposes, Castina also buried tin cans under her vegetable beds in order to retain moisture in the ground. Her helper assisted her in the garden but her grandchildren do not as they are not interested in gardening.

Food security

When asked if she sold her vegetables Castina explains; “Nothing, zero, it’s for household consumption”. Castina also mentioned that the only time she has to buy vegetables is if her crops fail, “No I don’t have to buy vegetables, unless some of my crops fail, then I have to buy”. Going back to her the following year I asked what she had just harvested. She said, “Ja well after that mealies, I’ve planted green beans then I harvested them and currently I have potatoes, pumpkin and beans”. She was also able to plant throughout the year. On saving money because she grows vegetables Castina comments, “Ja it helps me a lot because I don’t sell a lot this is not my intention of planting them but I plant them for household consumption”. Castina purchased the rest of her groceries in Cata at a local shop in the Skafu settlement and then at another one in the Nyanga settlement. Castina spent about R800 (USD \$69.69) per month on groceries for a household of seven people.

Challenges and aspirations

When asked what her primary challenges in her life were Castina explained, “The main challenge is my houses; some of them are falling because they are mud houses. We can see from there the other one is falling apart. So that has been my biggest challenge for this year.” She also did not have the economic means to maintain her house, “I’m struggling financially because I need someone to assist me. I don’t have this kind of money.” In terms of her future aspirations she said, “Ja [Yes] well my biggest dream is to build a big house. Where I’m living now I think everyday how I can achieve this cause if I could I would by now destroy the house now and build a brick house.”

Summary: the most prominent mediating processes in Castina's rainwater harvesting and food gardening practice and learning

Castina held an ethos of independence and self-sufficiency (*tools/implicit mediation*) with much responsibility as she was the main breadwinner of her household. She was aware that the history of betterment (*tool/implicit mediation*) has shaped her life, determining where and how she lives now. She grew her own food to feed her family (*community/explicit mediation*) and had a helper (*division of labour/explicit mediation*) to aid with the work. Her mother (*tool/implicit mediation*) taught her most of what she knew of food gardening but her grandchildren (*division of labour/explicit mediation*) did not value and were not interested in learning about this knowledge. Castina recognised the benefits of harvesting rainwater and having a closer supply of water to her house than a communal tap so invested in a rainwater tank (*tool/explicit mediation*). Castina has also learned that growing a garden contributed to her food security.



5.5.3 Bolekwa Ntusi (Nyanga, Cata)

Figure 5.21: Bolekwa Ntusi standing in her food garden (Cata, 2012)

General profile

Bolekwa Ntusi was a lively and friendly middle-aged women living in the Nyanga settlement of Cata. Besides tending a thriving garden she also worked as a health worker for the Department of Health in her community, visiting and talking to families about their health and social concerns. Her husband was a farmer who tended fields in the forest close to their house. She became a member of the WfF programme in 2006. Her daughter was the original member but Bolekwa took over once her daughter went back to school. When asked why she joined the programme she explained:

I joined because initially I was only planting mealies and sometimes potatoes ... but I realised when you are a member of the project you can choose from

various types of crops and that when you planted that crop, people they do come and buy. So that's why I decided to become a member.” She explained further, “I already had my own garden at the time. When I joined, I divided the garden in two, one side was mine and the other was for the purpose of the project.

Water in the past

Bolekwa had five Jojo tanks. She was donated four by the DWA through Umhlaba Consulting and bought one for herself. Before she had tanks she collected water from the river: “I would say a round trip is about an hour or more”. The distance and time it took to collect water persuaded her to buy a Jojo tank in order to have water on site at her house. She bought her Jojo tank sometime before 2006 before joining the WfF programme, using it for “watering garden and for domestic purposes”. When she did not have her tank or drew from the river, she would use water from the communal taps in her neighbourhood which was problematic at times as sometimes pipes would burst. She explained:

Whereas we have community taps, it is not easy even for us to have access to that water because it is not always available. There will be a call from one community member that the water in the taps is available and we all go line up for that water but some of us will not be able to get that water. The water will stop before all of us actually get into it. So in my case I don't really use tap water because now I have enough water on my property.

Having water tanks has thus provided Bolekwa with a more secure and reliable water source.

Installation and problems with tanks

Umhlaba Consulting installed Bolekwa's tanks but she understood that it was her responsibility to maintain them. She explained how they installed her tanks:

You just point where you would like your tank to be placed and then they will install it there. They are not going to prepare a cement base for you, that will be your responsibility and then they will also give you a small gutter that collects water from your roof to your tank.

A few research participants explained that they were asked where they wanted their tanks as tank recipients knew their land best and where the water flowed around their houses. Bolekwa provided two cement bases and three soil bases for her tanks.

She had not experienced any problems with her tanks: “We collect enough water, no leaking. I have not had problems with the tanks”. All her water was collected off the roof

of her house. Commenting on her gutters however she explained, “I have not replaced them but you need to always monitor them, they don’t necessarily break but they bend so you need to monitor them and get someone to fix them.” When she was donated her four Jojos, she and other members were told

...you must clean it yourself. They provided small ladders so you can go into the tank and clean it. Those who were asked to put their tanks in the garden, those who have tanks in the garden, the water will be redirected to the tanks and they will provide a dish like, that sifts all the dirty water before it gets into the tank.

Some members were thus equipped with mesh devices to collect debris and prevent it from entering the tank. She explained that after the tanks were set up those who installed them came to see if they were working once but then they never came again (the issues of follow-up visits, monitoring and funding is discussed in Chapter Seven).



Figure 5.22: Bolekwa’s rainwater tanks at her house (Cata, 2013)

Water security and gardening techniques

Harvesting rainwater has contributed to the food security of Bolekwa’s family. Having tanks has provided them with more water to work with, in a closer proximity and has provided them with the ability to plant throughout the dry season.

I’ve learned a lot in terms of how to manage my garden because before I would only plant at a certain time of the year. After the harvest I abandon the garden and wait for the next season for planting. But since I’ve been a member of the WfF we have learned a lot of techniques such as digging furrows around where your garden will be and also before you plant your garden you dig a three meter hole and put your cans in there. And we dig those trenches and furrows in such a way that when the water comes those trenches will be able to distribute the water across all your beds. And still each bed will retain some amount of water. That way it allows you to always have a crop in the garden throughout the year

so you don't wait now for a certain planting season so you always have food there because of such techniques.

Bolekwa attended an Earth Harmony Innovators workshop and commented on the need for diversity as observed from the forest: "In the forest you won't have just yellowwood but you have other different in the same place. So now we can, in one bed, plant different type of crops."

Food security and household income

Not only could Bolekwa feed her family from her garden but she also sold her vegetables, bringing in extra household income. "We planted potatoes last year. Since last December I have been harvesting potatoes from my garden. Not only harvesting but selling." As a community of practice the WfF members also contribute money to buy seedlings:

Last year in October as a project we sat down and bought potato seeds and shared the money ourselves and we planted. But I have decided to buy my own potato seeds but this is not part of the project now. This is my own initiative and I'm not sure when they will meet again. We do meet and contribute some money for seedlings but we don't often do that; buy seeds and share it.

At the time of the interview in 2012 Bolekwa estimated that she would probably only have to buy potatoes for one month of the year due to her large potato crop.

Bolekwa's husband also tended fields in the forest near to their settlement. He grew "mealies (maize), beans, pumpkin and a kind of melon [but] it's not for selling really, it's just for the house". Her husband was also a pensioner so brought in income to the household through his pension. Bolekwa estimated that she made about R220 (USD \$19.22/ €15.64) extra a month by selling her vegetables and when asked if her food garden saved her money on monthly groceries she answered, "Easy, yes I do save". Bolekwa usually did her grocery shopping in King William's Town and explained that she went "to a specific supermarkets to check prices, that is very important, and compare ok that one is cheaper here so ja ...". She spent about R2000 (USD \$174.42/€142.23) a month on groceries for the nine people living in her household: "I have five [children] and other extended family children that are under my guidance ..."

The garden: A family affair

The garden was a family affair in Bolekwa's household which is a legacy passed on from her mother and father. She explained, "Everybody here works in some way in the garden, even the head of the house". Commenting on her children's labour in the garden she said, "It's not up to them to say I'm not interested in the garden". She went on to explain that she did not ask them, she told them and that "Even if I'm not around they know that they must go and water the garden". When she was a child she disliked working in the garden but her parents encouraged her and her siblings. It was difficult but as an adult, she understands now that they equipped her with valuable skills and knowledge. When asked why she started a garden she explained, "From home, from my parents and then when I got married I started this garden. It was my own idea, my own initiative; I did it, with that background that I come from."



Figure 5.23 Bolekwa and her children garden together (Cata, 2013)

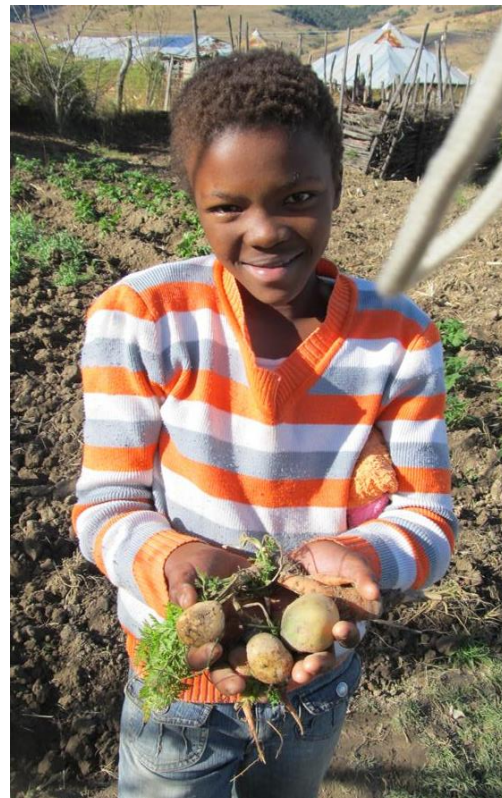


Figure 5.24: Bolekwa's daughter holding the 'fruits' of their labour

WfF community and sharing knowledge

The idea behind the WfF programme was for it to be sustainable and run by itself. Bolekwa explained:

The BRC said ja now we are going to let you stand on your feet and we are not going to support you anymore. Initially we agreed that when the BRC pulled out we would fund our own project by contributing a certain amount of money and buy seeds and seedlings and share that but when that call was made by us some of our members wanted to withdraw but if you withdraw you won't be entitled to get seedlings bos [because] you did not contribute. Those that did not contribute feel sidelined but we can't afford to pay for other people.

WfF members also shared knowledge among themselves and with other people. The BRC approached the WfF members to train others in neighbouring villages with gardening techniques. Bolekwa explained, "the BRC came because they are having a similar project in another village and actually asked us to train those people who are involved in the WfF project. Bos [because] they don't have money to train them but asked us to use our skills and help the people." Water harvesting and gardening knowledge was thus shared between and across communities in their area.

The WfF programme also had a built-in support system that encouraged members in their rainwater harvesting and food gardening practices in the form of a monitoring committee.

Bolekwa explained:

As a project we have members of a monitoring committee who monitor our gardens: Are we still active? Are we still planting? Those who seem to be discouraged or seem to drop out, the committee's responsibility is to ask the problems and then as a group we see how we can solve the problem and encourage that particular individual to plant again. If we see that some members are lazy we quickly change them. So our meetings are really related to our own functions, how do we function and how do we support each other and also our relationships.

Finding support and funding were usually their main concerns at meetings.

Health and food security

As a community health worker, Bolekwa saw food security as one of the solutions to health issues in her community. She encountered diseases such as diabetes, HIV and hypertension and saw a varied diet of fresh vegetables as a solution to a healthier lifestyle. She argued:

Some households will complain that they don't have food, so I encourage them to have a garden. Even if you don't have money but you have land. It doesn't matter how big your garden but the thing is that you will be able to get some food there so you can't say that we don't have money but you have land. So I push people to have their own gardens when they have their own land.

She went on to add:

We do encourage people to plant their gardens because these fresh vegetables assist a lot in terms of fighting diseases. You do not have to pay for vegetables whereas you have land you can get the vegetables on your own land when you want it... You can get them at your own time whenever you want it. You won't always have money. We even go further to encourage families to have even one or two chickens so you can have free eggs and whenever you feel you need protein you can slaughter your own chickens. Not everything in life that matters you need to buy. Where you cannot buy, try and get that for free by having your small livestock and having your own garden and then you will have access to those things whenever you want.

When asked what her plans and hopes were for her family in the future she replied, "I just wish my family unites and works together so that we live in peace and harmony and every member of the family to play his or her role in making my family better".

Summary: the most prominent mediating processes in Bolekwa's rainwater harvesting and food gardening practice and learning

Having rainwater tanks (*tool/explicit mediation*) near her house increased Bolekwa's food and water security where she used to have to rely on faulty communal taps (*tools/explicit mediation*) and river water. Bolekwa understood that the responsibility for the maintenance of her tanks (*rules/explicit mediation*) lay with her and her family. Her role as a community health worker (*subject/implicit mediation*) also led her to encourage and teach others to garden as she has seen the monetary and health benefits (*outcomes/implicit mediation*) of having clean water and fresh vegetables. Having inherited a legacy of gardening knowledge (*tool/implicit mediation*) from her parents, Bolekwa and her husband understood the value of passing their knowledge (*tool/implicit/explicit mediation*) on to their children. Growing food was thus a family affair (*division of labour/explicit mediation*) and their children were expected to help (*rules/implicit mediation*). Being part of the WfF Movement (*community and tools/ implicit/explicit mediation*) Bolekwa also gained gardening and rainwater knowledge which enabled her to grow food throughout the year. Through the WfF structure she also learned how to support those around her, work as a group and share knowledge (*outcomes/implicit/explicit mediation*).

5.5.4 Sisiwe Khiba (Nyanga, Cata)



Figure 5.25: Sisiwe Khiba standing in her vegetable garden (Cata, 2013)

General profile

Sisiwe Khiba and her husband Dumisani were both WfF members and worked closely together in their food garden. Sisiwe was born in Cata and has lived there for 46 years. She and her husband were amongst the first Cata community members to join the WfF programme in 2004 but were gardening before becoming members. They had four children, one girl and three boys. One of their children was working while the other three still attended school.

Water in the past

Because they were already active gardeners like Nothemba, they were also identified to receive a cement reservoir in their garden by Umhlaba. Before receiving a reservoir Sisiwe said, “We used to collect water using buckets from community taps. Before taps I was using my tank, which I bought in 1999. Since then we never experience any problems with this tank.” Because they received a reservoir they did not qualify for donated tanks:

That means we did not benefit from the three tanks that were given to other members who joined later. There are four of us who benefited in getting reservoirs but later they gave us one tank. In fact, we got this tank because every household in the community was given a tank, even non-WfF members.

At present Sisiwe and her husband have a reservoir and two tanks, one which was donated and the other which they bought. She explained, “We have two tanks: one is for watering the garden the other for household use”.

Problems with the reservoir

Sisiwe and Dumisani experienced problems with their reservoir since it was built in 2005. Sisiwe explained, “Since the reservoir was built we were never able to keep water there. It has been leaking since”. When asked if they had reported it Sisiwe replied, “Yes, we did and

they came and used silicon to fix the leaking, but that did not help. It leaked again. We can admit and say we do not have a reservoir, in reality.” Besides the leaking they have also had problems with channelling water into the reservoir. Sisiwe explained:

We have arranged for overflowing tank water to get into the reservoir, because it was badly situated where it was almost impossible to get ground water into it. Unless we could use pipes to try and bring water to the reservoir It is difficult to use community taps as they are far from us, so we rely entirely on rainwater.

Sisiwe went on to explain that if their reservoir was functioning it would allow them to increase the amount of vegetables they could grow. At present they use water from their tank to water the garden.



Figure 5.26: Sisiwe walks toward her leaking reservoir and vegetable garden (Cata, 2013)

Figure 5.27: Sisiwe’s leaking cement reservoir



Figure 5.28: Sisiwe shows her leaking cement reservoir (Cata, 2013)

Rainwater harvesting techniques

Sisiwe and Dumisani were taught to use other rainwater harvesting techniques besides collecting rainwater in tanks through their WfF workshops. Sisiwe explained, “We have dug trenches that direct water to small ponds in our garden, we also dig furrows between the plots of the garden so that the water can run through the plots and stay a little while before getting into the ground”. They also practised soil moisture retention methods: “Before planting in our plots we dig deep into the ground and fill the hole with cans and cloth to keep the soil moisture”.

Food security and gardens

Harvesting rainwater and having tanks has allowed Sisiwe and Dumisani to garden all year round which has contributed to their food security. They did not sell their vegetables as Sisiwe explained, “It’s for us here at home and we also share some with our other relatives”. Having a vegetable garden also saved them money with monthly groceries: “I don’t buy vegetables. I only buy other stuff but cabbage and other vegetables I don’t buy so I save lots of money”. Sisiwe spent about R1000 (USD \$87.36/ €71.11) per month on groceries and estimated that she saved about R500 (USD \$ 43.68/ €35.56) on vegetables. Sisiwe bought her monthly groceries in King William’s Town.

Income and the CPWP

Besides gardening, Sisiwe and her husband were involved in the Community Public Works Programme (CPWP) like Nothemba. Dumisani worked in the forests, clearing wattle while Sisiwe worked at the primary and secondary schools in Cata, with maintenance and renovation. In this sense Sisiwe and Dumisani were both breadwinners for their household.

Gardening: A family affair and sharing knowledge

As with Bolekwa’s family, Sisiwe and her husband saw the importance of teaching their children the value of gardening and being able to feed themselves. Sisiwe commented, “I am the member of WfF but when it comes to working in the garden everybody in the house is involved. We all work; myself, husband and children”. She went onto explain:

Ja well we’re hoping to pass this legacy of relying on gardens, on home gardens. We are trying to set an example here so even if we are no longer around they can remember us. So that is why we are trying to teach them the importance of gardens, that’s its part of you. It doesn’t matter where you go the garden will always be

important. And so we make sure they learn how to plant in the garden. One of our wishes is to send them to school and to progress and have an education but not forgetting where they come from and that is why we involve them.

When the weather was good Sisiwe explained they worked almost every day in the garden as “there is always something to do in the garden; watering, removing weeds and so on”.

WfF competition and funding

Sisiwe was an active member of the WfF programme, taking on much responsibility for the administration of their group in Cata. In 2012 they won second place in a provincial gardening competition hosted by the Department of Water Affairs in which their group represented the Eastern Cape (Gauteng province came first). Nothemba explained that the judges “... came to visit my garden to see how I collect rainwater and looked at my reservoir that does have a latch that prevents sediment to get into the water so they came and saw that” (Int.1Cb). Their group won R50 000 (USD \$4367/ €3555) in prize money and at the time of the interview (September 30, 2013) they intended to hold an official launch of their project in November 2013. Sisiwe explained the motivation behind this:

We are being recognised now and will be able now, as an individual group, not relying on any NGO. We will be able to submit proposals for funding ... [for] garden materials, you know wheelbarrows and hoes, fencing of our gardens, pipes, watering pipes and so on. So those are the main resources that we need and proper taps. Grout and even our taps do run out of water, we would like more taps.



Figure 5.29: Sisiwe holding the WfF certificate (Cata, 2013)



Figure 5.30: The WfF certificate (Cata, 2013)

Members of the group used their own tools or shared with neighbours but would like to own their own gardening tools. Obtaining official registration from the government for their WfF group in order to receive the prize money has been a constraint to their activities as a group however. At the time of the interview they were in the process of drafting a constitution in order to be recognised as an official development group in order to accept the prize money. They still met monthly whenever possible.

Summary: the most prominent mediating processes in Bolwekwa's rainwater harvesting and food gardening practice and learning

Sisiwe's broken reservoir (*tool/explicit mediation*) was a hindrance but this had not prevented she and her husband from gardening, although they claimed that with a functioning tank they would be able to produce more vegetables. Being part of WfF had taught them how to grow food throughout the year and they used plastic rainwater tanks (*tool/explicit mediation*) to water their garden. Like Bolekwa's family, gardening was also a family centred activity (*division of labour and community/ implicit/explicit mediation*) as both Sisiwe and Dumisani sought to educate their children to be self-reliant. Sisiwe was also a very active member (*community and division of labour/implicit mediation*) of the WfF movement which impacted on how she learned about not only gardening techniques but also about supporting, encouraging and providing advice to others.

5.6 Conclusion

This chapter has provided a contextual background to the Cata case study site and its activity systems as well as presented the narrative accounts of the four primary research participants from Cata. Using a second generation CHAT framework, a typical rainwater harvesting and food gardening activity system and its elements was described from the point of view of female rainwater harvesters and food gardeners. A historical background to Cata was then provided as well as the socio-cultural, economic and ecological context in order to better understand the factors that shape rainwater harvesting and food gardening practices in this specific community. The different interacting activity systems in Cata were then presented and described, providing a more complete understanding of their interaction with the central activity system. Narrative accounts of primary research participants from Cata were also presented, situating participants in their context by providing a description of their history with water, their water use at present, accounts of their food security practices and how they

learned these. In each account the most significant social, economic or political mediating factors were surfaced which impacted on each participant's practice and learning.

The following chapter (Chapter Six) represents the same three aspects (activity system, history and narrative accounts) but from the historically and socio-culturally different context of the second case study site of Glenconnor in the Eastern Cape.

PHASE ONE A

CHAPTER SIX

LEARNING RAINWATER HARVESTING AND FOOD GARDENING PRACTICES IN CASE TWO: GLENCONNOR, EASTERN CAPE

6.0 Introduction

Chapter Six focuses on the second case study site of Glenconnor. As introduced previously (Section 4.0), Chapter Six forms part A of Phase One of the research project and presents data aimed at answering the first research question in Phase One:

- 1) *What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security practices in rural communities?*

This question was guided by the sub-question:

Phase One A (Chapters Five and Six)

- Who is learning?

As in the previous chapter, Chapter Six presents an historical and socio-cultural background to the case study site, highlighting the structural and contextual factors that have bearing on the learning and practice of the central rainwater harvesting and food gardening activity system. The development of rainwater harvesting and food gardening practices are then introduced through the presentation of the Glenconnor central activity system and the other interacting activity systems. The narrative accounts of four primary research participants from this case study are presented, highlighting the mediating factors inherent in the practice and learning of rainwater harvesting and food gardening. As mentioned in the contextual introduction of the two case study sites (Section 1.4), one primary research participant was from a neighbouring settlement called Kleinpoort. The two settlement towns are very similar in history but the following contextual profile focuses on Glenconnor. The history of the two

towns is also expressed in the narrative accounts of the primary research participants (Section 6.4) and distinctions and similarities can be found in these. I have noted the marked differences where they exist between the towns.

Previously (Section 5.1) I described a typical learning central rainwater harvesting and food gardening activity system, which consisted of subjects, mediating tools, objects, outcome, rules, community and division of labour. The same concepts are applicable in this chapter and are used consistently throughout.

6.1 Historicising rainwater harvesting and food gardening practices in Glenconnor

Glenconnor lies on the outskirts of the citrus farms of Kirkwood, one of the main town centers of the area (Connor, 2007). It was set up as a railway settlement by Transnet, a large national railway company. Transnet was established in the late 1850s with the proposal of railway transport running to harbours in the Cape and KwaZulu-Natal. It was the discovery of diamonds in Kimberley in 1867 which drove the expansion of the railway across the country (Transnet, 2013). Transnet (or Spoornet in Afrikaans) built stations along their line accompanied by houses for their railway workers. Settlements such as Glenconnor and Kleinpoort can be found along the railway line running through the Eastern Cape to Cape Town. Transnet has long since closed down its operations in these small railway towns resulting in the disappearance of employment and a steady state of decline. In her thesis on farm workers in the Sundays River Valley (SRV), Connor (2007: 76) confirmed this and depicted railway towns such as Glenconnor and Kleinpoort as having “long ceased to function and trading posts and railway stopovers ... are derelict”.



When Transnet closed down these station settlements the houses they built were left empty. At the same time however farm workers and their families in the area were being evicted from farms due to downsizing of small stock farms, land being sold off to game farms and often because of quarrels with farm owners (Connor, 2007). One research participant's life history gives an account of much moving and insecurity as she and her family were constantly at the mercy of farm owners whose land they lived and worked on. Anna Armoed (Section 6.4.3) recounted her husband's troubles with the farmers he worked with:

Then he had a fight with the farmer and we moved to Noorslaagte where there was another problem and then we left to another farm ... The owner then died but his wife was still alive and then the farmer's son caused some problems ... So he was actually saying we must leave the farm.

Connor (2007: 5) also described "multiple experiences of disruption and movement" by farm workers such as Anna's family. She argued for an understanding of this displacement as a process and not an event: it had multiple ways of manifesting in people's lives as it was rarely one move but a lifetime of disruptive moves (Connor, 2007). Because many farm workers and their families had no houses of their own they took advantage of empty railway houses and populated the railway settlements. This was confirmed in an interview with a local NGO worker operating in Glenconnor: "Meanwhile there were nearby farm dwellers experiencing unfair treatment by the white commercial farmers so they saw that as a space so they jumped and occupied those houses" (Int.10G).



Figure 6.2: Transnet railway houses (Glenconnor, 2012)

Transnet still owns many of these houses however with residents having to pay rent to the company. According to residents' accounts in both Glenconnor and Kleinpoort, they have paid rent to Transnet for many years but without the company providing services or maintaining the houses. Inhabitants of Glenconnor and Kleinpoort have spent many years

fighting with Transnet, the Cacadu District Municipality and more recently the local Sundays River Valley Municipality (SRVM) for ownership over these houses and for basic services such as water, electricity and sanitation services. An active community worker and resident of Glenconnor explained, “What did Cacadu do with our rent? Because Cacadu didn’t even paint our houses. There were leakages. There was no water. Why should we still pay rent? OK some people followed me and said ‘OK Jimi we will not pay rent’” (Int.2G). The Glenconnor community then sought the help of a local NGO based in Port Elizabeth called the Khanyisa Educational and Development Trust (Section 6.3.2). Khanyisa sought to mobilise, capacitate and educate impoverished communities around their civil and political rights. Mr Gerald Mkele, working at Khanyisa, explained:

Then the government, Cacadu wanted to take over the service of Spoornet and to take over by evicting all those people and drive them to the nearest town which is Kirkwood. So the people didn’t want to do that. They had many years staying there from those farms and they calculated the rent they had been paying and find out that they are supposed to be owning those houses. So they met us to assist in facilitation of those struggles. They told us that they do not want to move, instead they want to respond but they want to be united to understand the policies and their rights. So that is what we did. We established the Glenconnor Development Committee which was responsible in terms of uniting all the communities and all those people have certain skills, like organising skills and understanding the organisation of the government. (Int.10G)

After several years of struggling with Transnet and seeking the help of the local municipality, Glenconnor residents won the title deeds to their houses. Kleinpoort residents are still fighting for ownership of their houses. Before unpacking these socio-cultural, economic and ecological challenges in this area however, it is first useful to understand the roots of these problems by looking broadly (at the national level) and specifically (at the local level) at the history of the area. The following section provides a history of the Glenconnor area through the lens of water.

6.1.1 A history of the Lower Sundays River Valley: Through the lens of water

Glenconnor and Kleinpoort are part of the rich history of the Lower Sundays River Valley (LSRV). One of the main findings out of a collaborative project under the South Africa Netherlands research Programme on Alternatives in Development (SANPAD) conducting work in this area found that a paradox existed in the coexistence of a healthy and productive agricultural sector with an unhealthy and poor population of residents (Clifford-Holmes, in press). This can be observed in the fact that wealthy citrus farmers have primary access to

water in the area while poorer residents suffer persistent water shortages. Another paradox exists between a highly efficient and profitable agricultural sector and a severely challenged and under-capacitated municipal and local government sector (Clifford-Holmes, in press). SANPAD researchers constructed a history of this area in order to understand the challenges of inequality with a focus on water services at present.

This narrative of change in the LSRV is divided into seven periods from 1652 to 2012 in order to track the history of the area:

Period 1: 1652 – 1882: Contested settlement

Period 2: 1883 – 1913: Laying the foundations of local development and ‘apartheid’

Period 3: 1913 – 1947: Land use and development trajectories

Period 4: 1948 – 1989: Apartheid: its development and decline

Period 5: 1990 – 2000: National level transition – the changing roles of government

Period 6: 2000 – 2009: The Sundays River Valley Municipality (SRVM) begins in a period of continued national transition

Period 7: 2009 – 2012: Municipal challenges and the ‘turnaround’ of the SRVM.

It should be noted that these divisions are artificial and do not represent distinct periods from each other or necessarily follow on from one another in a linear fashion (Clifford-Holmes, in press).

The early history of the LSRV is one of how a black African population was made to be dependent on an entrepreneurial white coloniser economy (Clifford-Holmes, in press). This period is part of the broader history of South Africa which laid the foundations for the formation of the apartheid system in the mid-20th century (Mezerik, 1967; UNESCO, 1972; Clark & Worger, 2004). The first period of early settlement and interaction (1652 – 1882) began in the mid-16th century when predominantly Dutch and British colonisers subjugated the black African population through their interaction with Xhosa chiefdoms (Clark & Worger, 2004). During the 18th century the LSRV was regarded as little more than an expanse between the established Cape and the remote inland regions (Clifford-Holmes, in press). Recognising the potential of the area however, fierce competition for independence

and natural resources such as arable land, livestock and water existed between the Xhosas and British which resulted in many battles between the groups, eventual British victory and the expulsion of the Xhosas from the area (Clifford-Holmes, in press).

The second period of this history (1883 – 1913) laid the foundations of local development and ‘apartheid’. In the 19th century Europeans settled in the LSRV with three main objectives: to create rest stations for travellers, to establish Christian missions in the area and, of primary importance, to establish a farming economy (Clifford-Holmes, in press). Scarce water supplies prevented any large-scale agriculture from developing during this time however (Clifford-Holmes, in press). The first formal settler farms in the area were awarded by the Cape government to settler forces in 1814 for successfully defeating the Xhosas (Clifford-Holmes, in press). By the 20th century the wealth and power of the Xhosa chiefdoms had been broken by defeat in successive battles with European colonisers as well as the loss of cattle due to the events of the ‘Great Cattle Killing’¹⁶ of 1857 (Bernard, 2010). At a national level Africans were restricted from owning land with the passing of the Glen Grey Act of 1894 which forced many Africans off the land that their livelihoods depended on (Christopher, 1994; Crais, 2002). At a local level white individuals and companies intent on expanding the agricultural potential of the LSRV refused land to black Africans (Clifford-Holmes, in press). These events were central to the black African population becoming dependent on the colonial economy. One elder in the Glenconnor community recounted the history of the area:

But the old people say this area here there were no white people here. Those huts over the mountains here, the people with the big blankets they were living that way, plenty of livestock. Everybody was doing their own thing and there those days rain was so plenty people just had spaces planting everything. They were living their own life. And then the coloureds came also in this area and they were living together. There were no wars here. Then later on the white people came and took everything from them. (Int.5G)

In her study on farm worker identities in the LSRV, Connor (2007:11) also found that people’s memories of the area extended “beyond that of the farmed landscape (current farm

¹⁶ The Great Cattle Killing took place because of the prophecy of a young Xhosa girl ordering the complete destruction of cattle and crops. It was believed that this sacrifice would appease Xhosa ancestors and lead to the destruction of foreigners. What resulted however was endemic starvation among the Xhosas and they were forced to leave their chiefdoms in search of work in the white colonial economy (Bernard, 2010).

boundaries) ... and thought fondly of the 'old way of life', or what has been bolstered by the presence of white farmers..."

The third historical period (1913 – 1947) in the Sundays River Valley (SRV) area saw many important socio-economic developments but these were accompanied by entrenched inequalities between the white and black populations (Clifford-Holmes, in press). Economic developments during this period included the construction and centralised management of irrigation infrastructure and institutions, the formation of the Addo Elephant National Park and the growth of the agricultural sector (partly as a result of increased water supply) (Clifford-Holmes, in press). In the late 19th century the lack of irrigated water in the SRV was a serious problem for farmers. In 1920 Sir Percy Fitzpatrick, a local politician and farmer, saw the potential for citrus farming and set up the ambitious Sundays River Irrigation Scheme in order to draw European settlers to the LSRV (Connor, 2007). In 1922 Fitzpatrick was granted the funds to build Lake Menz (or Darlington Dam as it was renamed in 1995) which was built north of Kirkwood and which still services the area (Connor, 2007). This increase and reliability of water to the LSRV led to the expansion of the citrus industry (Clifford-Holmes, in press).

Another development of great economic importance to the area to this day was the establishment of the Addo Elephant National Park in 1931 (Connor, 2007). The vast elephant population was another key feature of the area Fitzpatrick had to contend with when marketing the LSRV to settlers as these animals were destructive to water infrastructure and farm fences. After an attempt by farmers to completely eradicate all the elephants in 1918, sixteen were saved in order to maintain the species (Clifford-Holmes, in press). The Strathmore Reserve (1926) eventually became the Addo Elephant National Park in 1931. Tourism only gained momentum in the 1970s however after the erection of the Armstrong game fence in 1951 which contained the wild elephants (Connor, 2007). There was and still is much contestation over the expansion of what is now called the Greater Addo Elephant National Park (GAENP) due to loss of land and forced removals of local people in the area (Connor, 2007).

The fourth period of the SRV history (1948 – 1989) saw the rise of apartheid. Benefactors of most of the above-mentioned development projects were the minority white population while black communities were subjugated under national policies, first under British colonial

government and then under the Afrikaner National Party (Clifford-Holmes, in press). This period saw the passing of a range of laws affecting race-relations: the 1913 Natives Land Act, the 1923 Natives (Urban Areas) Act, the 1936 Native Trust and Land Act, the Immorality Act, the 1950 Population Registration Act and the 1950 Group Areas Act (Crais, 2002). In addition to the devastating social impact of these laws, the longstanding effects have included a cycle of poverty, high illiteracy rates and a struggle for land rights which directly and indirectly affect peoples' livelihoods (Westaway, 1997; Westaway, 2012; Clifford-Holmes, in press). Most of these laws were blatantly racist while others like the 1956 Water Act were less blatant, giving riparian rights to the minority white farmers and thus control over watercourses (Clifford-Holmes, in press). This riparian right remains evident in the lives of my research participants as one resident of Kleinpoort recounted:

Farmers had water and we did not. In 2000 Cacadu came and we told them we want water and 2003 they fix a water pump that was not working. After a year or two one farmer bought that land where the pump was installed that meant now again we don't have water... (Int.Glen4)

At a national level the Republic of South Africa was born in 1961 when South Africa withdrew from the Commonwealth in a whites-only referendum (Clark & Worger, 2004). The National Party government under Hendrik Verwoerd transformed the administration of the black population, developing 'homelands' for a multiple African 'nations' within South Africa. Each 'homeland' was administered under white tutelage by a set of Bantu authorities (consisting primarily of hereditary chiefs), with each nation supposedly 'capable' of developing along its own lines. Thus separate development was encouraged by the national government. A state of emergency was declared in the 1980s following escalation of violence and events such as the Soweto Uprising (Clark & Worger, 2004).

The fifth historical period of the LSRV (1990 – 2000) saw the changing roles of government in South Africa and further infrastructural developments. In 1990 the African National Congress (ANC) was unbanned and 1994 saw the first democratic elections for South Africa (Clark & Worger, 2004). Accompanying social democracy in the country was the idea that the allocation of natural resources had to be seriously revised (South African Constitution, 1996). The *1998 Water Act* was a key piece of legislation that aimed to completely change how water was managed, allocated, conserved and distributed in South Africa (DWAF, 1998). In 1994 the South African government, under former president Nelson Mandela, implemented the Reconstruction and Development Programme (RDP) in order to address the

immense socio-economic problems brought about by the consequences of apartheid. As a result, local government had a larger role in developing rural and semi-rural areas (Stolten, 2007).

The sixth historical period (2000 – 2009) of the Sundays River Valley saw the Sundays River Valley Municipality (SRVM) in a continued national transition (Clifford-Holmes, in press). Between 1999 and 2001 the first local government elections were held with the Sundays River Valley Municipality being formally recognised and being ‘seated’ in the Kirkwood Municipality in Kirkwood (Clifford-Holmes, in press). The new Sundays River Valley Municipality was tasked with the responsibility of providing a wider range of services than the Kirkwood Municipality had, such as providing drinking water and sanitation services to domestic users in the Greater Kirkwood area (Clifford-Holmes, in press). Agriculture development was also expanded by a small group of white farmers in the area and by incorporating ‘emerging farmers’. Land redistribution was one mechanism used to achieve this, but as will be discussed below, this has not proved to be successful (Cacadu 2009/10; Trust for Community Outreach and Education (TCOE), 2010). Institutional shifts in agriculture and water management were also undertaken with the establishment of the Lower Sundays River Water User Associations (WUA) in 2003 (Clifford-Holmes, in press). The motivation behind the Water User Associations is that they are more democratic institutions which can support transformation in terms of water management. During this period the Greater Addo Elephant National Park (GAENP) continued expanding with commercial farms being sold to accommodate this expansion (Connor, 2007). Many farm labourers were displaced from these farms, moving into urban areas in the Sundays River Valley Municipality (Connor, 2007). Although tourism increased as a result of this park, pressure was added to the municipal water systems by the resulting urbanisation (Clifford-Holmes, in press).

Period seven (2009 – 2012) in the historical narrative of the SRV saw many municipal challenges and the ‘turnaround’ of the Sundays River Valley Municipality. Between 2009 and 2010 the Sundays River Valley Municipality filed for bankruptcy due to financial mismanagement and under-capacitation so was placed under Provincial Administration and a turnaround strategy was implemented (Clifford-Holmes, in press). One of the challenges faced by the Sundays River Valley Municipality was the inability to supply enough water to the area. The Lower Sundays River Water User Association lacked sufficient off-site storage

facilities to store water, resulting in increased water shortages as demand increased (Clifford-Holmes, in press). Several solutions have been sought for this problem at both a technical and institutional level.

From this brief historical sketch, one is able to understand present-day inequalities in land and water access affecting small towns like Glenconnor. The management of water is historically rooted in larger, complex systems of land-use and governance. Clifford-Holmes (in press: 28) argued that "... what are seen as 'local complexities' in the Lower Sundays River Valley exist throughout South Africa and are related to wider challenges". This then is the backdrop to my study site and provides a broad understanding of the origins of the socio-ecological challenges faced by my research participants and their families.

6.2 Socio-cultural, economic and ecological context

The following sections provide a socio-cultural profile for the people of Glenconnor, considering their mixed heritage and cultural background. Educational and health factors within the town are also considered as well as local economic aspects and the ecological context in terms of land use and water resources in the area.

6.2.1 Ethnicity and language: The people of the Sundays River Valley

Because of the history of forced removals and migration during apartheid, the Sundays River Valley is comprised of people of mixed heritage. During my fieldwork I observed that many Glenconnor residents were fluent in both Xhosa and Afrikaans. This is confirmed in Connor's (2007: 80) thesis where she noted "It is not uncommon to find a family whose members speak both Xhosa and Afrikaans, and who stem from both so-called 'coloured' and 'Xhosa' backgrounds". Identity is thus constructed not along racial stereotypes but around personal histories of background, context and marriage choices (Connor, 2007). I often came across people who one would identify as 'coloured' but who had Xhosa names and people who seemed 'Xhosa' but had 'coloured' names; many people had both Xhosa and coloured names. People in this area cannot be classified according to fixed categories of ethnicity then but identity was personally constructed on the basis of different social, historical and cultural experiences. Connor (2007: 14) argued that while many people use ethnic markers of 'Xhosa' or 'coloured' when referring to themselves, these categories cannot account for the complexity and ambiguity of the racial and ethnic assimilation of white, Xhosa-speaking,

Khoi and San inhabitants of the area. While many Glenconnor residents were fluent in both Xhosa and Afrikaans, few were conversant in English.

The history of forced removals in the 1960s and 70s by the apartheid government and the recent (2000-2001) removals of farm workers from farms as they sold off their land for the expansion of the Greater Addo Elephant National Park (GAENP) have resulted in displacement of the people of the Sundays River Valley. Displacement here is defined generally as an “experience of forced migration and involuntary settlement, and implies a disruption and removal from a piece of land originally occupied by displaced people” (Connor, 2007: 5). People draw their identities from different sources of experiences of being removed, being farm labourers as well as being removed from lands they claim were theirs. People in the Sundays River Valley have experienced a general loss of traditions, lifestyles and future opportunities for an independent rural way of life. There was thus an identity based on a sense of belonging to a specific area and rootedness combined with a history of being removed as well as a history of mobility as a result of the migrant labour system (Connor, 2007). Connor (2007: 14) argued that farm workers have also “moved around and in-between the virtual (or invisible) boundaries of ethnicity, race and even cultural markers of Xhosa tradition ... as much as they have travelled the physical and geographical boundaries of their landscape”. People’s identities were therefore not rigid, unchanging codes of behaviour and cultural identity but rather revealed the extent to which people have assimilated these experiences and how they define themselves (Connor, 2007).

Addressing specifically farm worker identities, Connor (2007: 14) argued that farm workers in the Sundays River Valley “cannot be considered to be exclusively rural inhabitants, since many individuals use town and urban-based linkages in order to earn money, some even having a second home (usually with family) in nearby towns or cities”. This was confirmed in my interviews with most research participants from Glenconnor and Kleinpoort, even if they were not farm workers, as many people mentioned sending their children to schools in the cities and some of the women’s husbands worked in nearby cities such as Port Elizabeth and Uitenhage. Referring to where they would send their older child for schooling, a couple commented: “My boyfriend’s sister is in Uitenhage so we will send her there. Or maybe we will go weekends and visit her and come back Sundays” (Int.1Ga). People in the area can

therefore be understood as cultural hybrids, not existing as true rural traditionalists nor existing merely as servile labourers to farmers in the area.

6.2.2 Religious beliefs: Traditional Xhosa and Christian belief systems

Religious life was important to many residents of Glenconnor. There are three churches in Glenconnor: the Methodist, the Apostolic Faith Mission (AFM) and the Congregational Church. During my fieldwork period I attended the Congregational Church with several research participants (Elizabeth Flip (Section 6.4.1) and Patrick, Anna Armoed (Section 6.4.3), and Mr and Mrs Plaatjies (Section 6.4.2) one Sunday morning. Due to lack of finances, their pastor only visits twice a month as he travels from Uitenhage but they hold church by themselves when the preacher is absent with different members bringing a message each Sunday. I experienced what it was like living in a tri-lingual community as during the church service Afrikaans, isiXhosa and English was used to accommodate everyone there. Mr Plaatjies opened up in prayer in isiXhosa. We sang several songs in English and isiXhosa. Mrs Plaatjies then presented the sermon in Afrikaans and English. She spoke out of Exodus 3 about God's plan for everyone's lives and she addressed people in the congregation directly. She told one young man that he was not put on Earth by God to work for Mr X on the farm but was called to greater things. In this she shifted his identity away from being purely a farm labourer and constructed him as a unique individual who was loved by God with a greater purpose for his life. Their faith in God thus helped them to see beyond their current circumstances and encouraged them in their daily struggles. Mrs Plaatjies and Mrs Armoed then prayed a blessing over my family which was a great honour. Mr Plaatjies then closed in a prayer of thanks for the congregation.

As my primary research participants were mostly Afrikaans and of Christian faith, they did not mention any traditional belief systems informing their daily practices. Due to the fact that this is a Xhosa area and intermarrying has been widespread amongst the coloured and Xhosa communities, it was fair to assume that some households may hold to their traditional Xhosa beliefs or at times have a syncretic world view, adopting both Xhosa and Christian belief systems. This was confirmed in Connor's (2007: 196) work on farm workers in the Sundays River Valley where she argued that it is not only the Xhosa-speaking workers who observed certain customs but that Afrikaans home-language speakers in the area also had a respect for customs "and certainly share certain (but not all) aspects of ritual events with their Xhosa-speaking counterparts". Connor (2007) noted that it was usually the Xhosa-speaking workers

who organised rituals but that Afrikaans workers were found to share beliefs concerning water spirits and rainmaking rituals.

As in Cata, Connor (2007) found that people in the Sundays River Valley also believed in the same water spirits or mermaids living in certain bodies of water around Jansenville and Darlington Dam. People, especially children, were often warned against swimming or fishing near these water bodies from fear of being drowned or taken by the water people. SRV farm workers also shared beliefs around rainmaking ceremonies where people danced and sang to ask Tusui/Goab (their Supreme Being or God) to bring the rains (Connor, 2007). Connor (2007) found that many of the farm labourers she interviewed belonged to the Apostolic church but were still connected to certain ancestral beliefs through their Christian faith as the Apostolic church accepts dream interpretation and prophecy. These rainmaking rituals are not as widely practised amongst people who hold to certain Christian traditions however as they have an aversion to excessive drinking of alcohol and behaviour, both essential elements in rainmaking rituals (Connor, 2007). As one of Connor's (2007:200) research participants informed her "But these rituals have disappeared, people have turned to the church – they won't do such things again, they don't know the old songs anymore".

Many research participants in Glenconnor stated that God was looking after them when their rainwater tanks were almost empty. When asked if his rainwater tank ever runs empty for example, one man in Glenconnor responded, "No. When the tanks are just about a quarter empty then the rain will come. God is looking after you" (Int.6G). From statements such as these, one can conclude that belief systems inform and mediate how people made sense of their rainwater harvesting practices in terms of provision of rain.

Figure 6.3: Pentecostal church in Glenconnor (January, 2013)



6.2.3 Local economy: Income and unemployment

From the historical developments of the area it was not surprising that the two current economic drivers in the region were large scale farming and eco-tourism (SRVM, 2012). The Sundays River Valley provided much of the region's milk, mohair, meat (ostrich, mutton and beef) and citrus (Connor, 2007). Other agricultural products included vegetables, potatoes, maize, wheat, chicory, flowers and kukuyi-rye grass (SRVM, 2012). One of the other sources of employment in the area is the Greater Addo Elephant National Park (GAENP) as well as a large game farming industry. Ecotourism brought much income to the area as well as provided jobs for local residents. The establishment of game farms was controversial however as people often lost their jobs and were moved off what used to be old stock farms (Connor, 2005). Many people had been displaced from their homes because of the creation of this national park.

According to a 2009/10 Cacadu Annual Report many people in this district are relatively poor and unemployment is high (Cacadu, 2009/10). In a 2011 census, unemployment for the Sundays River Valley area was 15 per cent compared to 34.1 per cent in 2001 (Stats SA, 2011e). This was confirmed in interviews with research participants from the area: "Of course also there are no jobs here, and if there come some work then you can't help everybody" (Int.2b). With slow job growth and the increase of job seekers many people in the area still relied on social grants for their livelihoods (TCOE, 2010). This was confirmed in interviews with research participants in Glenconnor and Kleinpoort as many households relied on welfare grants for monthly living. Many women were housewives or worked as domestic workers for farmers or for the surrounding game farms. The citrus farming industry was "exclusionary by nature" as it only absorbed labour at certain times of the year while the game farming industry required less labour so has actually been the cause of unemployment (TCOE, 2010: 31). The temporary nature of the work in the area led many farm workers to migrate to the Western and Northern Cape in search of work (the effects of the seasonal nature of work for rainwater harvesting and food gardening practices is discussed further in Section 7.3.8).

The process of land redistribution in the area has also largely been a failure. Less than 5 per cent of land in the area has been redistributed with many of the projects with black emerging farmers collapsing due to the lack of support in the form of farm equipment, skills training

and management expertise (TCOE, 2010). This was confirmed in an interview with Khanyisa Education and Development Trust (Section 6.3.2 below), one of the primary local NGOs working in the area and affiliated to the Trust for Community Outreach and Education (TCOE). One of Khanyisa's field officers, Mr Gerald Mkele, commented:

Yes they [government] managed to assist them [black emerging farmers] to have land access but the problem is that not all of them were keen to work the land, others were just roped in to make the numbers. So it's difficult to work the land profitably like that. So they end up being divided with lots of disputes and so on. So that makes it difficult for them to work the land and moreover there was lack of support from the government. This is agriculture and they use highly industrialised machinery that they are not getting. And they are not training these people and they must be trained in business skills. And since they are interested and keen to work the land, they end up fundraising somewhere and they end up lending money from the land bank. Well the land bank is like any other bank, if you don't pay the bank then they take your land away. So that's happening to the farmers. So you don't produce enough because you're not trained because you are not getting supported. So you end up being unable to pay the bank so the bank takes over the land and you go straight to square one of being landless. (Int.10G)

Khanyisa (TCOE, 2010) reported that many of these farms are in debt with some being liquidated as well as some of the beneficiaries losing interest due to the difficulties faced. From Mr Mkele's commentary, these projects did not start on a good footing with landless individuals being reluctant to join the projects in the first place. Employment in the Sundays River Valley area was thus dismal and was constantly brought up as a problem by research participants. Unemployment had also risen, largely due to the fact that small stock farms were no longer economically viable (Connor, 2007). Game farms on the other hand were growing as they were more lucrative requiring less maintenance and a smaller labour force (Connor, 2007).

Many farms could not absorb the inordinate numbers of unskilled and semi-skilled labourers in the region (Connor, 2007). As a result many working-aged people migrated to urban centres such as Uitenhage, Dispatch and Port Elizabeth. This is confirmed in many interviews with Glenconnor residents. One of my four key research participants in Glenconnor explained why she has moved to Kirkwood during the week; "No, it is for my work..." (Int.1Gb). Her boyfriend worked in Johannesburg and Port Elizabeth and explained that one of the biggest challenges for him over the past years has been "... not seeing my family for three months ... There are no jobs in the towns anymore, so if I can stay here and get a piece of land and plant so I can create my own job..." (Int.1Gb). It was thus a struggle for many households to

survive on a month to month basis with limited income. A conversation around the learning of food and water security practices thus became important when addressing issues of livelihoods, unemployment and poverty in the area.

6.2.4 Literacy and education

Access to education in the area was a struggle as with other rural areas in the province (Westaway, 2012). In 2011 it was reported that only 15.2 per cent of people in the Sundays River Valley had matric while 8.8 percent had no education (Stats SA, 2011e). Most railway settlements such as Glenconnor were fortunate if they had a primary school, and even then communities had to fight to keep them open. During interviews with several residents it was found that in 2011 the Department of Education wanted to close down many of the smaller schools in the area due to financial constraints. As one Democratic Alliance (DA) councillor and the new ward councillor for the area stated:

Education. It's not a big issue in Kleinpoort at the moment but in Glenconnor it will be an issue because the Department of Education is going to close them down. We have no idea what to do with those kids. There are always financial constraints and stuff but those kids are going to have to get lifted into Kirkwood every single day. And small children and I mean we have a boarding school in town but that's going to get closed down anyway. But I'm not sure when. (Int.9G)

Glenconnor residents were able to fight to keep their primary school open but children in Grade Seven and above had to be sent to larger towns as the primary school only goes up to Grade Six. In her study Connor (2007: 79) confirmed this situation stating that government schools are usually 50-100 kilometres away, "forcing long periods of absence for young scholars who do not always have access to regular transport". One primary research participant from Glenconnor lamented at sending her young daughter away for schooling:

... and the school. But it ends at Grade Six neh so the kids have to go to the other school, like to town to Kirkwood. You decide. So they are still small when they have to go. They have to stay at boarding school or you'll send them to family. So my baby has to go, she is finishing school. Grade Six and she goes to Grade Seven. (Int.1Ga)

This was confirmed by Connor (2007: 79): "Many workers ... thus prefer to send their children to public primary and secondary schools in nearby towns and cities".

Figure 6.4: The primary school in Glenconnor with a vegetable garden and rainwater tank (2012)



Schools also struggle to keep their teachers in the area as one research participant commented, “But teachers don’t want to come here, we have one teacher with Grade 1 to 5 all in one class. The other teacher qualified herself further and now she has left” (Int.2Ga). In January 2013 two male matric learners attended the focus groups we ran in Kleinpoort. When I enquired as to why they were not rather at school they said their high school was closed on account of the boarding house having no food. One is able to see from these accounts then that access to education was a struggle. Even when children do pass matric and go onto study in tertiary institutions they still contend with various challenges such as unplanned pregnancies. One young woman in Kleinpoort was studying at a college in Port Elizabeth and the following year when I returned to carry out more research, she had dropped out of the college and was living at her parents’ house with her child. One research participant commented on the need to create opportunities for youth: “And we can employ the youth instead of them having babies to get money from government” (Int.2Gb). Despite these challenges however, there is a strong motivation to educate children. One farm labourer argued, “I don’t want my children to work on farms, like us, they should go to school and get good jobs” (in Connor 2007: 79).

6.2.5 Health and welfare

Access to health care is another challenge residents of Glenconnor and Kleinpoort had to contend with. According to research participants, the residents of Glenconnor had to negotiate with the local municipality to receive mobile or satellite clinic services. Even though this was a victory, one research participant explained:

I think the only problem facing here is we have a clinic neh but it’s not every day, its second week neh, every fortnight. And twice a month, and then when there is people to see the doctor. From Addo, Doctor Tailor. But when you are seriously ill you have

to phone an ambulance. And it took long, it doesn't come easy. You have to wait two hours. (Int.1Ga)

Another Glenconnor resident gives an account of a mother with tuberculosis (TB) who had to move away to Kirkwood in order to receive an injection every day because this service was not available in Glenconnor: "You know we fight for our clinic" (Int.2Ga). According to a Democratic Alliance (DA) ward councillor working in the local municipality, the health care in the area is relatively good compared to other areas:

But with the hospitals and clinics there are small issues but overall we can be proud neh. The clinics, there's always medicine. There's small issues, sometimes people need food cause they need to take their antiviral medicines. But I mean the municipality is trying to address this in different ways. But there are pills for them, there's a doctor at the hospital and everybody gets seen to. It's not bad at all. But again you will have people that would complain about that but not realising that they are actually doing a very good job. (Int.9G)

Certain challenges are thus viewed from different perspectives by different people.

6.2.6 Land use in the area

The Sundays River Valley lies in the corner of the Eastern Cape Province at the intersection of two southern climatic zones with an intermingling winter and summer rainfall zone (Connor, 2007: 74). The flora consists of Cape fynbos at the coastal belt but where I was working in Glenconnor it was drier and more sparsely vegetated with areas of grassland, savannah and noorsveld which includes varieties of succulents. There were also densely wooded valley thickets containing endemic species of Cape aloe, spekboom, cycad and exotics such as prickly pear and saltbush. Temperatures in the Sundays River Valley are extreme with summer months being very hot accompanied by dry berg winds from the north and winters being bitterly cold. The Sundays River itself flows from the Sneeberg mountains surrounding Graaff-Reinet, down toward the plains of Darlington Dam (also called Lake Menz) and winds through the Zuurberg Mountains until it reaches the citrus producing town of Kirkwood (Connor 2007: 75).

As discussed above (Section 6.2.3) most land in the Sundays River Valley was used for agriculture and game farming. The four kinds of farming activities dominate this region: dairy farms along the coastal belt, irrigated crops such as citrus and lucerne along the Sundays River and south of the Zuurberg Mountains, small stock farming such as sheep and goats in the Karoo regions and game farming (Connor, 2007). The Sundays River Valley

produces approximately 25 per cent of South Africa's navel oranges and 50 per cent of the country's lemons and brings in about R1 billion in foreign exchange for the country through exporting these oranges (SRVM, 2012).

Figure 6.5: A view of the Zuurberg Mountains from an entrance of one of the many game farms in the Sundays River Valley area (May, 2012)



6.2.7 Water sources in Glenconnor

Glenconnor is part of the Fish to Tsikama Water Management Area, the fifteenth of the 19 WMAs (NWRS, 2004: 73). In 2011 32.3 per cent of households in the Sundays River Valley had piped water within their dwellings while 53.5 per cent had flushing toilets connected to a water sewage system (Statistics SA, 2011e). From the history of the Lower Sundays River Valley it was evident that water had been a defining factor in shaping the developments in the area. The struggle for water in the towns of Glenconnor and Kleinpoort were a prevalent theme in people's narrative accounts, especially the relationship of the ownership of land and thus access to water. On reflecting on growing up as children and the learning that occurred around water issues, a general theme of water quantity and quality emerged. Referring to the scarcity of water in the area and the rainwater his family used to collect one participant recounted, "That was also only used for drinking; it was like holy water because the Karoo doesn't have plenty of water. I grew up with my grandma ... And I learned not to waste a single drop" (FG2G.p.1). Other accounts conveyed a sense of what it was like to grow up with scarce and brackish water. One participant explained that he and his brother were only allowed to bath once a week while another says, "The children washed with the salty water and the grown-ups with the soft fresh water, so the children always looked so ash pale when the salt dried on our skins" (FG2G.p.2 and FG1G.p.3).

Highlighting the effects of riparian rights to access to water, both Glenconnor and Kleinpoort residents had been at the mercy of farmers. Mr Plaatjies, a Community Development Worker and resident of Glenconnor explained:

...in the past neh since 1970 /'98 we used to get our water from our adjacent landowner neighbour, Mr Andre Miller. There is a farm up there almost 3km from here where we used to get clear water from. It used to be Spoornet property, about 78 hectares of land. It was on a lease for the last ten years with the adjacent landowner from Transnet. And then when Transnet said after four years the lease agreement with the adjacent landowner would end, thereafter there is something in the pipeline for you that you might be the owners of the land because it's government property. But things did not go that way. When the lease agreement was finished, when approached and when we saw what was happening, the white lady's building a big house there. And when we requested about this they said, 'No she bought the land'. But nobody showed us yet even today from whom did she buy the land? There is a big question mark. That is why we bring in Land Affairs. (Int.5G)

Residents of Glenconnor thus had hopes of owning their own land, therefore enabling them to have access to water. Mr Plaatjies' account illustrated the close tie between land and water rights.

Apart from relying on neighbouring farmers for water, Transnet used to transport water to residents in station towns for several years. One resident explained, "Also the train will bring us water, there was a machine there which pumped water for us..." (Int.3Gb). When the railway terminated its operations in the area however, water delivery also stopped. Mr Plaatjies' wife, Mieta Plaatjies (Section 6.4.2), recounted having to queue for several hours at a communal tap to fill her buckets with bad quality water:

When I come here, you see that big house where you come from. You see that big tank, there is a house, we brought our water there in that yard. There was one tap. If I will do washing today I must wake up four o'clock to put my plastic 25l and put it there. If I come there is already seven [people], there's a queue. And it opens little little and if you open it the water is black. You understand? If you come on that time. Dirt, and roos [rust]. Long time, we wait for three, four hours cause the *druppel* [drip] is *klein* [small]. You wait for an hour for the 25l. (Int.2Ga)

From her account then not only was water in short supply but was of bad quality as well.

Due to the state of water in the town both Glenconnor and Kleinpoort residents petitioned the District Municipality of Cacadu to help them fund and erect town water tanks. In 2009 the Cacadu Municipality reported "the drought condition in the Cacadu District over the past few years, and aging and dilapidated infrastructure in local municipalities" as the major

challenges to the water services sector (Cacadu Annual Report, 2009/10: 21). As a result of this drought, the municipalities were under pressure to deliver water services to railway settlements such as Glenconnor and Kleinpoort. In 2009 Glenconnor was given a large water tank from Cacadu District Municipality which was said to be filled from a neighbouring farmer's borehole (Int.5G; Int.3G).

Figure 6.6: Glenconnor's town water tank (May, 2012)



Mr Plaatjies explained further, “All the services we got from Cacadu. They assisted us with this big tank of water. We get it from the adjacent farm. Next to Clearwater farm into this reservoir and then we get the water” (Int.5G). In 2009 and 2010 residents were also given plastic Jojo rainwater tanks. As a member of the Glenconnor Development Committee, Mrs Plaatjies explained how they fought with the municipality for rainwater tanks, “Yes we fighting we fighting we fighting and they give us those green tanks”. As will be discussed in further detail (see Section 6.4.1, 6.4.2 and 7.3.11), people who lived on private land did not receive rainwater tanks as they did not fall within the municipality's responsibility.

Good quality water was precious in Glenconnor and people did not use their rainwater tanks for their home food gardens. Instead, they used it for drinking and for domestic purposes only. One resident explained:

Drinking and cooking. Rains are not so plenty here so if you have a full tank you must also consider that you don't know when it will rain again so you must save as much water as you can. Mostly for drinking and cooking (Int.5G).

Another resident echoed this:

Researcher: Your water in the tank, what do you use it for?

Int.7G: Just for the house. We drink it and cook with it, not for the dishes.

It is important to note that when residents were given their plastic Jojo tanks, no training was offered in terms of tank use or maintenance. One beneficiary explained:

Researcher: And did the municipality deliver and install them?

Int.5G: Yes they put themselves. They had their own contractors.

Researcher: Did they teach you how to clean it?

Int.5G: No. The only thing that we know is to put a drop of Jik to keep it germ free.

Another tank beneficiary confirmed this lack of training around the plastic water tanks:

Researcher: You have a water tank, when did you get that?

Int.7G: Two years ... three years.

Researcher: Did you buy it?

Int.7G: Municipality give it to us.

Researcher: Did they install it?

Int.7G: Yes they did it.

Researcher: Did they teach you how to look after it?

Int.7G: No.

In Kleinpoort the story was not much different. The primary research participant from this town, Evelyn Jackson (Section 6.4.4), explained:

When I came to Kleinpoort in 1990 we paid R20 for water from the Railway, then in 1996 it stopped. Then Mr van der Merwe said we could use his quarry but that water was only right for washing, not for cooking ... We really struggled before having water here. These tanks and pipe water it was easy to get them. For six years we used to collect water from the quarry which is far from here. (Int.4Ga)

Although people did not have to walk that far to get water, the quality of the water was questionable as Evelyn explained, "... so in the quarry there was a hole, that hole was full of water and that was the water we were using. We had no choice but to drink that water" (Int.4Ga). Highlighting the disparity between access to water and ownership of land, Evelyn said:

Farmers had water and we did not. We stole water from close farms because the water we had access to was very dirty ... and one day he [a farmer] told us that the water is for his people and the sheep and that Transnet must give us water. Then in 2000 we received letters from Transnet that the Municipality will give us water and in 2002 we got two [town] tanks. The water came from a borehole. Then the pump broke sometimes and then we reported it. (Int.4Ga)

Illustrating the importance of the relationship between access to water and access to land Evelyn explained:

After a year or two one farmer bought that land where the pump was installed that meant now again we don't have water but we fought again with Cacadu and in 2010 Cacadu made that tank for us ... Now we have that big tank that provides water for the entire community, this is water from underground ... So, this is borehole water we are using. Now we have access to water. (Int.4Ga)

Providing bulk water supply to both Glenconnor and Kleinpoort was confirmed in a section in Cacadu's 2009/10 Annual Report: "Key issues for 2009/2010 Augmentation of Bulk Water Supply in Rietbron, Glenconnor & Kleinpoort" (Cacadu 2009/10: 23). Like residents in Glenconnor, people in Kleinpoort also received plastic rainwater tanks from the municipality with no training regarding maintenance. From this contextual account it becomes clear that access to water and land has been a constant struggle for the poorer people in the area.

Inequalities in water access were still dictated by the legacy of racist colonial and apartheid rule. This was observed as minority white farmers were usually able to meet their water needs while poorer black and coloured residents living in informal settlements in the surrounding area have persistent water problems either of water quality or water availability. One Democratic Alliance (DA) ward councillor in Kirkwood pointed out that service levels still run along racial lines:

And then you go along the racial lines again. They are not getting as good services as the white people in town. It's realities that we live in and that's the problem. But then you also have the people that have the biggest mouth, but they are also the biggest rate payers so how do you balance and keep everybody happy and provide the same service? And when the town's water is finished, we might sit without water for a day but the people in Baarsig, that's a coloured area, and Mobida will sit without water for three, four, five days. The further away from the hub the worse it gets. But I think people in this valley are slowly starting to get very frustrated. And promises have been made to them that haven't been kept ... And clean drinking water. I mean we're going against our constitution. Everybody should have access to clean safe, drinking water and we're not complying with that. (Int.9G)

Infrastructural and institutional challenges marked the water situation in the area. Due to "aging and dilapidated infrastructure", local and district municipalities are challenged with providing water to surrounding settlements and towns" (Cacadu, 2009/10: 23). According to the 2009/2010 report, the area was suffering from an extended period of drought which led to a state of disaster being called and the District Municipality investing in rainwater harvesting infrastructure which they rolled out in a number of settlements including Glenconnor and Kleinpoort as discussed above (Cacadu, 2009/10: 7, 23). These rainwater tanks are seen only

as a short term solution however to eventual potable water. During a water infrastructure and Geographic Information Systems (GIS) mapping workshop held in the Sundays River Valley in May 2012, one Department of Water Affairs (DWA) representative had this to say about rainwater tanks; “Ah it’s just a short term intervention, not a long term solution”. An employee from the Agricultural Research Council (ARC) responded to this comment: “I really think tanks must be a long term solution”. This opens up a debate around government providing services but then also allowing people to be independent and self-reliant when it comes to water. It also highlights the difference in the ideas about sustainability and how government departments conceptualised it compared to civil society, research institutions and NGOs.

6.3 Development of rainwater harvesting and food gardening practices in Glenconnor and interacting activity systems

The historicised account of the Glenconnor activity system serves as a background to situate the current rainwater harvesting and food gardening practices in Glenconnor and the socio-cultural, economic and ecological challenges they respond to. The following section discusses the introduction of rainwater harvesting and food gardening practices in Glenconnor as well as presents and describes the activity systems that interacted in this case study site. As in the preceding chapter I used second generation CHAT to describe key activity systems even though I am aware of other neighbouring activity systems. I used this approach to avoid conflating the representation of the different elements in the activity systems.

Learning rainwater harvesting and food gardening in Glenconnor involved three interacting activity systems. The section begins with a description of the Glenconnor rainwater harvesting and food gardening central activity system (Section 6.3.1). The remaining two are then presented and include the object-creating activity system of the facilitating organisation of Khanyisa Education and Development Trust (Section 6.3.2) and the tool-producing activity system of Kouga Urban Harvest Garden training (Section 6.3.3). Figures 6.7 to 6.9 present the second generation of these three interrelated, yet separate activity systems.

6.3.1 Glenconnor rainwater harvesting and food gardening central activity system

Described here is the central rainwater harvesting and food gardening activity system for Glenconnor. As described in the previous chapter under a typical rainwater harvesting and

food gardening activity system the *subjects* of the activity systems are four women who have plastic rainwater tanks and harvest rainwater for drinking only. Two of the four primary research participants did not garden for reasons that will be made clear during their narrative accounts in Section 6.4. For those who do garden, they used tap water to water their gardens.

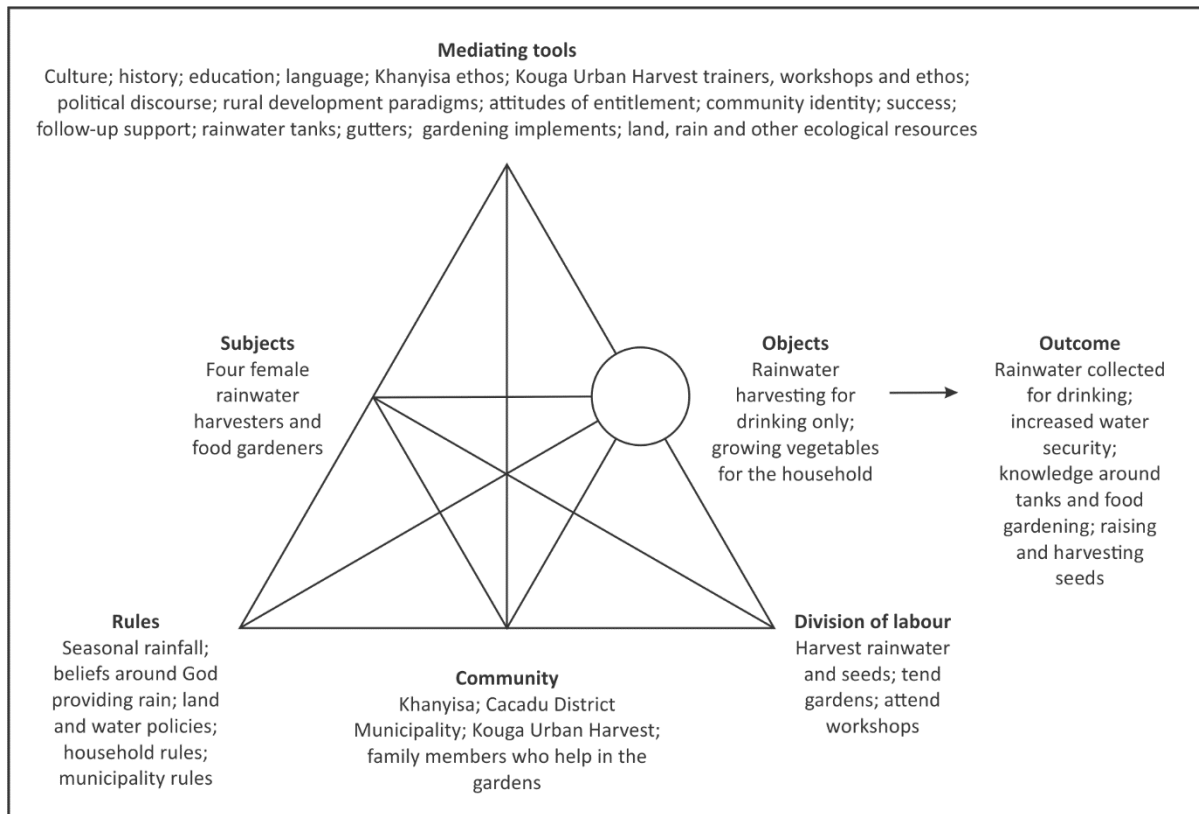


Figure 6.7: Glenconnor rainwater harvesting and food gardening central activity system

The *object* of this activity system is to collect or harvest rainwater from house roofs into plastic rain tanks for the purpose of drinking and cooking. Unlike in Cata, the residents of Glenconnor only used their rainwater for drinking and cooking because water was not abundant and water from their standpipes was brackish. Research participants who tended food gardens did so with the object for household consumption only.

The *mediating tools* of this particular activity system include the history and culture of the area, educational levels and language used. Factors such as political discourse, rural development paradigms, attitudes of entitlement and community identity are also tools that implicitly or explicitly mediated the learning and practice of rainwater harvesting and food gardening practices in this central activity system. Material tools such as rainwater tanks, gutters and taps that were donated to the subjects by Cacadu District Municipality are also

mediating tools. Khanyisa, the local NGO working with Glenconnor, also champions an ethos of food security using non-GMO (Genetically Modified Organisms) foods which mediated the food gardening practices of Glenconnor research participants. The Kouga Urban Harvest trainers, workshops and permaculture ethos are also mediating tools in this activity system as well as factors such as success, follow-up support, land, rain and other ecological resources.

Land and water policies in the past such as riparian rights as discussed earlier (Section 6.2.7) are *rules* that have mediated the access to water and therefore the food gardening practices of residents in Glenconnor. Local municipal regulations and funding and infrastructural constraints are also rules that mediate this central activity system as well as seasonal rainfall and ecological phenomena such as droughts and floods.

Comprising the *community* or different voices of this central activity system is the district municipality of Cacadu who donated rainwater tanks and Khanyisa Educational and Development Trust who served a similar role to that of the Border Rural Committee (BRC) in Cata. The Kouga Urban Harvest Garden Project from Port Elizabeth (Section 6.3.3) trained women in Glenconnor and the surrounding area. Family members who help the primary participants in their gardens with either financial support or labour also comprise the community in this activity system.

In terms of the *division of labour* within this central activity system the role of the four female rainwater harvesters and food gardeners was to attend Kouga Urban Harvest workshops, harvest rainwater and seeds and tend their gardens. In terms of the *outcomes* of this central activity system, rainwater was collected for domestic purposes which increased water security. Two out of the four primary research participants grew vegetables for their household. Increased knowledge around harvesting seeds and planting was also achieved.

6.3.2 Khanyisa Education and Development Trust

As introduced above (Section 6.1) the Khanyisa Education and Development Trust was an NGO based in Port Elizabeth and has worked closely with communities like Glenconnor to develop and capacitate people. Below is a representation of the Khanyisa activity system and a description of its introduction in Glenconnor.

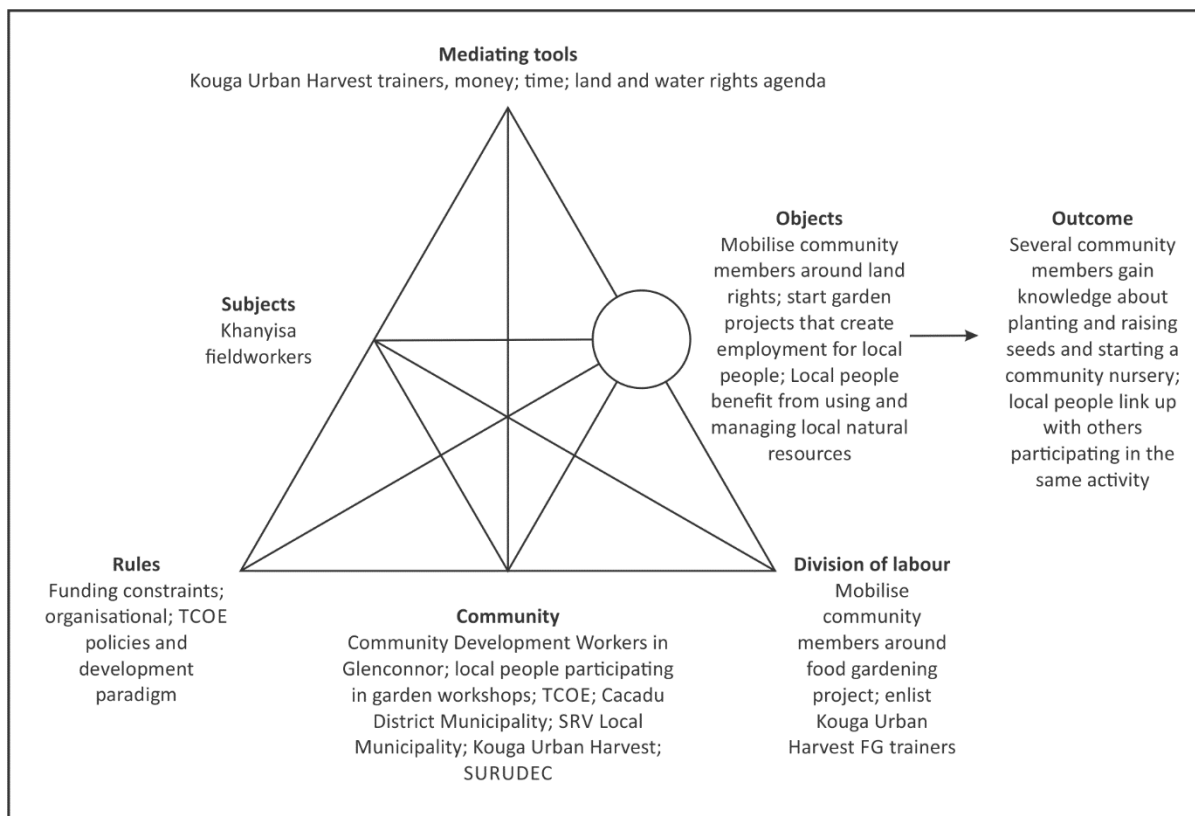


Figure 6.8: Khanyisa Education and Development Trust activity system

Khanyisa Education and Development Trust (*subjects*), an NGO, started working in the Sundays River Valley area in 1996. Khanyisa in this context means “enlighten” or “I pause to reflect” and is based in Port Elizabeth (TCOE, 2012). It is an affiliate of the Trust for Community Outreach and Education (TCOE) (*community*), an organisation established by the late Steve Biko in 1983 (ACB, 2012). Describing the birth of the Trust for Community Outreach and Education and its affiliates, Gerald Mkele, a worker at Khanyisa, explained, “So all the affiliates were born in different times and different years but what is similar to them is ... it was during the time of apartheid. Apartheid is usually accompanied by poverty. So, all these offices were trying to address the question of education” (Int.10G). The Trust for Community Outreach and Education’s vision was to foster a society that is responsive to the needs of the poor and to encourage sustainable rural livelihoods (TCOE, 2010). As an affiliate of the Trust for Community Outreach and Education, Khanyisa’s *object* is to address poverty and underdevelopment in the Eastern Cape by mobilising and capacitating local leadership and community structures (Khanyisa, 2012). They educate communities regarding their socio-economic and political rights and teach people to lobby and campaign for policies that deepen social transformation (Khanyisa, 2012).

Khanyisa worked with several peri-urban settlements in the Cacadu District, two of which are Glenconnor and Kleinpoort (Khanyisa, 2012). Khanyisa was involved with a collective of small farmer associations, crop producers, development forums and women's forums. The organisation mobilised communities around their land rights, built movements such as the Makukhanye Rural People's Movement in the Sundays River Valley and the Kuyasa Social Movement in Uitenhage, supported and capacitated rural women, aimed to increase food security and sovereignty in the Eastern Cape and capacitate local government and networks (TCOE, 2010: 32-34) (*division of labour*). Khanyisa was also affiliated with Sustainable Rural Development in the Eastern Cape (SURUDEC) which was a joint programme between the European Union and South Africa which aimed to reduce poverty in the province by providing funding to support the design and implementation of Integrated Community-driven Development Plans (ICDPs) (TCOE, 2010).

Gender integration and food sovereignty

The Trust for Community Outreach and Education and its affiliates such as Khanyisa also focused on integrating gender issues into all aspects of their work by incorporating women into leadership structures of the organisations, creating women's forums and raising consistent awareness around the issues of patriarchy and the systemic obstacles of oppression and exploitation of women in South Africa (TCOE, 2010). Khanyisa ran workshops with women in these communities focused on oppression, exploitation and challenges specific to women in South Africa (TCOE, 2010). The organisation also understood the important relationship between household food security and the role women play as food producers and providers and they have worked to revive household food gardens (TCOE, 2010). Mkele explained, "And also you have producer groups like mostly women that are working that do not have land but they managed to negotiate with churches or schools and since they are unemployed these are the people that we train in organic farming" (Int.10G). In 2012 the Trust for Community Outreach and Education rolled out a strategy in the Cacadu District area for food security through food gardens and agricultural business skills (Khanyisa, 2012). Fieldworkers from Khanyisa identified women in communities to engage them in household food gardens and sought the help of Kouga Urban Harvest (Section 6.3.3), a garden training organisation focused on permaculture methods. The Trust for Community Outreach and Education (2010) has also adopted a shift in thinking from food security to food sovereignty

encouraging programmes that breed and recover native seeds types (as opposed to GMO seeds), thus empowering local small farmers.

Land and resource access

The main focus of Khanyisa's energies was land and resource access. Khanyisa worked with communities in accessing land and information sharing on land rights and rights to other natural resources. Local government engagement with local community structures was often an integral part of this work. They worked with farmer associations and small/emerging farmers around different issues such as water access and grazing land (TCOE, 2010). Land reform projects such as the establishment of farming co-operatives for Black Emerging Farmers have also failed dismally due to lack of government support. Khanyisa has worked alongside these emerging farmers in targeting government and the Land Bank regarding land repossession. As cited previously (Section 6.2.3) Khanyisa commented on the failure of these projects and the Land Bank's repossession of land from black emerging farmers.

Khanyisa also took part in land rights forums around matters affecting land reform beneficiaries such as liquidation and the support requirements of emerging farmers. The organisation has also organised farmer exchanges and training in alternative farming methods such as permaculture and organic farming with the aims of increasing food security in these areas (TCOE, 2010).

In November 2012 Khanyisa launched the Makukhanye Rural People's Movement (Khanyisa, 2012). The movement was initiated by Khanyisa as a tool to capacitate and inform communities around their land rights and rights to other natural resources such as water, demand access to land, to post settlement support and re-opening of restitution (Khanyisa 2012: 7). They assisted communities to design monthly programmes of action which set out the roles between the organisation, Makukhanye and the community structures. As Gerald Mkele from Khanyisa said:

So what we are doing is all those people who have acquired the land we organise them. We run capacity building activities so that they can stand on their own and challenge this thing on their own. So ... they end up establishing their own vehicle called Makukhanye Rural Movement. So all our capacity what we doing, we doing it to these leaders so they can go back and share to their perspective communities. And they can also use this information to lobby the different government departments for

resources, but the government, his neck is very stiff so they are struggling in that regard. (Int.10G)

6.3.3 Kouga Urban Harvest

Kouga Urban Harvest was enlisted by Khanyisa to train individuals in permaculture training methods. Below is a representation of this activity system as well as a description of its introduction in Glenconnor.

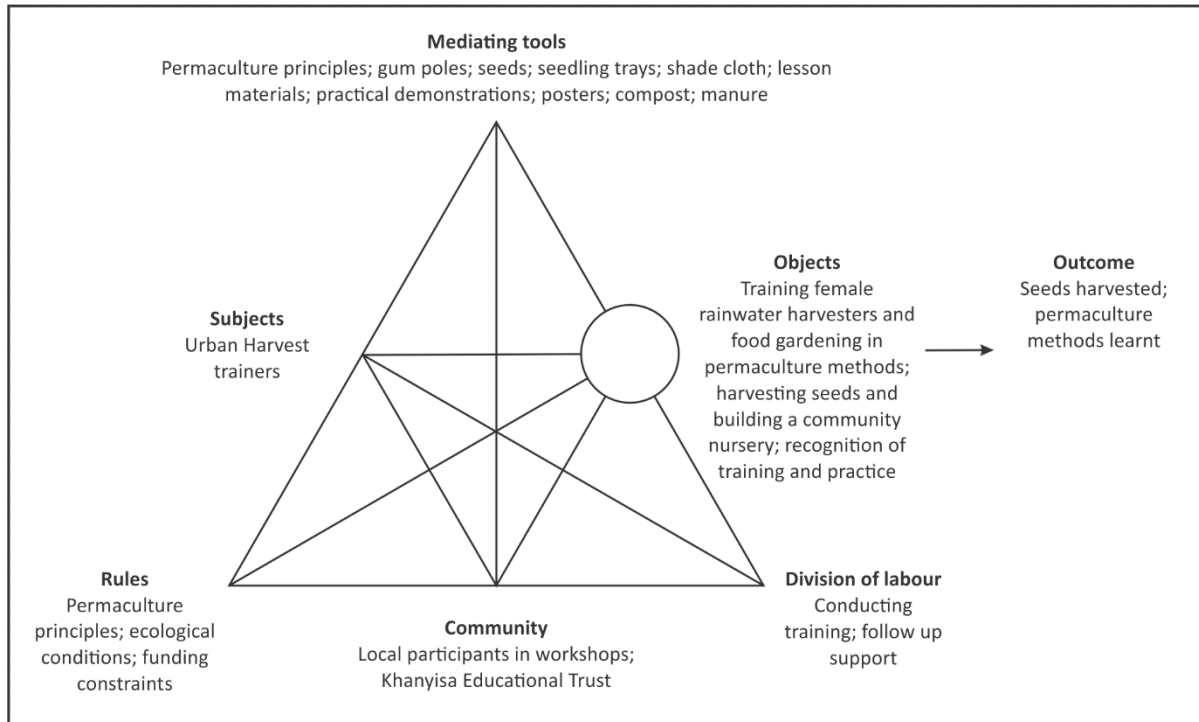


Figure 6.9: Kouga Urban Harvest garden training activity system

Kouga Urban Harvest (*subject*) is based in Port Elizabeth and its *object* is to teach people how to grow their own food. Jakkie Botha, one of the owners and trainers of Urban Harvest explained, “With Urban Harvest our main focus point was providing food gardens to suburban households”. It has only been in the last two years that they have done outreach to rural areas, recognising the need as: “The Eastern Cape, with its low levels of education and employment, has a high need for it. I worked in various informal settlement communities and I was always shocked with how little people knew about how to grow their own food and even where their food is coming from”. They present workshops to a wide range of participants from non-profit organisations to schools and large corporates. Urban Harvest teaches permaculture techniques and ecological design (*mediating tools*) such as companion

planting and crop rotation to implement food gardens for clients and argue that no space is too small or big to grow in.

In July 2012 three women from Glenconnor, two of whom were primary research participants, attended a training workshop by Urban Harvest with about 18 other local people from the area. The workshop focused on harvesting one's own seedlings and how to establish a community nursery. Jakkie Botha explained the *object* of the training she provided: "The end goal of the workshop was to provide the community with a nursery that ensures a constant flow of seedlings, so that the gardens that they started or wanted to start always had 'stock'" (Int.12G). The topics covered in the workshop included: "What is a nursery and the purpose of a nursery? What are the various aspects to consider when building a nursery? How to plant seeds and seedlings? How to take care of your seedlings? How to catch your own seeds and then, how to physically build your own nursery" (Int.12G). Some of the *mediating tools* used by Urban Harvest include gum poles, shade cloth, seeds and seedlings trays. Seeds were supplied to workshop participants with the aim that they would learn how to harvest their own seeds so as not to have to keep buying seeds, thus very practically placing the power of food sovereignty in their hands. One primary participant who attended the gardening workshop explained, "Oh she also learned us when you have your fruit neh, how to dry it the seedlings how to dry it. It will be cheaper for you if you dry it and keep it in a safe place. And to feed other people in the community, the broader community" (Int.1Ga).



Figure 6.10: Seeds given to workshop participants to start them off (Glenconnor, 2012)

One of the aims of the workshop was to give priority to the role of women and youth in this project as well as for municipalities and traditional authorities to recognise small scale farming as an important contributor to rural development (Khanyisa, 2012). Encouraging women to grow community nurseries to sell plants and vegetables was a way to achieve this goal. In the beginning of 2013 a group of women, headed by one of the primary research

participants in Glenconnor, Mieta Plaatjies (Section 6.4.2), and who attended the gardening workshop, started clearing a piece of land to grow a community nursery and food garden near one of the local churches.

6.4 Narrative accounts of rainwater harvesting and food gardening practices

This section presents the case stories or narrative accounts of the four research participants from Glenconnor and their rainwater harvesting and food gardening practices. As with the narratives in Chapter Four, they follow the same common themes: water in the past, water at present and learning about water and food security amongst others. These accounts reflected the dominant mediating factors in each participant's lives in terms of their learning around rainwater harvesting and food gardening practices. The narrative accounts are based on eight individual semi-structured interviews (two interviews per participant) as well as observations during each interview. As in the previous chapter, a summary of the main mediating factors influencing each participant's rainwater harvesting and food gardening practice is found at the end of each narrative account.

6.4.1 Elizabeth Flipp (Glenconnor)



Figure 6.11: Elizabeth Flipp standing outside her house (Glenconnor, 2012)

General profile

Elizabeth Flipp lived in Glenconnor with her partner, Patrick Flipp, and their two children.

They lived on a small informal house on a

piece of land next to Patrick's mother, Anna Armoed (Section 6.4.3). Elizabeth was 32 years old and was born in Glenconnor. Her father died when she was ten years old but her mother still lived in Glenconnor in the informal settlement based on the church grounds on the outskirts of the town (the significance of this will become apparent). At the time of our first interview in March 2012, Elizabeth was unemployed but by our follow-up interview in January 2013 she was employed as a cashier at a grocery store in Kirkwood. Elizabeth lived in Kirkwood during the week in order to work and returned to her home in Glenconnor over

the weekends. Her main motivations for moving to Kirkwood were for work and to live closer to her two daughters who attended school in Kirkwood. She said, "... they are now with me, the one is in Grade Seven and the other one is Grade Two". As explained in the contextual profile above, Glenconnor's primary school only goes up to Grade Six so her children attend school in Kirkwood. Patrick's work also takes him away from home for long periods of time as he works as a fitter (of road signs) on the national roads. When I first interviewed Elizabeth, Patrick was based in Johannesburg and sent money home every month but later he was based closer, in Port Elizabeth.

Garden training programme

In February 2012 Elizabeth was selected to be part of a garden training programme run by Kouga Urban Harvest. She and another research participant, Mieta Plaatjies, attended the day-long training session along with others from the surrounding areas. Even though the workshops were held in English, a translator was on hand. The focus of the workshop was food security and community nurseries. People were taught how to harvest their own seeds and grow their own seedlings so as not to have to buy seeds. Elizabeth explained the aims of the project: "She gave us some seeds and how to start. The main thing was how to build a nursery but they didn't build it here ... And to feed other people in the community, the broader community". The larger aim of the workshop was to establish a community nursery in one of the communities so as to show people that not only can they feed themselves but that they can make a profit by selling surplus vegetables as well. Elizabeth explained, "Ja [Yes] to grow food, vegetables for the community. I think you can sell it, if the community got enough to the shops". In 2013 there were plans underway to establish a community nursery in Glenconnor, spearheaded by Mrs. Plaatjies.

In terms of what was learned, the workshop focused on drying out and harvesting seeds, growing and replanting seedlings, making your own pesticide and building a community nursery. Elizabeth explained that they taught them,

How to seedlings plant it, put it in. Oh, she said your plants neh, it's very important to look after them when they started to grow. And to protect your plants, what to use, liquid and boiling water and for the snails and what you can throw there. Wood ash so the snails can't eat your plants.

In terms of knowledge and information around water Elizabeth said the trainer explained:

When you start to build a nursery there have to be a lot of water. You have to be near to water. She also learned us when you have your fruit, how to dry it, the seedlings ... It will be cheaper for you if you dry it and keep it in a safe place. She showed us how to put in the seed, when to transplant it into your garden.

Sharing the knowledge

In the workshops, there was not an emphasis on sharing knowledge. Elizabeth explained that the trainer said nothing about teaching others back home but instructed them “to plant those [seeds] and she will come back and come see how far we go in our own gardens”.

Unfortunately there was no follow-up according to Elizabeth, “That lady said she would be back to see how we plant those seedlings and to see how did it go but she didn’t come” (the issue of follow-up support is addressed in more detail in Section 7.3.1.9 and 7.3.2.1). When asked if people ask her for gardening advice she explained, “No they didn’t. There’s a lot of people who are interested in planting here. Because there are a few people who have some gardens”. One of the reasons Elizabeth might not be approached for her gardening advice was that she had no garden then. The reason she gives for this is that she has no fence to protect her vegetables from animals such as goats: “Yes, I’m planning to get a fence because since that workshop I’m interested in growing my own vegetables”.

Living and working away from home during the week also hindered Elizabeth and Patrick from having a food garden. Elizabeth explained, “Ja [Yes], then you can eat and also sell but it is difficult because we not here most of the time”. When asked if she has received any follow-up training in gardening she replied, “I am not part of that because I am in Kirkwood most of the time”. Living away from home thus provided opportunities but also hindered her and her husband from taking advantage of certain activities and being active members in their home community.

Water in the past and present

Elizabeth explained that water was a problem in the past in Glenconnor but not anymore. It was interesting to speak to the older generations about water problems because they remembered the struggles for access to water in the past whereas the younger generations were accustomed to having taps in their gardens and have either forgotten or have not experienced struggling for water. When asked if water was a concern in the town Elizabeth explained, “No it is not a problem. It used to be a problem at first but so they [Cacadu

Municipality] put taps in every household”. In the past, their water came from a farmer in the area:

There was like a hole here, they call it Clearwater Farm neh, there were shacks from there. We used to get our water from here in wheelbarrows. But then Cacadu put some taps in for the people ... Every house has a tap, but not the shacks. I think Cacadu didn't give to the shacks because we stay on private land, the church ground. So people from there we didn't get. It's only the railway houses.

Elizabeth explained that the private church property in Glenconnor that shack dwellers live on did not qualify for municipal taps or rainwater tanks because they did not live on municipal land. Elizabeth explained, “I'm hoping. That's why I moved here to get an RDP [Reconstruction and Development Program] house. Bos [because] they don't do services there cause its private land there, church grounds. So they don't do services there”.

Currently Patrick and Elizabeth have moved their informal house into the town itself, off the private church property in order to qualify for an RDP house. Patrick explained, “We don't own it, it was transferred by Transnet so it belongs to municipality”. Patrick and Elizabeth had a tap on their property now but they had to fight hard to get it. Patrick explained, “Ja, we fought for that one and some people were angry that we got it. Even the developer complained that it was not part of the tender to bring taps but those are plots and a plot needs a tap”.

Figure 6.12: Elizabeth's house and tap (Glenconnor, 2012)



This couple have waited for a Reconstruction and Development Programme (RDP) house for several years now but with little success. After acquiring a house Elizabeth said she and Patrick will look into investing in a rainwater tank if supported by the local municipality. She explained, “I think maybe in future. Ja, we are under SRV now. I think we are in that IDP budget so in future”. Integrated Development Planning (IDP) is an instrument used to support pro-poor and pro-growth Local Economic Development (LED) policies. Included in

this policy is the notion of land-use planning and public intervention. As a member of a local government committee, Elizabeth was thus informed about her property rights and felt entitled to assistance when it comes to housing and services such as water.

The Glenconnor Development Committee

Elizabeth and six others in Glenconnor belonged to the Glenconnor Development Committee which was part of the roll-out of public participation in local government. They met twice a month in a large tent which was used as a church: “When something urgent comes up and then we meet”. Elizabeth described their achievements and present struggles as a committee:

What we have already achieved ... these people here they paid railways rent now these houses are their houses. We fight for that. And the people they have the title deeds. And what we are busy with now is for us to get RDP [Reconstruction and Development Programme] houses. But we are short of land, we don't have land. It's also the Railway's but Cacadu bought it. So Cacadu is giving it over to Sundays River Valley, our municipality. So this is an empty plot.

One of the central issues for residents of Glenconnor was gaining access to electricity. Patrick described the electricity struggle: “It is the question of electricity. Seems one of the white ladies over there doesn't want to give permission for a pole to be put up on her land. So we are still waiting to hear about that”. Information around why the town cannot gain access to electricity was ambiguous, leaving residents frustrated. Education and employment not readily available near their home had also forced them to seek these further afield. Elizabeth's participation in the Committee had also waned due to the fact that she lives away from Glenconnor: “I haven't been at the meetings because I'm working at Kirkwood so I don't know what has been discussed”.

Groceries and food security

Until Elizabeth moved to Kirkwood she used to do their monthly grocery shopping in Uitenhage which cost R100 (USD \$8.74/ €7.11) there and back with a taxi. Transportation around Glenconnor and similar towns in the area is a problem and Elizabeth explained, “Bos [because] when you go to Kirkwood you have to hire a car there [for] R150 (USD \$13.10/ €10.67) cause there's no taxi going there. So it's cheaper to go to Uitenhage. There are more shops there”. Since moving to Kirkwood she did her monthly grocery shopping there and spends about R500 (USD \$43.68/ €35.56) per month. Patrick agreed that if they were able to grow their own food then they would save money on monthly food expenses. Living

away from home however makes preparing and tending vegetables difficult. In terms of their future goals Elizabeth and Patrick wished to start a food business. They explained, “There are no jobs in the towns anymore, so if we can stay here and get a piece of land and plant so we can create our own job, even sell to Spar¹⁷ or open your own Fruit & Veg store where you can supply other places”.

Summary: the most prominent mediating processes in Elizabeth’s rainwater harvesting and food gardening practice and learning

Elizabeth and Patrick’s situation was a primary example of the socio-economic factors (*implicit/explicit mediation*) that stood in the way of attaining food and water security and the learning that surrounded this. Unemployment (*tool/explicit mediation*) was a factor mediating Elizabeth’s opportunity to learn and work on her food gardening practices more extensively. The need to migrate to find work elsewhere added to their impermanent situation and to not, literally, being able to put down roots. Not having a proper house (*tool/explicit mediation*) with a formal title deed has prevented them from gaining access to a rainwater tank (*tool/explicit mediation*) and being able to collect water. Having no time and money for a fence (*tool/explicit mediation*) to protect their garden, having to find employment elsewhere and not being able to attend workshops detract from Elizabeth’s learning experiences. These then were the constraints that mediated Elizabeth’s opportunity to learn and practice food gardening and rainwater harvesting.

6.4.2 Mieta Plaatjies (Glenconnor)



Figure 6.13: Mrs. Plaatjies standing by the fenced off plot where she usually grows her main food garden (Glenconnor, 2012)

General profile

Mieta Plaatjies was an active member of the Glenconnor community and she and her husband, Jimmy Plaatjies, both sat on the Glenconnor Development Committee. She was an

¹⁷ Spar and Fruit and Veg are large grocery stores found throughout South Africa.

avid gardener and provided food for her family in this way. Mieta was born on a farm in the area and has lived in Glenconnor for 11 years. Mieta and her husband had one daughter who was unemployed and lived in Uitenhage with her grandmother. Mieta was currently unemployed while Jimmy received a basic salary as a Community Development Worker (CDW). Mieta would take employment wherever she was offered it: “I can work at the clinics, I was trained for HIV/AIDS counselling. So I also put my CV at the municipality”.

The struggle for water: Water in the past

Mrs. Plaatjies remembered how time-consuming collecting water in the past was in Glenconnor as was presented earlier in Section 6.2.7 when addressing water sources in the town. From her account, not only was water in short supply, people had to wait in queues for several hours, but the quality was bad as well, with water contaminated with dirt and rust. As a member of the Glenconnor Development Committee, Mrs. Plaatjies and others fought to gain access to clean water and eventually the municipality donated plastic Jojo tanks in 2011. Mieta had one rainwater tank which was given to her by the Cacadu Municipality in 2009. She had experienced no problems with it but said some of her friends and neighbours had experienced leaking tank taps. When asked if people fixed them, Mieta made reference to the municipality who she thought should be responsible for the maintenance of the tanks, “No, if he [Cacadu] come today and do something Cacadu don’t want to come back to repair”.

Water at present

Most houses in Glenconnor had taps in their yards and the water from these, according to Mieta, came from a borehole of a farmer in the area: “But the other farmer give us another borehole so we can put those taps in. But from last year there is no problem of water.” At times the town pump which pumps water into their garden taps broke and then Mieta explained that they relied solely on water from their tanks, “The tanks are also going on, but there was another tank. Three or two weeks without water but we were lucky with the tanks but there is other people who don’t have the tanks, on the private land”. Her account echoed Elizabeth’s who had described how people living in informal dwellings on the outskirts of Glenconnor did not qualify for tanks or taps because they lived on private land. They could not enjoy the water security offered by these tanks but residents with taps shared their water with people without tanks or taps. For example, Mieta had elderly neighbours who lived in a

house which was run down and had no running water or a tank. She explained, “Water is always a problem [for them]” but she allowed them to take water from her tap.



Figure 6.14: Mrs. Plaatjies’ rainwater tank adjacent to her kitchen (Glenconnor, 2012)



Figure 6.15: Mrs. Plaatjies drilled a hole through her kitchen wall for easy access to her water tank tap (Glenconnor, 2012)

Even though the quantity of water was currently a non-issue for people with taps and tanks, Mieta and the Committee were pushing to buy a piece of land for the rest of the town with a borehole on it. There had been problems with acquiring this land due to problems with private landowners and the municipality. She explained:

Anyway I come up with a plan. There is another place there in the mountains, there is [a] borehole with fresh, fresh water. Spornet said they would give us an opportunity to buy that land for us. They said there is borehole. It’s more than 50 years [old] but still gets lots of water. We waiting for the municipality and government to buy that land for us. There is another woman there we don’t know what’s going on.

Mieta thus considered herself a community activist and was always looking for ways to improve people’s situations in her community.

Generational knowledge transfer and food gardening

Mieta tended two food gardens, a small one in the front of her house and a larger one down the road from her next to her father-in-law’s property. She grew beetroots, potatoes, onions, pumpkin, watermelon which she shared with her neighbours if she had enough for her family. “On every December I don’t go to the shops and buy vegetables for my house. I get it here in my garden”. In order to harvest in December she plants in June or July. She learned how to garden from her father. When she was young she learned a hard lesson:

From my Pa ... He also had a small acre with mealies [corn] but he didn't want us to go there. And I couldn't understand the pumpkin patch, why could it not be neat like the vegetable garden and then I got a hiding for breaking off the shoots. Later I understood that without the shoots there will be no food. And I always checked every morning once he planted to go see if the seeds were sprouting.

She gardened on her own as her husband had problems with his eyesight. Self-motivated, Mieta bought her own tools but needed others in order to be more productive. In order to water her vegetables she used the tap from her father-in-law's yard: "... this is my father-in-law, there is a pipe I took it from his yard to water here. I got a wash pipe from there all the way to here. But the land is very good, good soil." Mieta described how she knew exactly when and how much water to use to water her garden, "Ja [Yes], no no no. I know my place where I plant. If I put today water it is very hot. I put today afternoon I will put every second day water. Now I put twice a week."



Figure 6.16: Mrs. Platjies next to her food garden in front of her house (Glenconnor, 2013)

Garden training and meeting like-minded people

Like Elizabeth Flipp, Mieta was also one of the women from Glenconnor who attended the seedling and gardening workshop in February 2012. She said the most important thing she learned was what time of year to plant and how to harvest her own seeds. Meeting so many other women who have an interest in gardening also encouraged her immensely:

I [am] very interested of plant. And I saw other people who are interested. Cause if you don't meet other people who are interested in that thing then you think, no man I waste that thing. But that thing gives me power to encourage me. Not to encourage me but to encourage other people.

Mieta tried to encourage other people in her town to garden, especially women. Her motivation for this was that it can save household money. She explained, "If I want to buy

one onion now here I will pay R4 now. So it's very expensive. If I can plant for myself then ja". After the training workshop people came to her for gardening advice:

Ja the people come to me and ask how to plant. And the other thing me I'm very interested I always go to the Shoprite and buy seeds from there but on that day I see I can even take my own seeds here in my own, you understand. That thing is very important bos [because] seeds are very expensive.

One of the most important skills the women were taught in the garden workshop was how to harvest their own seeds from their plants in order to always have a ready supply and not have to buy them. Mieta prided herself in her 'green fingers' and enjoyed being self-sufficient with the food she grew. "My hand is that way, if I plant today, it's Friday and then Sunday it comes up. Really! Some people say eight days a week but three days it come up, really."

Sharing and expanding knowledge

Mieta also sought to share her knowledge of planting by involving school children. For the nursery project Mieta explained:

We can use our yards and our school is also big enough and then we can get the young generation involved too. My idea is that every child can plant his own tree ... I want to use the trees to teach the children how they must also look after themselves and how one grows in body and spirit. One must be able to look after something to see it grow. I also want to have competitions so everyone can have a garden and people can be motivated to grow their own trees...

Mieta also participated in a training workshop to raise and sell chickens in early February 2013. This idea was introduced by Khanyisa tasked with disseminating the Sustainable Rural Development program in the Eastern Cape (SURUDEC). She and four other participants from Glenconnor were sent to Grahamstown to learn how to raise the chickens. Mieta explained the process: "It works without electricity, in the evening it is a certain temperature and during the day it is different. So it was a whole process ... I think it will be at the Methodist church. Other thing is the nursery we want to build, so we can grow our own plants." Mieta described how she and several community members had set up a community nursery and wanted to grow citrus seedlings in order to take advantage of the citrus market established in the area already. She explained their logic:

This is citrus area so there's always a shortage of plants so there will be a market. We don't want these GM [genetically modified] seeds that grow fast but rather the old fashioned seed, the original kind. So we can harvest the seed and use it again, like I do with pumpkin seeds.

One can recognise Khanyisa's ethos of not using genetically modified seeds in Mieta's discourse.

Food security and groceries

When Mieta's vegetables were not successful she could see the difference in her grocery budget immediately. She explained, "I had to buy potatoes and onions, the carrots were very small, so there was a big difference in my budget!" Over the December period she said she did not have a good harvest as the plants that came up were very small. It is only she and her husband that lived in their home and they spent about R1500 (USD \$131.04/ €106.67) per month on groceries but Mieta said, "When the garden is growing then it is less. And I can't buy a lot of vegetables because with no electricity I can't have a fridge. So I can't buy a pocket of potatoes, it is just a waste". Mieta bought her groceries in Uitenhage as Kirkwood was more expensive. Even though they have to hire a taxi to get to Uitenhage Mieta said that it was worthwhile for her and others in Glenconnor who buy in bulk there.

Social issues and the Glenconnor Development Committee

As a member of the Development Committee, Mieta was very involved and aware of the problems that needed to be addressed in the community. She explained that the issues ranged from youth unemployment to securing housing and land, access to medical care and the formation of community policing groups. "I struggle to get the youth. But since there is no work the youth just sit down. I try to encourage them to get involved in something but they don't try. Even our political party is ANC [African National Congress]. They don't even go with the ANC Youth League." Even though one of the triumphs of the Committee was to secure ownership of the Transnet houses for Glenconnor residents, availability of communal land was still a struggle. Mieta explained, "There is community land, but the municipality is not clear about what is ours". Residents sought communal land to start community projects such as cooperative nurseries but they were hindered in their attempts because they lacked land and water. Transportation to and from Glenconnor was also a problem as Mieta explained, "And there is no public transport, you have to hitchhike. Of course also there are no jobs here, and if there come some work then you can't help everybody".

Mieta was also the Chairperson of the Community Policing Force (CPF). Small communities such as Glenconnor could not afford to have their own police station so have set up community policing groups to report domestic violence and other criminal activities.

Mieta explained:

So if for example there is a child that don't go to school but gets a child support grant or need to be at school and the mother don't care about that. Who see that? We see it not the police. So we as the community are the eyes of the police and the ears of the police if they need assistance of the police they phone me. You get training for that. But I'm not a police. I'm just the ears and the eyes to get clarity of the picture of what's going on here.

Mieta said that sometimes her roles of authority caused jealousy or tension in the community because some people saw her as a threat, wanting to get ahead in life for her own gain or being too nosy in other people's business. As she explained:

My biggest problem is that the community knows how strong you are, but there is jealousy ... There's a tendency of undermining, for example there was a by-election and the other people in the ward saw I am the one but then my own people here think about 'How much money she will make'. So it becomes a personal thing which distracts from the issue that needs to be addressed. But what I have learned that each stumbling block it just made me stronger. I thought if I just sit down then our problems will not be solved.

Mieta and others have also motivated for the informal shack dwellers in Glenconnor to get Reconstruction and Development Programme (RDP) houses. She explained that Glenconnor used to fall under the jurisdiction of the Cacadu District Municipality but recently, in 2010, the Sundays Rivers Valley Municipality took over from Cacadu, "Ja for RDP houses now. But we was on the District but now we are under the Sundays River so we are new now but we are on the budget. So next year we will get those RDP houses." Commenting on the issue of electricity Mieta said, "No we still waiting. The Cacadu Municipality said when they brought that Spoornet houses you will get also electricity. Fine they finished with Volvontein and Kleinpoort. We are the last. We will get in July month". Going back a year later however Glenconnor had not received Reconstruction and Development Programme (RDP) houses or electricity. Mieta echoed the same exasperation with the municipality as other residents in Glenconnor, "The other problem is the municipality having deaf ears, promises, promises, promises".

Mobilising Glenconnor

Mieta spoke of the attitude or lack thereof in the community around volunteerism. She explained, “You see the people here let me tell you the truth. If you start a thing here you get money now. If you start a thing and we will work and work and work maybe three or four years before it gets money. They don’t like that. People don’t want to volunteer.” She then illustrated her point with the fact that people were not willing to part with even twenty rand to support community events to raise money. Another obstacle in the way of organising communities around projects was that in order to be supported Mieta said that they had to be registered as a group. Mieta explained, “How many times I ask the women let us do something. There is an NGO group who wanted to give us the things you know but you must be registered. And we still struggle with that. They can help you though.” Mieta also tried to mobilise community members around projects and cooperatives but was often met with apathy and indifference:

I try to get people together to uplift ourselves like a stokvel. So I want to start a cooperative in construction. Why use all the people coming from other places to do the work on the roads here instead of using the local people from Glenconnor? And we can employ the youth instead of them having babies to get money from government.

Summary: the most prominent mediating processes in Mieta’s rainwater harvesting and food gardening practice and learning

Mieta was a very active member of her community (*community/implicit mediation*). Her involvement in the Committee and the development discourse (*tool/implicit mediation*) introduced by organisations such as Khanyisa and Sustainable Rural Development in the Eastern Cape (SURUDEC) mediated her attitude toward learning and growing food gardens as a way to lift people out of poverty. The Trust for Community Outreach and Education ethos (*tool/implicit mediation*) of using non-GM seeds and participating in rural development initiatives also mediated Mieta’s practice, decisions to spearhead community projects and how she processed knowledge. When Mieta was introduced to a wider community of like-minded people (*community/implicit mediation*) during the gardening workshop she was encouraged both in her learning and practice and it spurred her on to encourage other people to garden. The success or failure thereof of her gardening activities (*outcome/implicit mediation*) also mediates her learning and decisions as she was discouraged when she had a bad harvest of vegetables. Existing tools as well as an inadequate supply of gardening tools (*tools/explicit mediation*) also mediates her learning and practice as she says she needs more

gardening tools. Mieta's desire to share her knowledge with younger generations is also a demonstration of knowledge sharing.

6.4.3 Anna Armoed (Glenconnor)

Figure 6.17: Anna Armoed showing us her previous food garden (Glenconnor, 2012)



General profile

Anna Armoed was born in Uitenhage and has lived in Glenconnor for over 20 years.

She was raised by her uncle and started work at an early age on one of the farms

she lived on with her uncle's family: "I went to school, but those days it worked like this, if your father stays on the farm then someone must go work in the house of the farmer". At the age of 15 she moved to Uitenhage to work on another farm.

At a farmer's whim: Moving from farm to farm

Working in Uitenhage, Anna met her husband Karl and they married and set up house on the farm Anna had moved to. They had five children, four daughters and one son, "One daughter is in Johannesburg, one in Cape Town and two are in Port Elizabeth". One of their sons, Patrick, is Elizabeth Flipp's partner. As a family they moved often due to politics with the farmers they worked for. Anna described one incident where a farmer asked them to leave as her father-in-law was sick: "...then the farmer's son caused some problems and said my father-in-law was sick at the time and couldn't work and we should 'make a plan'. So he was actually saying we must leave the farm, that's when we moved here [Glenconnor]". After moving back to Glenconnor her husband contracted lung cancer and died in 2009. She then lived alone in their house and worked part time as a domestic worker for a farmer's wife. She was an active member of the Congregational Church in Glenconnor and surrounded herself with her wider community and her children and grandchildren when they came to visit.

Water in the past

When Anna and her husband arrived in Glenconnor they already had a tap in their yard, put in by the municipality but she explained, "Also the train will bring us water, there was a

machine there which pumped water for us, but Cacadu [Municipality] gave us that silver tank. There were taps in our houses as well”. As other participants have confirmed, the railway company Transnet used to bring in water for Glenconnor residents. After a while however they stopped and the district municipality (Cacadu) erected a large water tank for the town which, according to Anna, was filled from a neighbouring farmer’s borehole.

Water at present

Although the taps in people’s houses did not function, the taps in their yards did and like other Glenconnor residents, Anna said that water is not really a problem anymore. She and her husband received a plastic water tank from the municipality which she uses for drinking only. For cooking and other household needs she used the tap in her yard. In terms of managing the water in her Jojo tank, Anna explained that she taught herself how to measure how much water was in her tank: “I worked it out myself because I can’t see inside, so one day I started to knock from the top to the bottom and so I worked it out, where the sound changes”.



Figure 6.18: Anna demonstrates how she monitors the water levels in her tank by knocking on the walls of the tank (Glenconnor, 2013)

Figure 6.19: A neighbour filling up a bucket of water from Anna’s water tank at her house (Glenconnor, 2013)

Commenting on the quality of water out of the taps Anna said, “The water from the tap I have never drank. I tasted it once it was not nice. And you need to use a hell of a lot of washing powder because it is brackish, so I use it but not for drinking.” Although the quality of the water was not the best and they did not have potable water in their homes, residents of the

town are more concerned about the lack of electricity. Anna explained, “Water is not an issue really, electricity is ... So this television is just an ornament, I can’t use it.” Anna said they have been fighting for more than 30 years for electricity but she did not know what the problem was.

Sharing knowledge: Tanks and gardens

Anna’s husband was a good teacher and shared his knowledge about how tanks work and how to garden. Anna described him, “... he’d call me then I must go and then he will show me. If he planted beans he would take the sticks and put it in the soil.” Like others in Glenconnor, Anna’s husband did not use rainwater from a tank to water the garden but used tap water. Anna also learned about tanks from her husband: “One day when I took him food and said I must look inside the dam and see the stepladder. He had chicken wire inside the dam and made concrete and there was a space and then he threw the concrete the one day and then let it dry and then next day he would continue. That time there were no plastic tanks, they came much later.”

Figure 6.20: Anna demonstrates her knowledge gained from her husband about cement rainwater tanks (Glenconnor, 2013)



Due to her husband’s efforts they had a thriving vegetable garden but Anna confessed:

I’m very lazy for it. My husband was the one responsible for the garden when he was alive. Now you have to hire and pay someone to do the garden for you... But the young people from Glenconnor ... if they help you, you need to know you must have money to pay them, that’s why it looks the way it is now, because I don’t always have money.

She does sometimes plant on her own but explained that she is getting older and found manual labour difficult. Anna explained, “My problem is that I can dig but not hoe. Digging is not a problem, but standing for long I can’t do that.” At my first visit to her vegetable

garden she was growing spinach, cabbage, green beans, beetroot and carrots. Elizabeth Flipp helped her grow these from the seeds she (Elizabeth) received from the gardening workshop. Elizabeth lived next to Anna's house and did not have a fenced-off garden like Anna so Anna let Elizabeth plant her seeds in her garden. When her husband was alive, he and Anna used the vegetables they grew for their household and gave any excess away. The garden produced most of what they needed for their household except for potatoes. Anna's children were never interested in learning how to grow vegetables and when asked why she answered, "They are just lazy".

Income and groceries

In terms of food security Anna said, "I am careful with the money. We [get] pay the third [of the month] so then I go the next day and buy and not again till the next month." Like others in Glenconnor she did most of her shopping in Uitenhage as it was less expensive. She did not buy many fruits or vegetables as she had a gas fridge which was costly to run: "I eat the fruit before it goes off". She spent no more than R500 (USD \$43.68/ €35.56) on groceries per month on herself and said, "Sometimes I cook too much and then I give to the neighbours who don't have".

Community

Anna was an active member of her church. She sang in her church and helped run the Sunday meetings. Commenting on the cohesion of the Glenconnor community Anna said, "Ja, we are all friends but some do quarrel. I don't like it but I go to people straight and ask them what the problem is, I don't like gossiping. I don't know about the young people, they hang out at the shop and drink." When asked about her future plans or what she would like to achieve in the near future Anna replied, "I want to make improvement. I want to do something for my church this year if the Lord will allow me to do that. I have an idea but I must ask that from the Lord because it will require strength. It takes prayer."

Summary: the most prominent mediating processes in Anna's rainwater harvesting and food gardening practice and learning

One of the most important mediating factors in Anna's rainwater harvesting and food gardening practices has been her husband as a knowledge sharer (*tool/explicit mediation*) of gardening. Once he passed away Anna's food gardening activities waned as she found it difficult in her old age (*tool/explicit mediation*) to perform the manual labour. Financial

constraints have also limited her gardening activities as she was unable to pay anyone to help with the hard labour. She shared her garden with Elizabeth Flipp and together they have grown vegetables. Her rainwater tank (*tool/explicit mediation*) was an important source of drinking, cooking and washing water and she has learned how to manage her water in the tank.

6.4.4 Evelyn Jackson (Kleinpoort)



Figure 6.21: Evelyn Jackson stands by her food garden in front of her house (Kleinpoort, 2012)

General profile

Evelyn Jackson and her husband were avid food gardeners. Her husband tended a large vegetable garden next to their neighbours' house while Evelyn helped him and tended her own vegetable and flower patch in front of their house as well. Five people lived in their house: she and her husband, their two sons and a granddaughter. She was an active member of Kleinpoort, sitting on the school board, community council as well as being a member of the Methodist Church of Africa.

Evelyn was born in the Sundays River Valley and grew up in Kleinpoort. She was educated until primary school but was prevented from attending high school due to Apartheid laws as she was from a rural area. She explained:

Then I went to Uitenhage in 1967 and that was, how will I put it, still in the days of Apartheid, and they said a child from the farm must go to high school in the Transkei. So I couldn't continue with school because of that and I really wanted to go on ... I could not take the train daily to go to school. There was not enough money for me.

Evelyn and her husband worked on farms most of their lives, moving from farm to farm, much like others dependent on the farming industry for employment. As an example of quite a mobile life due to the insecurity of farm work, Evelyn explained, "Later we were asked to leave this farm, we moved to another farm, it was not nice there; we lived only two years

and moved to another one". While some farmers were benevolent others took advantage of them with low wages and moving them off farms. Her husband was once injured from farm work but received little compensation. Evelyn explains, "The farmer paid for medical bills, but did not compensate him. He had nothing. We even used our money to take him to check-ups sometimes and I looked after him". In 1992 Evelyn and her husband started living in Kleinpoort, renting out the Transnet house they lived in at present. Throughout these years Evelyn worked as a domestic worker for her husband's employers. When she moved to Kleinpoort she then worked at the local farm stall for eight years. Evelyn and her husband both received pensions on a monthly basis as well as a child support grant for their granddaughter. Their one son used to have a job but was retrenched and now worked on and off in part-time jobs.

Learning about water

Evelyn grew up with her grandmother who taught her the value and uses of water. When she was young her grandmother gave her and her sisters small buckets to collect water from the windmill to fill a barrel at their house: "My grandma would use the water to make sour porridge for breakfast. And we used it for cooking and cleaning and doing laundry." The water would not last long; "Almost every day we had to go fetch water. But when it rained we put buckets under the gutter to collect fresh water." Evelyn's grandmother was strict in terms of the use of water. She recounted, "We would get a hiding if we used water from the barrel to play with!" The way she was raised with water as a child has influenced how she used water in her household as an adult: "I don't waste it. The water from the tap we use for washing. My husband is also strict, when he sees the children are playing with the water he says we must put the lock on." Asked if she did things differently from her grandmother in terms of water collection and use Evelyn said, "... today I won't drink water which is not closed with a lid, not sure why because those days we drank water from the open barrel. Maybe it's the new generation".

Gender roles and water use

When growing up there was a clear division of labour between the two genders in terms of household chores. Evelyn and her sisters were the ones who collected water in the family as she explained,

It was a disgrace for a man to carry water on his head! My granny said they [her brothers] must go help my grandfather and it was our duty to fetch water because one day we will want to take a husband and then we need to know about water. The boys had to go help milking the cows and fetch wood from the bush. The girls had to clean the house and do the dishes.

Water in the past

Like Glenconnor, residents in Kleinpoort also struggled with access to water for years.

Evelyn recounted their struggles:

When I came to Kleinpoort in 1990 we paid R20 for water from the Railway, then in 1996 it stopped. Then Mr. van der Merwe said we could use his quarry but that water was only right for washing, not for cooking ... We really struggled before having water here. These tanks and pipe water it was easy to get them. For six years we used to collect water from the quarry which is far from here.

To collect the water she said, “We used our heads to transport water, we would put a five litre bucket on our heads”. Although people did not have to walk that far to get water, the quality of the water was questionable as Evelyn explained “... so in the quarry there was a hole. That hole was full of water and that was the water we were using. We had no choice but to drink that water.”

Highlighting the disparity between the rich and the poor Evelyn said, “Farmers had water and we did not”. She admitted that

We stole water from close farms because the water we had access to was very dirty ... and one day he [a farmer] told us that the water is for his people and the sheep and that Transnet must give us water. Then in 2000 we received letters from Transnet that the Municipality will give us water and in 2002 or 2004 about we got two tanks. The water came from a borehole. Then the pump broke sometimes and then we reported it.

Illustrating the importance of the link between access to water and access to land Evelyn explained,

After a year or two one farmer bought that land where the pump was installed that meant now again we don't have water but we fought again with Cacadu and in 2010 Cacadu made that tank for us ... Now we have that big tank that provides water for the entire community, this is water from underground ... So, this is borehole water we are using. Now we have access to water.

Figure 6.22: One of the two town water tanks in Kleinpoort (May, 2012)



Water at present

To water the garden Evelyn and her husband used tap water from the yard which is fed from the large town tank. Evelyn and her husband would like to own a tank specifically for their garden:

That big tank of ours is not for us only, it is for all of Kleinpoort. The white people water their trees and gardens and so on and then when the water is finished it takes long time to fill up. If we have a green tank then we can water in the evening, but now we have to water during the day which is not right and in the evening often there's no water.

Besides the town tank many of the houses have one rainwater tank donated by the municipality: "We ask for tanks for each house and I have one tank and each house have one tank. But we have one big tank that supports us." Evelyn used the water in her household tank for drinking water only. If her rainwater tank ran dry she would use her tap: "I use the big tank and the tank gets its water from the ground. That tank is enough. It serves the whole of Kleinpoort, for black and white including businesses." Tensions remain around the use of water and who has access to it however. When asked about a game lodge in the town with several rain tanks outside the building Evelyn stated, "That is our water as well. They build this house with our water. They pump ground water into those tanks. Sometimes white people come with big trucks here and take our water that is what we not happy about, we fight with them." The construct of race thus still permeates tensions between 'the haves' and 'the have-nots'. In a later interview she reiterated this point when she said, "One year we saw Mr. van der Merwe letting other people use our water and I fought about that with the municipality".

Figure 6.23: Evelyn collects water to drink from her rainwater tank (Kleinpoort, 2012)



Food garden: A neighbourly affair

Evelyn and her husband gardened with the help of their neighbour, Trevor, and as a result they shared the vegetables grown. They decided to use a piece of unused land owned by Transnet to plant a garden. It was originally her husband's idea but he asked their neighbour to help him as they were old and manual labour was difficult. Trevor agreed and they have had a thriving harvest of pumpkin, cabbage, beetroot, green peppers, potatoes and sunflowers for about two years. Besides helping her husband in the garden Evelyn also tended her own garden in front of her house which mostly has flowers and herbs in it. She explained that they both enjoyed gardening from an early age and learned from their parents. Learning from their parents she explained, "Yes, they used to plant lots of things, his parents loved their garden. But my husband is old now. However, as you can see our property we planted lots of trees in our yard..."



Figure 6.24: Evelyn and her husband in their food garden (Kleinpoort, 2012)

Profit and charity

Evelyn and her husband bought their own seeds. She explained, “We buy our own seeds no one gives us seed, but we get pumpkin, cabbages and fruit from Department of Health. The lady from the Department surprised us with these seeds.” Their original plan was to make a profit from these vegetables but it was unfortunately unsuccessful. Evelyn explained, “The vegetables are for household use. We`ve tried to sell it but people don`t want to buy. Sometimes we get lucky and people buy it but most of the time we eat it ourselves... The selling went well at the beginning especially pumpkin and onion but we don`t know what happened. They stopped buying from us and went back to the shop”. She commented on neighbours around her: “The neighbours want to eat free but don`t want to work. They want free food. They don`t want to help but want to eat. When I ask them to help, they say our garden is too small, but I give them my vegetables.”

Assistance and constraints

Evelyn drew a comparison between the younger and older generations, expressing a view that has surfaced often in other people`s stories that young people are not interested in learning how to garden. She explained:

... those people looking after gardens here are older and younger people are lazy, they don`t want to work. This old man here works alone whereas there are young people he does not get help from. The only person who helps him is Trevor.

Evelyn and her husband also faced barriers to their gardening activities such as financial constraints, “We are very poor to buy poles for the wire and put up the wire”. They have also had to contend with empty promises from the municipality: “Cacadu did not give us anything but they promised us. But it does not worry us too much that the promised was not fulfilled.” They have received some help from an acquaintance in the Department of Health: “We were promised money and tools for the garden some of us but it never happened. I speak to Aretha from Health Department to help us. She gave us rake, wheelbarrows, spade and netted wire.”

Food security

When their harvest was plentiful Evelyn did not need to buy vegetables: “I don’t need to buy from shop. But my pumpkin is small.” In 2012 however they harvested their vegetables in December and did not plant for the coming months so Evelyn said,

We planted potatoes and pumpkins in December and they looked good but then we went away for Christmas and when we came back there wasn’t water so it all got burnt. So last year we failed but he has prepared the soil again now and put some things in ... Now we’ll have to buy pumpkin and carrots and it is expensive.

When they had no vegetables from their garden she bought vegetables from the little shop in town but she did her monthly shopping in Uitenhage like many others in Glenconnor and Kleinpoort.



Figure 6.25: Evelyn and her husband in their food garden (Kleinpoort, 2012)



Figure 6.26: Evelyn shows Ewald the burnt potatoes and empty garden (Kleinpoort, 2013)

A community driver

Evelyn was a strong community leader, sitting on the town’s school board and community council. She was a mover and shaker in her community as well, often leading the struggle for services such as water, electricity and employment initiatives. Unlike Glenconnor, Kleinpoort has been able to secure access to electricity this year after a long fight. As testament to her fighting spirit Evelyn commented, “We only got electricity this year in our community. We also want these houses to be our house because now we pay R30 (USD \$ 2.62/ €2.13) a month for rental on these houses. I always fight to get what I want.” She is also motivating for the town to get a mobile clinic: “But we have applied now for container clinic, we have a bed and desk. Last week they were here and said they’ll put up the container. So that’s solved.”

Her activities were not without challenges however. Evelyn found that often she was not supported by the rest of her community because of apathy or jealousy. Referring to funding a crèche in 2010, Evelyn explained,

People of Kleinpoort did not want the project. They wanted to open a crèche and we got R50 000 but the community did not want it, so it failed. Now people are not working ... The community said they only wanted that money to build houses for them otherwise they will rather not have it, so again it failed. We have no skill and this project was going to provide some skills for us.

Short-sightedness and jealousy was a problem in the town as she explained,

They are silly because they thought I wanted the project for me. But I wanted it for community, I can't do it alone. I need support from the community. There are people who wanted to help but it died ... They are jealous of me because they think I do things for me but I do it for everybody.

In terms of future aspirations Evelyn would like to start her own sewing business: "I like business". Her sister gave her an electric sewing machine and now that she has electricity she would like to learn how to use it: "But there is no one to teach me".

Summary: the most prominent mediating processes in Evelyn's rainwater harvesting and food gardening practice and learning

Evelyn and her husband fed their family from their vegetable garden and harvested water from their roof for drinking and cooking (*object*). They used communal taps to water their gardens (*tool/explicit mediation*). Her household and their neighbours worked together in the garden, sharing both the work and the fruits of their labour (*community/explicit mediation*). Evelyn was also an active community member, fighting for services in the town and trying to create opportunities and work for people. She was not always supported in this however due to jealousy and apathy (*community/implicit mediation*). Old age and financial constraints hindered them from furthering their gardening exploits in terms of having tools, tanks and seeds (*tools/explicit mediation*). The reliability of the town water supply was also a problem which restricted their gardening practice (*tool/explicit mediation*). Evelyn has also experienced a clear division in access to water resources along racial lines in her town (*tool/implicit mediation*).

6.5 Conclusion

This chapter has provided a contextual background to Glenconnor as well as presented the narrative accounts of the four primary research participants from this case study site.

Glenconnor was first historicised in order to better understand the factors that shape rainwater harvesting and food gardening practices in this specific community. Working within a second generation CHAT framework the different interacting activity systems were then presented and described, providing a fuller understanding of their roles in relation to the central activity system. Narrative accounts of the primary research participants from Glenconnor were also presented, highlighting the primary mediating factors in each participant's rainwater harvesting and food gardening practices and learning of these. In delving into details of the mediating processes in the subjects' learning and practices Chapters Five and Six have introduced and opened up a space for the interpretive data presented in the following chapter.

The following chapter (Chapter Seven) considers what motivates subjects to participate in rainwater harvesting and food gardening practices, how they learn them and what they learn. Chapter Seven also presents in more detail both the implicit and explicit mediating factors that shape food and water security practices and the learning thereof.

PHASE ONE B

CHAPTER SEVEN

IMPLICIT AND EXPLICIT MEDIATION AND LEARNING

7.0 Introduction

Chapters Five and Six presented the historicised activity systems of each case study as well as the narrative accounts of research participants. The history and introduction of rainwater harvesting and food gardening practices in each activity system supports a fuller understanding of the motives of female rainwater harvesters and food gardeners to learn and practice rainwater harvesting and food gardening. Furthermore, one can understand better what they learn, how they learn it and the mediating processes that shape this learning and practice.

This chapter presents data from Phase One B of the research process aimed at answering the first research question:

- 2) *What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security practices in rural communities?*

This question was guided by the following sub-questions from the CHAT methodology (Section 3.8.6):

Phase One A (Chapter Five and Six)

- Who is learning?

Phase One B (Chapter Seven)

- Why are they learning?
- How are they learning?
- What are they learning?
- What are the prominent mediating processes shaping their learning and practice?

To answer these questions this chapter used both inductive and abductive analysis which uses theoretical lenses such as that of CHAT (Section 3.8) and the theory of mediation (Section 3.2) to understand what emerges from the data. The previous two chapters answered the first

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guiding question of *who is learning* by describing personalities and lived experiences behind rainwater harvesting and food gardening practices. Chapter Seven is concerned with answering the remaining four questions: why, how, what is learned and what the primary mediating processes are in these practices.

This chapter first discusses what motivates rainwater harvesters and food gardeners to participate in their practices as the *object* of an activity system is a strong force that determines the direction of an activity system (Section 7.1). Section 7.2 then discusses how these subjects are learning their practices and what they are learning. The primary implicit and explicit mediating factors that shape these practices are then presented in Section 7.3, illustrating how these have the potential to either enable and/or constrain the rainwater harvesting and food gardening practices and the learning within. Section 7.4 then provides a synthesis of these mediating processes and their implications for these practices.

7.1 Why are female rainwater harvesters and food gardeners learning rainwater harvesting and food gardening practices?

Before discussing the ways in which female rainwater harvesters and food gardeners learn their practices it is first important to understand why they learn and practise rainwater harvesting and food gardening. In CHAT, the motive for carrying out an activity is embodied in the *object* of an activity system, which also serves as a driver for what happens in the activity system (see Section 3.8.3). The object develops over time, carrying collective meaning and motives with it as it is shaped by cultural and historical factors (Daniels, 2008). It is thus important to understand why rainwater harvesters and food gardeners do what they do in their activity systems. The analysis below is clustered into different categories of reasons that were offered in the two case study sites. These included water security, proximity and time, food security and NGO and government involvement. This section is based on an inductive analysis of the data (see Section 4.6.2).

7.1.1 Water security: quantity and quality

Quantity

One of the reasons given for harvesting rainwater with reservoirs and Jojo tanks was to ensure water security in times of drought. People need water during dry spells but they also require reliable water sources on a permanent basis as communal water sources such as

community taps and town pumps cannot always be relied on. Evidence from interview data from both sites is provided in order to provide a ‘thick description’ of this interpretation.

In Section 5.5.1 Nothemba Languva explained how her and her family relied on rainwater in the past to water their food garden: “So we relied only on rainwater”. Bolekwa Ntusi (Section 5.5.3) also described how long it took to collect water from the river in the past; this and unreliable potable water from communal taps persuaded her to invest in a rainwater tank.

The motives of using rainwater harvesting techniques in Cata because of the lack of fresh clean water was confirmed by Viljoen et al.’s 2012 study (see Table 7. 1 below).

Table 7.1: Description of rainwater harvesting techniques practised by communities in the study area, specifically Cata Village (Viljoen et al., 2012: 40)

RWH&C technique	Village practised	Development of technique within village	Characteristics	Use of harvested water	Reason for choice	Implied impacts	Extent/scale of application
<i>IRWH</i>	Potsane, Rietfontein	Scientific: ARC-ISCW	Catchment: 2m runoff area Storage: 1 m basin area	Crop production	Best practice: simple and highly effective	More food (household food security); more jobs; more income; employment; less theft of produce; improved environment; higher water use efficiency (Botha <i>et al.</i> , 2003a; Botha <i>et al.</i> , 2006)	Homestead garden scale; implemented by 26 and 21 households in Potsane and Rietfontein respectively
Roof RWH	Cata, Kwezana-West; Rietfontein	Indigenous; introduced and improved	Catchment: Roof Storage: Above ground tanks and small containers	Domestic; supplemental irrigation; animal consumption	Lack of fresh water supply; clean, available on-site	Better supply of and easier access to drinking and cooking water; higher agricultural production	Homestead garden scale; most of the households in Cata and Kwezana West; 4 households in Rietfontein
Road RWH (homestead ponds)	Kwezana-West	Indigenous	Catchment: Roads, rangeland Storage: Underground pits; small open dams	Supplemental irrigation; animal consumption	Not much effort and investment needed; larger catchment	Higher agricultural production	Homestead garden scale; three households in Cata, and 1 household in Kwezana-West
Trenching	Cata	Scientifically: DWAF through BRC	Trenches filled up with litter and soil	Vegetable production	Promoted as applicable best practice; improves water holding capacity of soils in low rainfall areas	More food	Homestead garden scale; three households in Cata

As discussed in Section 6.4.2 (*Water at present*) and Section 6.4.4, Mieta Platjies from Glenconnor and Evelyn Jackson from Kleinpoort commented on the need for rainwater tanks because of issues with scarce water sources.

Quality

Quality of water was cited as one of the main reasons for and benefits of having rainwater tanks. Problems with water quality were only noted in the Glenconnor case study site however, indicating the contextuality of each site. Unlike in Cata, where people use their rainwater tanks for watering their gardens and livestock, people in Glenconnor only use their tank water for drinking and household uses such as cooking and occasionally washing of laundry. In many instances the other water in the area was described as being too brackish and hard to drink. As presented in Section 6.2.7, various research participants mentioned the brackish and poor water quality in the Sundays River Valley area. In her account of *Water in the past* Evelyn Jackson (Section 6.4.4) also spoke about the bad quality water people in Kleinpoort were forced to drink from an open quarry pit: “but that water was only right for washing, not for cooking... We had no choice but to drink that water”.

Khanyisa (Section 6.3.2) also commented on the water challenges in Glenconnor:

Ah the water issue is a very difficult one along the SRV. What they did, the Cacadu District Municipality, they managed to negotiate with the white commercial farmer which is staying adjacent to Glenconnor and they negotiated and then were able to get water from him. But the water had problems, it was dirty and what what. So they also engaged in the struggle to make that water clean and it was very long, but ultimately the water was cleaned.

Researcher: And then they got a water tank?

Khanyisa: Yes they did. And also the ownership and access to that.

7.1.2 Proximity and time

Many rainwater harvesters and food gardeners claimed that another reason they wanted rainwater tanks was to have water closer to their homes where they use it. This was not only for the convenience but also because it saved time for women who in the past had to walk long distances to collect water.

Castina Gcilitshama (Section 5.5.2) explained that saving time and labour was her motive for buying a rainwater tank. Both Bolekwa Ntusi (Section 5.5.3) and Sisiwe Khiba (Section 5.5.4) also attested to the convenience of having rainwater tanks on site at their homes. Sisiwe explained, “Before we received tanks we used to collect water using buckets from community taps. It is difficult to use community taps as they are far from us, so we rely entirely on rainwater”. In Glenconnor Mieta Plaatjies (Section 6.4.2) also cited time as a factor when collecting water in the past.

7.1.3 Food security: Social, intrinsic and economic motives

One of the main reasons given by participants for food gardening was for increased food security. This included not only having food available but an increased variety of food for health benefits. Economic benefits have also been accrued by some participants who save on monthly food expenses because they do not have to buy vegetables and who produce and sell surplus vegetables in their communities.

Social

By planting a food garden, Nothemba Languva (Section 5.5.1) was able to feed her family: “I had a garden because of the need for food in the household. And then I would plant mielies (corn), potatoes, and beans. And that’s all because then I would be able to feed my family”. In Section 5.5.3, Bolekwa Ntusi explained that one of her motives for joining the WfF was to plant diverse crops that she could sell to her neighbours. As a community health worker she also encouraged households to grow vegetables for their health: “It doesn’t matter how big your garden but the thing is that you will be able to get some food...”

Citing the socio-economic problem of poverty, the WfF chairperson in Cata explained why the movement was started in Cata: “So when the project started it was responding to the poverty, the poor of the poorest. It looked in the households that were very poor and then it needed to actually capacitate those households to generate their own food security. A few individuals came forward” (Int.8C).

In Glenconnor Mieta Plaatjies (Section 6.4.2) explained the social benefits of growing and nurturing trees: “See all the trees outside here in the yard, I planted it myself with my own hands, there was nothing there! When I touch the leaves I touch life. So trees are life for me. But I want all of us to do that, also to have food security”.

Intrinsic

Intrinsic motives such as personal interest and knowledge in food gardening and interest in community well-being were also noted as reasons for food gardening. Castina Gcilitshama (Section 5.5.2 *Food gardening and knowledge: “It’s in my blood”*) explained that gardening is in her blood and that is why she gardens.

Economic

Research participants in Cata also noted the economic benefits of growing their own food. Castina Gcilitshama (Section 5.5.2 *Food security*) described how she never had to buy

vegetables unless her crops failed. Sisiwe Khiba (Section 5.5.4 *Food security and gardens*) also claimed that she saved a lot of money on monthly groceries by growing her own vegetables. In another study of home food gardens in Cata it was found that the majority of home food growers produced crops for home consumption and those that produce surplus, sold it to other community members (Viljoen et al., 2012).

Research participants in Glenconnor and Kleinpoort also attested to the economic benefits of growing their own vegetables. Mieta Plaatjies (Section 6.4.2 *Food security and groceries*) explained how she fed her family from her garden and saved money while Evelyn Jackson (Section 6.4.4 *Assistance and constraints*) commented, “The vegetable is expensive to buy. You pay too much for vegetable now, but it is cheap to plant for yourself. I don’t know why they don’t to plant vegetables”.

A study conducted on food security in Grahamstown, Eastern Cape confirmed these findings concerning motives for food gardening. Researchers found that people garden for primarily three reasons: maximising natural resources, poverty alleviation and health benefits. With reference to the first reason it was found that people did not like to see natural resources go to waste and wished to use the land for its productive potential (Møller & Seti, 2004). One research participant argued, “We cannot let the land lie fallow. We have to use productively whatever piece of land is available ...” (Møller & Seti, 2004: 16) A second motive for food gardening was to alleviate poverty and to save money on purchasing food by growing one’s own. One research participant stated, “Growing vegetables frees up money that can be used on education for children, fuel or groceries such as oil and sugar” (Møller & Seti, 2004: 17). Another respondent commented, “I think it is largely poverty that motivates me to cultivate my garden” (Møller & Seti, 2004: 17).

A third major reason for why people cultivate food gardens was for their health. Gardening provided healthy vegetables for people suffering from HIV/Aids, diabetes and for those who required nutrient rich diets. One of their respondents claimed, “Growing a garden is very good for my health. I was suffering from high blood pressure before. Eating lots of green vegetables has helped to lower my blood pressure” (Møller & Seti, 2004: 17). Gardening also provided physical exercise and relieved boredom for those who were unemployed or retired (Møller & Seti, 2004).

Economic reasons for gardening were also cited by Møller and Seti (2004). One research participant realised she could save on monthly groceries by growing vegetables once she was no longer earning an income. They found that pensioners who gardened were able to supplement their income and maintain their financial independence and gardeners were often in a position to help others in need. It was also found in the Viljoen et al. (2012) study that the use of rainwater harvesting methods for food gardening had positive effects on food security as households were able to produce a variety of foods and thus reduce their dependence on buying food from shops.

7.1.4 NGO and government involvement

In some instances people practised rainwater harvesting and food gardening because an NGO or government programme had introduced these practices into the community through specific programmes such as the BRC in Cata inviting and introducing the WfF Movement to the community or the Cacadu Municipality donating rainwater tanks to Glenconnor and Kleinpoort residents. From the historical account of both sites one is able to trace the influence of the BRC, Umhlaba Consultants, Department of Water Affairs (DWA) and the WfF Movement in Cata and Khanyisa, Cacadu Municipality and Department of Agriculture (DOA) in Glenconnor concerning the introduction and support of rainwater harvesting and food gardening practices (see Sections 5.4 and 6.3). It should be noted however that rainwater harvesting and food gardening practices were evident before the presence of these external actors.

7.1.5 Summative perspective: Rainwater harvester and food gardener objects of learning and practice

From the case study evidence presented above it is clear that female rainwater harvesters and food gardeners harvested rainwater for the purpose of drinking, growing household vegetable gardens and for other domestic purposes. Their primary object is the land and rainwater with the intended outcomes being economic and social (and health) benefits. Increased water security to safeguard against times of drought and unreliable water sources as well as proximity and time were drivers for harvesting rainwater with Jojo tanks. Increased food security in terms of not only availability and variety but also economic benefits, were motives for growing food gardens. External organisations and government departments such as the Department of Water Affairs (DWA) and the Department of Agriculture (DOA) have also

been involved in these communities, introducing or supporting these practices. Some participants, however, gardened due to intrinsic motives, citing their connection to the land and former knowledge systems. The emphasis of objects in each activity system may be different, as in the case with water quality or external involvement, due to the different contexts and histories of each site. This confirmed Wertsch's (1998) third claim of mediated action which argued that mediated action has multiple goals or purposes which are often in conflict with each other. The goals in mediated action are therefore not always easily identifiable around a single goal and might conflict with one another as they interact. As has been shown, different contexts also direct the goals of harvesting rainwater, either for having water closer to homesteads in order to water food gardens (Cata) or for the sole purpose of providing better quality drinking water (Glenconnor).

7.2 How are female rainwater harvesters and food gardeners learning rainwater harvesting and food gardening practices?

This section describes the various ways in which female rainwater harvesters and food gardeners were learning rainwater harvesting and food gardening within each central activity system. In his study of social learning amongst commercial beekeepers Masara (2010: 73, 95) identified six different ways in which people learn: learning through observing and experiencing trends; learning from experienced others; learning through networking; learning through inheritance or spiritual calling; learning from trainers and learning by disruption of cultural beliefs. More specific to this study were Phiri's (2012) findings on how people learn in water management communities of practice in Cata. Phiri (2012: 104, 106) found that:

- Despite external influence, most learning has been achieved through social interactions amongst communities of practice and with the practice; and
- Learning has taken place through facilitated interventions.

In my study I observed similar learning processes in the practices of female rainwater harvesters and food gardeners. I observed that they learned from experienced others such as parents, grandparents and spouses and they learned from each other within their communities of practice. They also learned from trainers and workshop facilitators. As a result, learning took place through both informal and formal learning processes. The sections below describe these learning processes in more detail for each activity system. *What* rainwater harvesters and food gardeners learned is also addressed in this section. More data exists for how people

are learning in Cata than in Glenconnor because there was not as much training and documentation surrounding the training in Glenconnor. Where no evidence of certain learning processes is given for the Glenconnor case study, it is because this information was not available.

7.2.1 Learning through observing and experience

Learning through observations during practical training sessions was one of the learning processes through which rainwater harvesters and food gardeners in Cata and Glenconnor learned their practices. Learning through these processes can be associated with Vygotsky's notion of 'everyday concepts' (Section 3.3.3) as this knowledge is understood as immediate, social, practical activity and is also associated with Bernstein's horizontal discourse (Daniels, 2001).

One of the ways female rainwater harvesters and food gardeners learned their practices in Cata was through observations during knowledge sharing visits and practical exercises:

The trip to Pretoria was undertaken from 20 to 27 June ... The trip was for observing, sharing, learning and practising. What was important in the visit was to see that any kind of soil can produce food. The projects visited were producing on sandy soil.... Simple food processing methods were also another exciting observation (BRC report 2004a)

As discussed in Sections 5.4.3 and 5.4.5 participants also learned through experience and practically filling out monitoring forms in learning by doing:

From 13 to 15 June we conducted training for the new members... The new monitoring form was introduced and discussed thoroughly with examples. The participants seemed to understand it. At the end of the training, peas, broad beans and carrot seeds were shared, to enable a practical start with planting and filling in the monitoring form (BRC report 2005a).

As discussed in Section 5.4.5, Tim Wigley from Earth Harmony Innovators was brought in as a permaculture and rainwater harvesting expert to train the WfF group in Cata who received Jojo rainwater tanks. Many of the *mediating tools* he used such as the Council of All Beings, the forest walks and giving back to the earth Your Gift were very practical learning tools largely based on using the senses to observe the natural world and making use of various ecological resources such as rain and sunlight.

Bolekwa Ntusi (Section 5.5.3) attended one of Wigley's workshops and described how he explained the importance of diversity within gardens: "In the forest you won't have just yellowwood but you have other different, in the same place. So now we can, in one bed, plant different type of crops".

Kouga Urban Harvest (Section 6.3.3) also used a practical, hands-on approach to their training in the Sundays River Valley:

The workshop always consists out of theory and then a practical session where we do everything outside in a garden. There are no specific exercises, we just illustrate everything that we do practically. So within the second training focused on the nursery, I showed them how to build the nursery after we covered all the lesson materials.

7.2.2 Learning from experienced others

Participants in Cata and Glenconnor often stated that they learned their gardening techniques from experienced others such as grandparents, parents or spouses. In his study on commercial beekeeping, Masara (2010) also observed that novice beekeepers learned from more experienced others such as parents, spouses and neighbours. When asked from where they learned their gardening knowledge, many research participants in Cata and Glenconnor commented that their parents taught them (see Sections 5.5 and 6.4.2 – 6.4.4).

Mukute (2010) referred to this intergenerational passing on of knowledge through families as horizontal learning (Section 3.3.3) where individuals pass on knowledge that is usually oral, local, context dependent, specific, tacit, multi-layered and contradictory across contexts but not segmentally organised which points to the cultural-historical nature of learning and knowledge. This type of learning also links to Vygotsky's third type of mediational tool as another individual (Section 3.2.1.1). Another application of Vygotsky's theory of learning and situated cognition (Section 3.4) is the notion of social guidance through apprenticeship in the Zone of Proximal Development (ZPD) (Schunk, 2004). In apprenticeship novices work closely with more knowledgeable others or experts where novices learn important processes and integrate this with their previous knowledge. Apprenticeships are used in on-the-job training programmes like permaculture courses in rainwater harvesting and food gardening practices. Students thus acquire skills while in the work setting and interact with others. Apprenticeship therefore represents a type of dialectical constructivism that depends on social interactions (Schunk, 2004).

7.2.3 Learning from the group

Another learning process that was important to research participants learning and practising rainwater harvesting and food gardening practices involved learning from each other and fellow members of their communities of practice. Although this category could fall within *Learning from experienced others* (Section 7.2.2) I have given it its own category as this learning in groups, although generally informal, was deliberate and part of the formal learning structures put in place by the BRC within the WfF Movement in Cata. These informal learning structures are closely aligned with Reed et al.'s (2010) definition of social learning (Section 2.4.4) in that as these women interacted within their WfF social networks they learned from one another and a change in their understanding of rainwater harvesting and garden practice occurred that went beyond the individual to settle within wider social units or communities of practice.

Part of the functioning of the WfF group in Cata involved monthly meetings to discuss individual and group successes and challenges. Bolekwa Ntusi (Section 5.5.3 *WfF community and sharing knowledge*) described this structure of accountability and shared her knowledge with other WfF groups in neighbouring villages. A BRC report also described how members visited each other's gardens; "On 29 November, BRC and the whole group visited each garden in preparation for the field day on 2 December" (BRC report 2004b). When asked if she shared her gardening and rainwater harvesting knowledge with people who asked, Nothemba Languva (Section 5.5.1) explained: "I do tell them. Knowledge is not that difficult anymore". Describing how group members assisted and learned from each other a BRC report commented: "Some are struggling to understand the system of monitoring forms but are trying hard but others are doing very well and even assisting others" (BRC report 2005b).

Meeting other people with an interest in gardening encouraged Mieta Plaatjies (Section 6.4.2 *Garden training and meeting like-minded people*) in Glenconnor immensely. She also shared her knowledge with people when they approached her for gardening advice.

7.2.4 Learning from trainers

One of the other very important ways in which female rainwater harvesters and food gardeners from both study sites learned their practices was through trainers and organised workshops and training sessions. Learning permaculture methods which are more abstract

and require transference from context to context via mediation is related to Vygotsky's notion of 'scientific' concepts and Bernstein's (1999) 'vertical knowledge discourses' (Section 3.3.3). 'Scientific' concepts are generally seen as being more abstract, requiring formal and explicit mediation by a teacher or trainer in a formal or more structured learning environment. Scientific concepts form logical, hierarchical systems of meaning that require systematic mediation, often via a system of knowledge progression (Daniels, 2001).

One of the first introductory training sessions for the new WfF group in Cata taught rainwater harvesting techniques and planting methods (see Section 5.4.3 also):

BRC was in Cata from 19 to 21 April with a development activist [Mama Tshepo] from the Water for Food Movement... The workshop was arranged such that participants shared their present situations at their homesteads... The approach used by Water for Food is that run off water from roofs, storm water can be harvested and used for producing food (BRC report 2004a).

Nothemba Languva (Section 5.5.1) confirmed that Mama Tshepo (Section 5.4.3) trained them:

Ehe [Yes], first a few people were taken from the village to Mama Tshepo to be trained. Then the BRC, when those people came back they taught them, then the BRC thought it was actually better to bring Mama Tshepo here to train them.

The WfF chairperson in Cata also confirmed that as a group they learned through facilitated workshops and BRC reports confirm additional training for new WfF members:

From 13 to 15 June we conducted training for the new members... The training went well. It covered theory and technical design, and we gave a demonstration on how to fill a trench at one of the sites. The new monitoring form was introduced and discussed thoroughly with examples (BRC report 2005a).

On 19 July there was continued training on the monitoring form for the first group. It seemed that that the form was understood and that members were motivated to implement the monitoring process (BRC report 2005b).

As discussed in Section 5.4.5, Earth Harmony Innovators also taught practical permaculture techniques such as constructing trench beds, swales, fertility pits, digging diversion furrows, constructing and using an A-Frame for contouring, mulching and tree-planting. As part of the rainwater harvesting piloting programme they also trained people in a range of low-cost rainwater harvesting techniques such as trench beds, infiltration pits, swales and tied-ridges (Denison, 2010).

In Section 6.4.1 (*Garden training programme*) and Section 6.3.3, Elizabeth Flip and trainers from Kouga Urban Harvest described the training offered in the Glenconnor area by experts. In terms of maintenance of rainwater tanks in Glenconnor and Kleinpoort, residents received no training as discussed in Section 6.2.7.

7.2.5 Learning through mediating tools

Linked to learning through trainers or facilitators of knowledge is the observation that rainwater harvesters and food gardeners learn through the use of explicit mediating tools such as posters, diagrams, videos and gardening tools.

Researcher: So within those workshops do you use any learning resources like posters or books or diagrams?

Earth Harmony Innovators: I've got some stuff...little posters and quite a few videos, some of the permaculture videos like that one from Limpopo... there's a set of posters ... that shows the contrast between a permaculture system and a typical system. It's just for discussion and I use a few posters that I have developed on the principles of permaculture and design principles.

Another mediating tool was the monitoring system introduced by the BRC and developed by Earth Harmony Innovators (Section 5.4.2 and 5.4.5) that included several indicators: "On 29 April, an organisational meeting was held to discuss the recording of yields and income ... BRC decided to design a simple monitoring form that would capture all the necessary information, to train members on how to use it" (BRC report, 2005a) (see Appendix 14).

Learning through books, pamphlets, training and meetings was also confirmed in a 2012 study on rainwater harvesting and conservation practices conducted in Cata (Viljoen et al., 2012). It was argued that learning this way creates a different social experience compared to learning from extension team visits only, and effects the acquisition and transferring of human capacities at the community level (Viljoen et al., 2012).

Mediating tools such as posters were also used during the gardening workshop in Glenconnor as Urban Harvest (Section 6.3.3) explained: "Working with low levels of education any pictures are a great supporting tool. There are wonderful posters from permaculture resources readily available on the internet, and we always try to use ones that are quite simple and not with a lot of text..." The Urban Harvest team also used material tools to show participants practically how to carry out their food gardening practices: "I showed them how to build the

nursery ... I also provided them with the equipment, as in gum poles, shade cloth, seedlings trays, seeds etcetera. With this training it was raining though, so they only built the nursery after I left”.

Learning through cultural artefacts such as books and posters links to Vygotsky’s view of learning through psychological mediating tools as discussed in Section 3.2.1.1. Learning through these mediating tools also corresponds to Vygotsky’s notion of internalisation and externalisation (Section 3.5) where externalisation “produces artefacts ... that enter into and channel subsequent streams of activity” (Prior in Daniels, 2001: 45). External social relations and socio-historical systems are then transformed into mental actions, outcomes, and embodied states which are understood as knowledge and skill in the internalisation process. Internalisation produces new knowledge and ways of thinking and affects how a subject relates with the object, thus externalising what has been learned and giving new meaning (Lave & Wenger, 1991).

7.2.6 Learning through networking

Masara (2010) identified learning through networking as one of the ways beekeepers learn. These networks included buyers, extension officers and other important stakeholders (Masara, 2010). In the Cata case study specifically I observed that rainwater harvesters and food gardeners learned through networking with different networks such as agricultural learning institutions, government departments and local NGOs.

As a way to canvass for both technical (training) and financial support the Cata WfF group, for example, invited certain stakeholders to observe their gardens:

On 20 October, BRC met with the group to discuss and iron out problems... Also discussed in this meeting was scheduling of a field day to invite DoA [Department of Agriculture], Fort Cox College, the CPA and Gasela community. The group accepted the idea of a field day... The field day took place as scheduled and was very successful. The Department of Agriculture from both Stutterheim and Keiskammahoek, the Fort Cox College, and Gasela community representatives visited Cata. Project members and visitors...moved from garden to garden, covering six in total. DoA and Fort Cox were very impressed and both committed themselves to assisting the project in terms of inputs and may be establishing a nursery at Cata. BRC report 2005a: We made presentations on the project to Fort Cox College and Mvula Trust... The intention is to canvass technical support.... (BRC report 2004b).

The Cata WfF chairperson also commented on networking and sharing knowledge with schools and neighbouring villages: “And we also campaign schools in terms of having their

own garden projects and we also workshop communities, not only here in Cata but other villages, so the knowledge that we have or the skills that we have we share with whoever is willing to learn” (Int.8C).

7.2.7 Summative perspective: How female rainwater harvesters and food gardeners learn

Female rainwater harvesters and food gardeners generally learned through experiencing and doing. They learned from observations and by performing practical activities: they have also learned from experienced others such as parents, spouses, neighbours and people within their communities of practice. Formal training sessions facilitated by trainers were also important. Mukute (2010: 190) argued that through practical observations and doings ‘tacit knowledge’ is acquired which he explained “can be externalised through expressing the “inexpressible” through figurative language and symbolism such as metaphor”. Practical training methods such as the ones used by Earth Harmony Innovators and the WfF programme were suitable as many of the participants were not highly literate which made formal instruction difficult.

The second important conclusion that can be drawn regarding how rainwater harvesters and food gardeners learn is that mediating tools are important in facilitating learning. Some mediating tools are good for sharing explicit knowledge and these include books, posters, manuals or monitoring sheets; others are good for communicating tacit knowledge and these include demonstrations, look and learn visits such as the ones used by the WfF Movement in Cata and by the Kouga Urban Harvest Garden Training programme. These learning processes are not without their challenges however. The following section thus presents the implicit and explicit mediating processes that shape the learning and practices of these rainwater harvesting and food gardening activities, which have the potential to either constrain or enable how participants learn.

7.3 Implicit and explicit mediating processes that shape how female rainwater harvesters and food gardeners practise and learn

As was introduced in Chapter One, this study was undertaken in order to explore the context-specific mediating processes of women’s rainwater harvesting and food gardening practices. The study followed on from Phiri’s (2012: 109) third finding which argued that “a diverse range of contextual factors and structural mechanisms influence participation and learning in

communities of practice”. Phiri (2012: 77-83) identified six mechanisms that influence participation and learning within water management practices: use of English language; power relations; low education levels; resource materials not contextualised; policy frameworks and poverty. In his recommendations he argued that his communities of practice framework was inadequate to explore these contextual factors in depth and the structural and causal mechanisms driving them. He thus called for an in-depth analysis of the contextual factors that impact upon learning around water practices.

Drawing on Vygotsky’s (1978) theory of mediation and Wertsch’s (2007) theory of the interaction between implicit and explicit mediation (Section 3.3.1), the following section thus considers the mainly implicit mediating processes that shape the learning and practice of rainwater harvesting and food gardening. As was discussed these two categories of mediation (explicit and implicit) are not neatly separate but rather interact in a dialectical relationship. As such it is difficult to identify a mediating factor as either strictly explicit or implicit. These mediating processes were identified through the analysis of the data corpus of each case study site and have the potential to either constrain and/or enable practices and the learning thereof. The discussion of these mediating processes moves from the centre out, focusing narrowly on the mediating processes around the training of rainwater harvesting and food gardening practices and then extends to broader factors impacting upon these practices.

7.3.1 Training

Several mediating factors identified in this study’s two sites which influenced the learning and practice of rainwater harvesting and food gardening activity systems were specific to the actual training of these practices. These included follow-up support, committed and knowledgeable facilitators, time, seasonality and agricultural activities, false or misguided expectations, criteria for choosing rainwater harvesting and food gardening workshop participants, knowledge networks, success, education, literacy and access to information, language, generational knowledge sharing, hands-on practical training sessions, unemployment and migration, age, community dynamics and trust and power dynamics. These are discussed below.

7.3.1.1 Committed and knowledgeable facilitators

One important mediating factor identified that shapes people’s learning (around rainwater harvesting and food gardening practices) is the role of experience in mediation. When food

gardening leaders and facilitators practice what they teach and tend their own food gardens, this increases the chances of them being committed to supporting and encouraging others in their rainwater harvesting and food gardening practices.

Referring to food garden training workshops he observed around the Eastern Cape, Jonathan Denison from Umhlaba (Section 5.4.4) explained:

If you're a good gardening support group facilitator then you love gardening and you're doing it in your own home you know. I mean, I used to ask them, I always ask the extension officers, 'Do you grow? Do you grow in your own home?' And invariably the answer is no. Invariably, I would say like 49 out of 50.

Linked to working with food gardening facilitators who actively grow food gardens themselves is the importance of working with trained facilitators rather than translators with little knowledge around food gardening or rainwater harvesting. Umhlaba raised the point that it is far more effective and beneficial to have facilitators who understand rainwater harvesting and food gardening concepts than working with a translator with little knowledge of the field who could potentially explain concepts and tools incorrectly to people. Umhlaba also addressed the importance of the language embedded in practice:

And then I think language is huge, huge, huge... In my experience you never get really good translation even if they're skilled. If they don't have a grasp of the content of what you're talking about um, so I think that's a major block. So you almost want to not be working with translators and working with trained facilitators who even if they don't have to know all the details, they are more than familiar, they're actually trained in the working concepts of what you're dealing with as opposed to translating.

7.3.1.2 Criteria for choosing rainwater harvesting and food gardening workshop participants

Linked to the mediating factor of expectations around rainwater harvesting and food gardening training was the criterion of choosing participants to attend training workshops. It was found that the success rate of continued learning and practice in rainwater harvesting and food gardening relied upon selecting people who were already interested in and doing these practises.

Earth Harmony Innovators (Section 5.4.5) explained the importance of having people already interested in these practices:

The kind of people they would send on the workshops were more the politically powerful or the people who get their names down for things. This wasn't very successful. I mean the follow up. So we started insisting that to come on the training you already are gardening. And then you were getting to the people that wanted to garden, and when these people shared their experience with others it had far more impact. For instance someone saying 'I used to try to grow fruit trees and didn't succeed and then I did the training and now look at all the peach trees I have now', stuff like that. So it spreads and people talk and it's a shared experience that people want.

As cited in Section 5.4.4 Umhlaba also commented on the deliberate choice of working with people who were already gardening for the rainwater harvesting and food production pilot programme. Nothemba Languva (Section 5.5.1) confirmed this: "The people who were given the reservoir were those who were already gardening – who have their own home gardens".

Another issue which was raised is that the WfF Movement usually works with the 'poorest of the poor' in communities (see Section 5.4.3), as they did in Cata. A BRC report (2004b) confirmed this:

The BRC was in Cata from 19 to 21 April with a development activist from the Water for Food Movement ... Five very poor members of the community were invited to a sharing session with the activist. The workshop was arranged such that participants shared their present situations at their homesteads.

It has been confirmed in other studies that it is the most vulnerable groups such as single, older women with limited or no income, with limited or no alternatives and with limited formal skills and education who are the most in need and the most receptive to rainwater harvesting and food gardening methods as a mechanism to combat poverty and food insecurity (Viljoen et al., 2012). Some critique the idea of working with 'the poorest of the poor' however, arguing that it is a great risk to invest time, energy and funds into individuals who may not have the social and human capital to sustain programmes such as these.

Umhlaba was sceptical about this approach as they felt that sometimes it was better to include people who have more social and financial capital to increase the chance of successful uptake of new technologies and concepts:

... my take on that was it's all good and well but you're basically then targeting the most vulnerable people and that's an important target group, but you're limiting your chances of successful uptake of technology and getting production so rather open it up to a broader spectrum of people who are interested in food production.

In their rainwater harvesting and food production pilot programme Umhlaba found that none of the very poor participants who did the mind-mobilisation with Mama Tshepo in 2004 in Cata were still gardening in 2009 which “highlights the risks of working with the very poorest of the poor in terms of costs and likely success” (Denison, 2010: 36). Some of these people’s neighbours however saw the rainwater harvesting methods introduced during Mama Tshepo’ training and adopted these techniques themselves. Umhlaba argued that households that have greater independence in relation to buying their own seeds, seedlings and fertilisers were more active in their gardens over a sustained period of time (Denison, 2010).

7.3.1.3 False or misguided expectations

Linked to selecting the appropriate participants for training programmes is the issue of expectations of communities. False or misguided expectations of development projects or training programmes when introduced into communities also surfaced as a factor mediating people’s rainwater harvesting and food gardening practices and learning. If people’s expectations are not met by a certain training programme or by resources they assume they might receive, they may lose interest or fail to take up certain practices.

Referring to misguided expectations as one of the challenges to learning and practising rainwater harvesting and food gardening practices, Umhlaba (Section 5.4.4) commented:

And the other thing I think is expectations hey. People are, you know, people are engaged – people hear of a project coming so they’ll come ... their expectations or reasons for being there are not necessarily because they want to only learn and they’re interested ... I mean people might be going because there’s lunch. They might be going because there’s a tank or they might be going because they’re just bored ... So ja, I think that there’s kind of a need in a way to sift out why are people there? Who really wants to be there? And what you find is that in a first session there’ll be a lot of people there. Many people go ‘Ahh there’s nothing really coming from this except knowledge’, then you’ll be a smaller group and a smaller group. And after a couple of months then you’re really dealing with the people who are interested. So that’s a sifting out process ... cos those people who hang out or who are there for reasons other than knowledge assimilation or they’re interested or they love it, you know, they just distract or undermine or come to steer it in different directions.

Khanyisa (Section 6.3.2) also commented on misguided expectations of communities which were sometimes introduced by previous NGOs or government projects that give handouts:

Ours is training aimed at capacitation and self-reliance so people at the end of the day must stand up and respond themselves. So the other organisations are coming with something. So the government lack of housing, they come with RDP (Reconstruction and Development Programme) houses. So people sometimes they are confused and don't want to join because they say you are coming with nothing.

7.3.1.4 Hands-on, practical training sessions

One way of overcoming constraints to learning due to low educational or illiteracy levels during instruction is to conduct hands-on practical training sessions as discussed in Section 7.2.1. These are often engaging as people are able to participate and learn by observing and doing. Earth Harmony Innovators commented on the effect of practical sessions with WfF members in Cata:

When walking to the indigenous forest we passed through gum plantations and it was dry, dry, dry and very hot and the grass was absolutely dead ... and then we stepped into the indigenous forest and it was green ... Inside the forest it was cool and moist. We could observe and experience how efficient the forest is in conserving water... This motivates people to emulate nature and to work in this same very efficient way. People really get fired up, they want to go out and do this.

Another gardening and livelihood NGO called the Umthathi Training Project, based in Grahamstown and working throughout the Eastern Cape, was briefly interviewed to gain a broader understanding of what mediating processes shape rainwater harvesting and food gardening practices. Although they had never worked in Glenconnor, Umthathi had worked in the Sundays River Valley many years back. Practical training sessions were also noted as effective learning tools by Umthathi trainers:

Researcher: What about things that people really enjoy and understand?

Umthathi trainer 4: Eh demonstrations, because they are hands on; permaculture and nutrition. Because we use props so that it can be easy for those who can't read and write, easy for them to be hands on in what they are doing.

7.3.1.5 Community dynamics

Another mediating factor identified that shaped the learning of rainwater harvesting and food gardening during training was the dynamics of a community. Organised, cohesive and responsive communities were noted as being easy to work with during training sessions while communities fractured by jealousy and political in-fighting hindered learning and practice.

Although Cata was divided along the issue of how restitution money should be spent and how development projects should unfold in the community (see Section 5.2.1-4), Umhlaba commented on the fact that because of the BRC's role as a facilitator and building trust in the community, Cata was easy to work in (Denison, 2010). This was largely because of structures in place that allow for development projects to be introduced in an organised and equitable way:

Look I mean it's actually an amazing community, it's incredibly stable, friendly, people are you know... it's a, it's probably one of the easiest places that I've worked in in the rural setting, and by far the easiest in South Africa. By far. Because it's highly organised... I think it was definitely because BRC's got such a good relationship with people and such a long history and they've made so much effort in building organisational capacity.

In an interview with local government representatives in Kirkwood near Glenconnor, amiable community dynamics and good leadership were also identified as an important mediating factor for the uptake of certain practices.

Researcher: Why do you think some communities are more motivated than others?
Int.9G: And in Glenconnor I don't know if you met Mieta Plaatjies? She's quite, you know, community leader through and through. And I think if you have the right people there they will stand together. Because she's fighting for her people irrespective of the political thing all the time and I mean you can only applaud that – she's really really trying.

As cited in Section 6.4.2 (*Social issues and the Glenconnor Development Committee*) and Section 6.4.4 (*A community driver*) both Mieta Plaatjies and Evelyn Jackson addressed the challenge of trying to mobilise community members while their efforts were met with resistance and jealousy. Umthathi trainers also identified lack of unity within communities as a challenge to knowledge sharing: “If there is no unity in that village, if people are separated, they don't want to work together”. Attitudes of discouragement, apathy or lack of interest in rainwater harvesting and food gardening practices are also a mediating factor that constrains the learning and practice of these activities. Evelyn Jackson (Section 6.4.4) commented on the lack of interest of her neighbours in food gardening: “The neighbours want to eat free but don't want to work. They want free food. They don't want to help but want to eat”.

7.3.1.6 Power dynamics and trust

Linked to community dynamics, another mediating factor surfaced during interviews with Umthathi trainers that affected the uptake of new knowledge and practices was the interplay

of power dynamics and gaining the trust of communities. Umthathi observed that they often work in communities with lower educational levels and noted that people sometimes feel threatened when more educated people training them:

Part of the problem of not trusting is that when they see you coming they see you as someone on a higher level than them so the challenge is to bring them over to us...Remember we deal with rural areas mainly and people in those rural areas there is always that respect with someone who comes in with something and all that.

Trainers that enter communities from the outside must therefore be sensitive to the power dynamics that are inherently at play in any learning environment and in the learning tools that they introduce to communities. This finding supports Wertsch's (1998) tenth claim of mediation which argued that power and authority were to varying degrees inherent tools in mediated action and that socio-cultural settings inherently involved power and authority (Section 3.7.1).

7.3.1.7 Time

Another mediating factor identified through interviews was that time played an important role in the success and effectiveness of the learning during training workshops. People need time to process information and try new things out. When asked what prevented new knowledge from being taken up Umhlaba highlighted the importance of time for the learning of and reflection upon new concepts and practices:

I think when things are done quickly, so like done in a rush and people come in once and then talk about something and disappear... If you're engaging with people and you're introducing any new ideas, you've got to...allow people time to absorb the idea, contemplate it, talk about it and then have time to reengage. So you'll see in our project planning cycles, there's always a process of introduction, talking about the idea, and then going away, and then coming back. ... people have got to have time to assimilate. Like raise rumours, get confused, come back with questions, accusations, all sorts of stuff and then you reengage, and you clarify, you get more coherence and more understanding. And you go away again, and you come back. And if you don't do that cycle like a few times, three four times then you walk off, leaving all sorts of misperceptions and misunderstandings and confusions behind so that cycle of you know... multiple, or repeat engagement, and each time you can go into more detail. So we use that consistently now in all of our facilitation work.

A BRC report (2004b) confirmed time as an important factor in the processing of information: "BRC visited the families...What was noticed during the visits was that the

information was disjointed in participants' minds and the reason for this was that too much information was given within a short time".

Time was also identified by Mukute (2010) as a shaping factor in the training of farmers in sustainable agricultural practices. He identified several different ways in which time impacts on farming practices: time to master a practice, time to change attitudes, seasonality and agricultural activities. Time is needed to produce ecological services; it takes time to build agro-biodiversity and time to build soil ecology (Mukute, 2010: 192-200). Lack of spare time was also cited as one of the disincentives to community garden projects in Møller and Seti's (2004) study. For those who had jobs, finding spare time to garden as a community was difficult and those who were retired cited the inconvenience of travelling to other neighbourhoods to garden. They found that group initiatives such as communal gardens were more difficult to launch and that research participants were generally committed to individual projects which they could manage themselves (Møller & Seti, 2004).

The temporal dimension also came into play in terms of reaping rewards for work. Møller and Seti (2004) discovered that some people chose not to grow food gardens because they wanted instant rewards. One research participant argued, "They don't want to work and wait before they eat" (Møller & Seti, 2004: 30). This point is confirmed by Mieta Plaatjies (see Section 6.4.2 *Mobilising Glenconnor*) when she commented on the matter of waiting for the rewards of development projects: "You see the people here... If you start a thing here you get money now. If you start a thing and we will work and work and work maybe three or four years before it gets money. They don't like that". The need to earn money as opposed to spending time and energy on projects as unpaid volunteers is a legitimate concern for people.

7.3.1.8 Success

Another factor identified which can either constrain or enable the learning and practice of rainwater harvesting and food gardening practices is success. With food gardening specifically and development projects in general, when people start seeing results and successes this can spur people on in their practices and spark interest within communities. On the other hand, if people do not see results they can become discouraged and lose interest.

With reference to the rainwater harvesting pilot programme, Umhlaba (Section 5.4.4) explained the importance of people seeing success in their practices:

You know there's nothing like a successful gardens to generate interest and people to see hey this actually works. It's worked well ... putting the effort into it. Because look they got 40 people in the village who, you know, they've got food, their greens are ... they're whatever... it's like working for them, so to replicate it. Whereas if half of them fail, from the outside, what are people going to see? They'll go 'Ahh you know 50% chance of making this work'.

This was confirmed by Tim Wigley from Earth Harmony Innovators (Section 5.4.5): "I think what encourages it [learning] is when people see the results. People have got something that is really special, others see it and they can see it's different and that it's really working and they start asking questions". Wigley explained further the positive response of workshop participants when they saw results:

They also observed that having plentiful fresh vegetables and fruit not only saved money but also made them a lot healthier. We got a lot of feedback that we don't go to the clinic so often anymore and it releases cash that was taken up buying food and now a lot of the food comes from the garden so cash was free for other things. Having healthy food really changed their whole outlook.

A BRC report (2005a) also confirmed that people were encouraged and proud of their successful gardens: "Members believe that the project is bringing change to their lives in that they can see that in winter they are able to plant and have vegetables, which they could not do before. The pride of having enough food was also expressed".

Success was also identified as an important factor in people learning and practising food gardening and rainwater harvesting in the Sundays River Valley. When asked why some projects work Urban Harvest (Section 6.3.3) explained: "When they see the results is when they carry on doing what they were taught". On the other hand, when people do not see the fruits of their efforts, they can become fatigued and discouraged as Khanyisa (Section 6.3.2) explained: "Secondly you know it's difficult to change policy of the government so it takes time and it is difficult so the people end up being tired without achieving".

7.3.1.9 Follow-up support

Intensive follow-up support and evaluation of rainwater harvesting and food gardening training programmes was also identified as one of the key mediating processes for effective learning. If this is carried out it is immensely beneficial for participants to share

challenges and new knowledge. If there is no or very little follow-up support then the potential of practices dissolving increases.

Earth Harmony Innovators (Section 5.4.5) explained the importance of follow-up support to the learning processes of participants:

It's a case of giving the support and the motivation and the encouragement so that those who are doing well are rewarded, those who are not, their problems are dealt with in direct ways and especially around plant health and soil fertility... I think that is why I've found that follow-up makes a huge difference.

Commenting on follow-up visits and monitoring programmes on the rainwater harvesting and food production pilot programme in Cata, Umhlaba (Section 5.4.4) reiterates the importance of follow-up in training:

The maintenance programme I think we should have had more follow-up; it would have been good to have say for three months a visit with people each month and checking with people; Have you drained? Why not? Do you know why you should be? And then probably a six month follow up would have been ideal and then a one year follow-up...How much food are they getting? Is the system working? So that intensive support I think is essential and then that builds up the learning... But I think those cycles of support, that longer term of support is ... in governmental consultancy programmes that's not the way it works. The window is much shorter. And it's a major limitation in my view.

As testament to the lack of funds for follow-up support, Bolekwa Ntusi (Section 5.5.3) confirmed the lack of follow-up for this programme: "...And after they installed the tanks they came to see if they were working but then they never came again".

Lack of consistent follow-up support was also reported in the food gardening workshops carried out with participants from Glenconnor. Addressing the issue of follow-up visits Urban Harvest commented: "I went to the community twice in two years ... because this was not a priority for Khanyisa. They said they would offer the support and make sure that the programmes were being implemented, due to the fact that they had a field worker working in that area". Elizabeth Flip (Section 6.4.1) confirmed the lack of follow-up support: "She teach us to plant those [seeds] and she will come back and come see how far we go in our own gardens. That lady said she would be back to see how we plant those seedlings and to see how did it go but she didn't come".

Umthathi described their follow-up support strategy:

Ja actually we extended beyond one month bos [because] we realised that when you go back after one month it's too soon, there's nothing you can pick up from productivity. So you need to give it time, so within 8 to 12 weeks then you come back. At least by now you will be able to see. Even the production takes about 6 weeks before you see anything growing.

This finding was confirmed in a similar study as poor support services were cited as one of several factors that prevented the expansion of rainwater harvesting to more homestead gardens (Viljoen et al., 2012). An interview in Cata in 2008 claimed that the Department of Agriculture (DoA) “is good at providing plants and seeds, and fertiliser, but they have no follow up ...” (Viljoen et al., 2012: 71). A tension exists within this mediating factor as donors want their programmes and projects to be sustainable but often lack the funding to support this path.

7.3.1.10 Educational levels

Another mediating factor within the learning of rainwater harvesting and food gardening is levels of education and literacy. Rainwater harvesting and food gardening practices are largely practical so educational levels are not a major concern except where occasional maths and language literacy skills are required. As discussed previously in Chapters Five and Six many older women with lower educational levels practice rainwater harvesting and food gardening activities.

The manager of the Cata irrigation scheme (Cata Agriculture Project) commented on the constraining effects of employing people with low education levels: “Another challenge is that the people we employ do have low educational levels which is a problem because they deal with chemicals and they need the proper math skills” (Int.9C). Low levels of education as a constraining factor to learning water practices was confirmed by Phiri (2012: 100): “The low education levels of most workers in Cata have a negative effect on participation and learning... As a result, this may affect the implementation”. In interviews with both the trainers and participants of the WfF movement and rainwater harvesting pilot programme who worked in Cata, however, this was not flagged as a major problem as workshops were kept practical and participants were encouraged to help each other (Section 7.2).

A more concrete example of where educational levels may have proved problematic specifically to the rainwater harvesting and food gardening programme in Cata was with the monitoring system introduced by the BRC and Earth Harmony Innovators (see Section 5.4.2

and 5.4.5). It was discovered that many people struggled with the instructions due to the monitoring forms being in English (see Section 7.3.1.11) but they also had difficulties with the logic of the actual system and how it was structured:

On 30 August, BRC visited the project to check on progress with regard to harvests and sales. It transpired that understanding of the monitoring forms was at different levels, and that additional training for some members was required (BRC report 2005b).

With reference to this monitoring system Viljoen et al. (2012) argued that people in Cata did not easily take up this system because the village lies outside the ‘skills’ of markets and money. As a result, the monitoring system in most cases “became little more than intensified demands to document seemingly meaningless lists of numbers, dates, figures, measures and activities which were not translated into assets and capabilities” (Viljoen et al., 2012: 72). It can be argued then that the failure of WfF members to understand the monitoring system was not because of their low educational levels but instead because of the decontextualised nature of the business skills that the BRC attempted to transfer to them which lay outside of the participants’ village business context.

Literacy was also raised as only a minor problem to be overcome during training sessions in Glenconnor. According to Urban Harvest (Section 6.3.3) “Some people can’t read and write ... [but] we keep things quite practical and there are other people who can read and write so they help each other”.

In recent studies low levels of education were not seen as a hindrance to the participation in rainwater harvesting and food gardening practices specifically (Viljoen et al., 2012). It was found in fact that little correlation existed between earnings from food gardens and higher education levels. The most successful food gardeners were actually people with the least education (usually older women), with the lowest earnings and who were dependent on state grants (Viljoen et al., 2012). Seventy per cent of successful food gardeners using rainwater harvesting in rural and peri-urban areas in South Africa were less formally educated older women (Viljoen et al., 2012: 71). This makes sense if one understands that successful food gardeners generally have limited education and limited financial means and are therefore less likely to enter the labour market so rely on producing their own food. This also explains the negative association held by some people of food gardens with poverty (see Section 7.3.5 and 7.3.9). Viljoen et al. (2012) argued that it is the complex of the gender and age profile of households in many rural villages (with many of them being headed by older females) as well

as the factors mentioned above that determine who practises rainwater harvesting and food gardening. Education in these villages is also usually seen as an exit strategy for leaving rural life in order to enter urban economies (Viljoen et al., 2012). There is no investment in formal education that works towards rural productivity which forms a counter argument to the government call for formal education in rural areas to focus on practical, rural-oriented education (Viljoen et al., 2012).

7.3.1.11 Language

Linked to educational levels and literacy is the mediating factor of language. The language used during rainwater harvesting and food gardening workshops and the language used in learning resources such as booklets and manuals has the ability to engage or alienate people from the learning of practices.

In his study of participation in water management practices in Cata, Phiri (2012) identified language as a mechanism influencing participation and learning. He argued that the “use of English as the mode of facilitation hampers participation as most workers cannot read and write in English and this inhibits understanding and is a barrier to participation (a process of learning)” (Phiri, 2012: 78). During one of his interviews with a WfF member, Phiri (2012) discovered some of the problems people were having with the monitoring system (see Section 5.4.5). One of his research participants explained:

As the Water for Food group, we have an assessment form for performance monitoring that each member should fill in information like, varieties and number of seedlings received, how many have germinated after planting and so on. But not many members use the form because they cannot read or write as it is written in English (S4). (Phiri, 2012: 79)

This was confirmed in a BRC report (2005b): “On 30 August, BRC visited the project to check on progress with regard to harvests and sales. It transpired that understanding of the monitoring forms was at different levels, and that additional training for some members was required”.

Sensitive to issues around language barriers to learning, Kouga Urban Harvest (Section 6.3.3) worked with Afrikaans and Xhosa translators depending on where they were conducting training. Umthathi trainers were mostly isiXhosa speakers and worked in Xhosa communities so during training workshops language was not a problem. Many of the training materials they used were in English however, making it difficult for their isiXhosa-

speaking participants to follow. They expressed the need for English training materials to be translated into isiXhosa: “But the material is in English, we are working on getting those translated. It needs to be in isiXhosa but it demands quite a lot of time translating from English to Xhosa” (Umthathi trainer 1).

In his study of commercial beekeeping practices in South Africa, Masara (2011) also found that Xhosa-speaking beekeepers were hindered by teaching and learning materials that were in English. Masara (2011:80) asserted that “in learning commercial beekeeping the relevance of teaching and learning materials in the local language must not be underestimated as a mediation tool as beekeeping practices have a number of socio-culturally entrenched tensions and contradictions”. Dalvit, Murray and Terzoli (2009) noted the importance of languages as a mediating tool for learning and teaching. They argued that learning materials produced in local languages were more culturally appropriate due to their linguistic and cultural understanding of context.

7.3.1.12 Generational knowledge sharing

Through interviews during phase one of the data collection phase as well as during phase two of the piloting of the QBLR (Chapter Eight) it was noted by research participants and trainers alike that not only did older generations share their knowledge with younger generations but sometimes the older generations relied on the younger generations for help in activities such as reading. Generational sharing of knowledge thus mediated the learning of rainwater harvesting and food gardening practices.

Linked to the problem of literacy, when asked how a written resource could be made more accessible to the illiterate or visually impaired, one focus group participant in Cata responded: “We can also ask those who can read, especially children, to read to them. You can pick a specific topic in the booklet and ask your grandchild/child to read out on that topic” (FG2C).

As a roundabout solution to illiteracy among the older generations and to address the barrier of the English language, the Umthathi trainers explained that they worked with all levels of education and literacy and relied on those who could read to help those that could not. For example, many school-going children in households were able to read and they often aided the older, sometimes illiterate members of their families:

We have different people who are able to write. In terms of the criteria we take everybody... We take everybody, but we encourage because we issue the reading material, we give it to them irrespective if they can read or not because there are kids at home who do that for their grannies and all that so by then you get someone who didn't train directly to do that for a person who was part of the training (Umthathi trainer 1).

7.3.2 Funding

Through analysis it became clear that issues around funding were a major mediating factor shaping participants' rainwater harvesting and food gardening practices and learning. Lack of funding for follow-up support hindered the potential for further learning around these practices. In addition, dependency on funding, wanting to be recognised as an official group to gain financial support, attitudes of entitlement and issues around not receiving funding because a community appeared 'too successful' were some of the factors identified.

7.3.2.1 Lack of funding for follow-up support and evaluation

In interviews with both Umhlaba (Section 5.4.4) and Earth Harmony Innovators (Section 5.4.5) it was clear that lack of funding for follow-up support was a major constraint to the potential and success for individuals who participated in rainwater harvesting and food gardening workshops. Tim Wigley from Earth Harmony Innovators confirmed that follow-up support was essential to see what people were struggling with and why, and then to be able to encourage them:

I think that is why I've found that follow-up makes a huge difference... In some communities there has been follow-up built in, it's quite rare because most NGOs just provide training and that's it... and without the encouragement of seeing how its working and the impact it's going to have they might abandon the practice. So without the encouragement to apply it, people will slowly slide backwards and just end up the way they were.

With reference to the WfF garden programme in Cata, the BRC reports indicated that long term and committed follow-up visits were carried out:

Participants were left to make trenches in their gardens. A week's visit to Cullinan in Pretoria, to see related projects, was planned as a follow-up to the training... BRC visited the families on 21 April, 18 and 27 May, as well as on 15 June (BRC report 2004a).

BRC report 2004b: *BRC met with families involved in the Water for Food programme on 15 July in order to check on progress with regard to planting seeds brought from Pretoria and the digging of trenches and furrows.*

BRC visited the project on 25 February to gather information on the harvests and to recruit new members... On 24 March we supplied inputs and assessed how far the members were in the preparation of additional trenches... On 29 April, an organisational meeting was held ... A meeting was held with the project members on 16 May to review the project, to obtain their vision for the project and to check on general progress (BRC report 2005a).

This long term intensive follow-up support continued until the end of 2007 when the following was decided:

[The project and its members] had graduated from the 'Water for Food' project. In the light of this, BRC took a decision to suspend its proactive involvement in the project with immediate effect. During the first quarter of 2008, BRC intends to limit its involvement to monitoring levels of activity sustained without BRC support (BRC report 2007b).

This was confirmed by Bolekwa Ntusi (Section 5.5.3): "As a project we no longer have workshops by BRC. We were told this last year and BRC said 'Ja now we are going to let you stand on your feet and we are not going to support you anymore'".

It was also found that many projects that were not well funded usually did not include an evaluation component which was a hindrance to further learning and training because trainers would not know what was useful or effective or what people struggled with and why. Projects such as the rainwater harvesting and food production pilot programme implemented in Cata needed to be evaluated for factors such as food in the household, hunger, food availability, expanding agriculture and uptake by neighbours. Umhlaba argued this point:

If you implement programmes and there isn't some kind of monitoring and follow up, you don't know if it's justified or not. Was it a total waste of R40 million or not? Did it help people or not? Who knows? ... Monitoring and evaluation is fundamental because you've got no basis for knowing whether you've made a difference, whether your investment is thrown in the wind, burnt in the fire or actually yielded something really useful.

Without the funding to monitor and provide follow-up support over a course of several months to a few years, the time required to allow for this engagement is lost. In his study of expansive learning in sustainable agriculture workplaces, Mukute (2010) also found that insufficient funds did not allow enough time for learners to grasp new concepts and practices. He argued that, "this thin spreading of resources is intended to allow budgets to cover as many people as possible but the downside is that they do not gain adequate skills and knowledge: there is a tension between quality and quantity" (Mukute, 2010: 208).

Addressing the lack of funding for continued support of garden projects in Glenconnor, Urban Harvest (Section 6.3.3) argued “there was definitely no funding in the community to ensure that they get any support for the gardens”. In Section 6.4.1 (*Sharing the knowledge*) Elizabeth Flip confirmed this.

7.3.2.2 Dependency on funding

Another constraining factor surfaced during interviews with trainers, facilitators, NGO workers and consultants was the issue of communities becoming dependent on donor funds in order to continue their practices or people forming groups with the sole motive of gaining financial or material resources. Earth Harmony (Section 5.4.5) considered the problem of dependency on funding:

A dramatic example of how disempowering funding can be can be found in community gardens and the way so few survive beyond the funding stage... The motive for the community gardens I discovered wasn't to produce food, it was to get support and to get funding... If you've got a cooperative or a group you can get the government to fund, or some funder to fund it. So that's actually where the motive starts but then you'll also get people that get wise to it, everyone wants a slice of the pie and everyone is struggling for control of resources coming into the village. Its power and control over resources and often those resources are siphoned off... [Gaining funding] becomes the political agenda of people who have the power in the village and people won't go against it. Often 'development' is promoted by a few who see an opportunity for personal gain or prestige. There might be a lot of people who can see that the project will not benefit the community or might even bring more harm than good but they will not speak out.

Umhlaba explained the difference between NGOs who see their role either as facilitators or donors. According to them, organisations with a facilitatory approach, gave people the chance to take up opportunities and initiate projects themselves with the resources available to them as opposed to providing everything for them as donors. Denison (Section 5.4.4) argued that organisations who saw their role as facilitators worked towards ongoing support and independence and encouraged “people to take up opportunities themselves and to use the resources they've got”. Viljoen et al. (2012) similarly argued the support that governmental departments offered through development and community projects may be responsible for fostering a culture of dependency.

Khanyisa (Section 6.3.2) explained that sometimes communities did not wish to be self-reliant. Khanyisa's approach was to capacitate communities and it therefore put structures in place in order to allow communities to act independently:

Then there is the dependency thing. By establishing those movements, rural movements, we want to decentralise power. We thought that at some time the NGO will die naturally and then the movements will take over. Because some of the funders are not willing to fund the NGO. They want to give to the communities directly so at the end of the day and during that time ... the people are not really keen to be self-reliant. In fact they do not have that alternative of being self-reliant. Seemingly we'll support them forever. But there are plans in that regard from here at Khanyisa. We have a three year strategic plan. We are in the second year. By the third year we have a clear exit plan.

A fine line exists therefore between NGOs and government departments providing enough support to implement programmes and providing too much support which weakens the agency of individuals and groups and creates 'a culture of dependency'. Viljoen et al (2012: 123) argued that the presence of these government departments may be both "directing local forms of development, and equally explaining local levels of failure".

7.3.2.3 Official registration as a (developmental) group

Individuals wishing to launch developmental activities in communities usually have to form groups and be officially recognised as such in order to qualify for funding from donors. As was noted before (see Section 5.4.3) the Cata WfF programme was initially funded by the Border Rural Committee (BRC) and was set up to run on its own. It currently receives no financial support. The reality of the WfF as expressed by WfF members however is that although much effort was made to shape the WfF as a self-supporting group they were seeking funding in order to continue their activities. The need for continued funding and support is echoed in the voices of research participants.

And that possibility about getting outside support. There were visitors who came last year who promised to assist us financially. We already have our own bank account. And then maybe we don't know why the meeting was not called, the person who promised to give financial support. And then Agriculture ... there were rumours that they could help (Bolekwa Ntusi Section 5.5.3).

Efforts were made however to stand on their own. As noted in Section 5.5.4 (*WfF competition and funding*) the Cata WfF group won money from a nation-wide community garden competition in 2012 and sought to be officially recognised as a development group in order to

receive the prize money. With this money they hoped to become independent from NGO support.

One of the motivations in forming groups in Glenconnor was to receive funding as Mieta Plaatjies (Section 6.4.2) explained:

I try to encourage women. For example I know catering and decorating. It's a lot of money you understand. But if you can get registered. To get funding for that tea you must get five women or five people. You can't even say just women, you can get him. But now we still struggle in that cause you can't get funding just individuals. You must be a group of five, but I can't do that on my own...

7.3.2.4 “Too much success”

Another issue linked to funding was the fact that communities who were deemed “too successful” or seen as having achieved their goals in terms of food production generally did not receive funding or funding was discontinued. Earth Harmony Innovators (Section 5.4.5) explained:

This is a typical pattern with projects. They get bigger and bigger as long as there is funding and when the funding cycle stops so does the project. What started off as a really productive garden was diverted into a means of raising funds. When this is your focus you cannot be successful as you need to show that you need help. The government and NGOs help poor and starving people so you must not become too productive.

7.3.2.5 Attitudes of entitlement and reliance on handouts

Another mediating factor that surfaced was the attitude of entitlement or expectations for government handouts by some communities and individuals. Although not the outlook of all, this was confirmed in the voices of trainers as well as research participants from both case studies.

Referring to her broken reservoir, Sisiwe Khiba (Section 5.5.4 (*Problems with reservoir*)) expressed the desire for compensation from the Department of Water Affairs: “Even though I reported that the reservoir is leaking I was never compensated by tanks. I hoped they will give us these tanks but it never happened”. Referring to a community that is not dependent on government handouts, Earth Harmony (Section 5.4.5) commented: “And it's quite rare in South Africa because there's so much of this entitlement and funding and wanting to get stuff”.

When asked about broken tanks and who was responsible for fixing and maintaining them Mieta Plaatjies (Section 6.4.2) referred to the municipality: “No, if he [Cacadu] come today and do something Cacadu don’t want to come back to repair”. Contradictions exist between the ‘do-it-yourself’ or ‘pull-yourself-out-of-poverty’ development discourse espoused by some primary research participants and the attitude that local government should take full responsibility for certain services. A ward counsellor in the Sundays River Valley (SRV) municipality commented further on the lack of self-sustaining practices such as food gardening as a result of a culture of benefits:

I think it’s because we have a culture of benefits, a culture where people are not used to doing things themselves, improving their own lives. And then with these projects everybody’s intentions are great and everybody is on board and then it fizzles out after a while (Int.9G).

In Section 6.4.4 (*A community driver*) the contradiction between entitlement and self-sufficiency was echoed in Evelyn Jackson’s sentiments of disappointment with government not doing their part for people and then community members wanting money for housing rather than a crèche that could have introduced skills and jobs.

7.3.3 Material tools

Analysis of data also showed that broken or absent material tools, finances to own tools and the ownership of tools and practices mediated rainwater harvesting and food gardening practices.

7.3.3.1 Absence of/broken (material) tools

Absent or broken material tools such as the absence of gardening tools and fences or broken tanks and gutters were found to constrain research participant’s rainwater harvesting and food gardening practices in that they were unable to perform or hindered from performing certain activities if (material) tools were broken or absent.

While few complaints existed around plastic rainwater tanks in Cata, Nothemba Languva (Section 5.5.1) and Sisiwe Khiba (Section 5.5.4) either had faulty reservoirs or had difficulty getting water out of them. Umhlaba (Section 5.4.4) confirmed that some reservoirs leaked due to low-cost labour and lack of quality control measures:

The first tanks built generally held water because they were the first ones, because there was quality control and training on them and the idea was that people would

then go and do that by themselves. But about a third to a half of the tanks overall leaked... So either the training wasn't good, or the quality control wasn't good, or materials went missing, we don't know. All we know is that the tanks leaked.

The WfF chairperson explained that the biggest challenges to their rainwater harvesting and food gardening practices were the lack of material tools or having broken tools such as gardening tools or fences to keep livestock out of food gardens:

Ja [Yes] the main challenges are livestock. Some people have no proper fences around their gardens. And pests. And also the tools, some members do not have tools to work on their gardens. Ja those are the challenges that I can think of (Int.8C).

As cited in Section 6.4.1 (*Sharing the knowledge*), the absence of a fence hampered Elizabeth Flip from starting a vegetable garden for herself. Because the WfF group did not provide gardening tools for its members, some members like Nothemba Languva (Section 5.5.1) invested in their own tools. Lack of inputs such as tools, seeds, fertiliser, herbicides and fences were also cited in the Viljoen et al. (2012) and Møller and Seti (2004) studies as hindering the expansion of rainwater harvesting to homestead gardens. One participant argued, "You cannot go around borrowing garden implements" (Møller & Seti, 2004: 30). Pests and stray animals ate vegetables when fences were absent and space constraints were also a problem (Møller & Seti, 2004).

7.3.3.2 Financial constraints

Linked to the absence of material tools were the financial constraints that usually led to this absence. Without the proper funds, rainwater harvesters and food gardeners were unable to buy the materials to maintain their water tanks and food gardens. Evelyn Jackson (Section 6.4.4) explained: "We are very poor to buy poles for the wire and put up the wire". Similarly, Anna Armoed (Section 6.4.3 (*Sharing knowledge: Tanks and gardens*)) from Glenconnor confessed that in her old age she was unable to tend a garden and could not afford to hire help.

Møller and Seti (2004) also cited financial constraints as a hindrance to food gardening in that research participants cited costs of seeds and labour as a problem for those on tight budgets. In their study Viljoen et al. (2012) recommended that even though the use of rainwater harvesting methods for food gardening had positive financial returns, households needed to be supported in order to acquire the necessary infrastructure (gutters, tanks, roofs, etc.) as these tools were generally over and above what households could afford.

7.3.3.3 Meaningful ownership of tools

Linked to access to material tools is the mediating factor of ‘ownership’ of material tools such as rainwater tanks as well as the practice of rainwater harvesting itself. An Umhlaba report argued that it was likely that beneficiaries would turn to NGOs for assistance when maintenance issues arose. Interviewing several of these beneficiaries however shows that they understand that it was their responsibility to maintain their tanks. Commenting on maintaining her cement reservoir, Nothemba Languva (Section 5.5.1) said: “I can’t look any further for help but will fix it myself”. Similarly Bolekwa Ntusi (Section 5.5.3) recalled when her rainwater tanks were installed: “They are not going to prepare a cement base for you, that will be your responsibility and then they will also give you a small gutter that collects water from your roof to your tank. The other gutters around your house is your responsibility.”

Linked to meaningful ownership of rainwater tanks is the fact that some recipients of tanks involved in the Umhlaba pilot programme wanted more tanks collecting water from their roofs and not the ground for the purpose of using the water for drinking and cooking as opposed to gardening (Denison, 2010). Umhlaba (Section 5.4.4) explained:

...the water affairs subsidy for resource poor farmers is intended for food production. So the idea was to maximise the available water for food production which meant that the emphasis was on quantity and not quality. But people’s priorities are different from Water Affairs’ priority. And people’s priorities was that they rather wanted clean water close by so Water Affairs said ... and in fact we just we started responding to householders’ needs and then we just dealt with Water Affairs afterwards because otherwise people are going to pull up the tanks and put it on the roof anyway. You know it’s their tanks at the end of the day.

Some people thus prioritised clean water over quantity of water. Many people filled their three tanks in the ground with potable water instead of letting them collect ground water. This illustrated the tension between the object of the Department of Water Affairs (DWA) of providing water quantity while benefactors of the tanks wanted water quality. The constraints and enablements of these material tools can be related to Hasan’s (2012) concept of *concrete mediation* (Section 3.3.2) where material tools alter the structure of human physical labour and change the nature of the human environment.

7.3.4 Seasonality and agricultural activities

Another factor linked to time that shaped rainwater harvesting and food gardening practices was the seasons and the agricultural practices that rely on these. Before research participants in the WfF programme had rainwater tanks or were taught other rainwater harvesting

methods, the seasons would determine when they planted and harvested. Once they adopted the WfF methods of soil moisture retention and rainwater harvesting there were more reports that people could plant and harvest throughout the year. As a BRC report (2004b) stated: “The new members had started digging trenches, but had not yet redirected water to the trenches. Progress has been hampered by the fact that soil is very hard and dry during winter”. As discussed in Section 5.4.3 one of the aims of the WfF was to teach people to harvest rainwater in order to be able to grow vegetables all year round. By May 2005 members started seeing results in their all-year round vegetable production: “ Members believe that the project is bringing change to their lives in that they can see that in winter they are able to plant and have vegetables, which they could not do before (BRC report 2005a). Nothemba Languva (Section 5.5.1 *Gardening techniques*) and Bolekwa Ntusi (Section 5.5.3 *Water security and gardening techniques*) explained how the methods learned through the WfF had enabled them to grow vegetables year round.

Mukute (2010: 199) also identified seasonality as a shaping factor in sustainable agricultural practices as he noted:

Rainfall, and therefore water availability are key determinants of agricultural practices in many places. The main reason why people do not grow much in winter in most of southern Africa is that it is generally dry and they would need to water the gardens, which brings new challenges of labour and equipment.

As discussed in Section 6.2.7 (*Water sources in Glenconnor*) residents in Glenconnor and Kleinpoort did not use their harvested rainwater for gardening as good quality water was scarce. They used it only for drinking and cooking. As a result, many of their gardens relied on seasonal rainfall or communal taps. In Section 6.4.4 Evelyn Jackson (*Food security*) explained her failed vegetable crop due to lack of rain. Unfavourable weather conditions such as lack of rain were also cited as constraints to food gardening in Grahamstown by Møller and Seti (2004). Some people complained of both drought and heavy rainfall as one man explained, “We sometimes experience severe droughts here in Grahamstown that badly affect our crops. Sometimes rain damages our plants. It can rain heavily when it rains” (Møller & Seti, 2004: 19). Rainwater harvesting was an important practice to both have water when it is dry and to curb its destructive effects when it rains hard. Material realities such as drought, floods and soil type thus need to be accounted for when trying to understand what shapes people’s practice, decisions, knowledge and learning. These material realities are integral in shaping practices in the particular knowing, decisions and actions that are enacted

in these practices and must therefore be accounted for in order to provide a thorough account of the mediating processes within research participants' practices and learning.

7.3.5 Age

Age was another factor that both constrained and enabled the practice and learning of rainwater harvesting and food gardening practices. Old age enabled food gardening as it was mostly the older generation who were either interested and had the knowledge to garden or gardened out of necessity. In other studies it was found that it was generally the older generations who gardened as they either have the time (because they are retired or unemployed) or because of low income levels and grants where they rely on home food production for food security (Møller & Seti, 2004; Viljoen et al., 2012; Denison, 2010). Old age became a constraint to home food production however when the physical labour required to tend gardens became too strenuous (Møller & Seti, 2004).

The WfF chairperson commented on the need to educate younger generations in gardening techniques as their members were getting older:

We are also facing the challenge of our members getting older now and that is why at the moment we are encouraging the children and young people to work with their parents when they work in their gardens. Like myself here at home, with my children, we all work together on the garden so even when I get older they can take over. They can see that this is important (Int.8C).

Anna Armoed (Section 6.4.3) in Glenconnor explained that hard manual labour is difficult for her which is why she did not tend a garden anymore: "My problem is that I can dig but not hoe. Digging is not a problem, but standing for long I can't do that".

7.3.6 Conflicting economic opportunities

As discussed in the introduction of this section (Section 7.3), some mediating factors were specific to certain case studies. Another mediating factor shaping the learning and practice of rainwater harvesting and food gardening in Cata specifically was that other work opportunities and development programme activities drew WfF participants away from their involvement in the WfF programme. Members of the WfF programme such as Nothemba Languva (Section 5.5.1) and Sisiwe Khiba (Section 5.5.4) were involved in the Community Public Works Programme (CPWP) and worked in the forests clearing wattle and performing maintenance and renovation jobs. Because of other work opportunities, members were busy and did not necessarily have time to meet and discuss WfF matters as

Nothemba stated: “This CPWP could be the reason why we are no longer meeting on a regular basis because this programme is diverse in terms of what is happening”. A BRC report (2007b) confirmed this finding:

This [WfF] project has, for some time, been hampered by flagging levels of commitment and interest on the side of participants...The analysis put forward in the meeting was that the soaring levels of job creation and economic activity in Cata meant that the labour-intensive requirements of the project are now regarded as too onerous and not worth the return. (It should be noted that the census showed that food security has been achieved in Cata.) Also, it was held that the irrigation scheme had captured the local market, leaving the homestead producers high and dry. In a sense, staff argued that Cata had graduated from the ‘water for food’ project.

This also addressed the specific context of Cata as a village that has been earmarked for social development (Section 5.2.5) and illustrated how different development activities interacted within this village. This finding also showed that promoting and training people in rainwater harvesting and food production did not guarantee that people would proceed or continue to develop successful gardens.

7.3.7 Unemployment and migration

Another mediating factor specific to Glenconnor that shaped the practice and learning of rainwater harvesting and food gardening practices was the broader socio-economic challenge of unemployment. Forced to live and work away from home during the week because of unemployment was one of the reasons cited by Elizabeth Flip (Section 6.4.1 *Sharing the knowledge*) for not tending her own food garden. Her boyfriend, Patrick, agreed that living away from home makes growing food near to impossible: “When I am here the time is too short to work and improve things at home over a weekend. You don’t finish things and when you come back later what you have done is damaged and you must start all over again”.

The issue of migration as a livelihood strategy was also found to be an important constraint to the uptake of rainwater harvesting and food gardening practices in another Eastern Cape study. It was found that many impoverished households were increasingly being reshaped by intensified out-migration. In a 2008 survey conducted in Cata it was discovered that 90 per cent of ‘absenteeism’ of household members was due to seasonal labour with these members usually the most productive in the households (Viljoen et al., 2012: 76). The reasons given for migration were usually the need for employment and education. Viljoen et

al. (2012: 79) termed these households as “permanently migrated households of absence”. The implication of this out-migration in rural households for the expansion of rainwater harvesting and food gardening practices was that many of these households, although in need of food security, were unable or unwilling to produce food for the home or for commercial use as they were absent from their homes for long periods of time.

7.3.8 Seasonal work cycles and inconsistency in leadership

Linked to out-migrating for work and specific to the Sundays River Valley context again is the problem of consistent membership in community forums, development groups and civil movements because of the seasonal nature of work in the surrounding citrus industry. During the seasonal period of citrus harvesting, having collective meetings or training workshops is difficult as most of the leadership force is at work. Khanyisa (Section 6.3.2) explained that people’s first responsibility was to provide a livelihood for their families: “Especially during the citrus season people get employment there so who is going to perform the duties of the Makukhanye? You cannot say ‘You can’t go there’. So during that citrus season, there are problems”. These kinds of constraints led to challenges in ensuring that community structures and local leadership that aid in implementing programmes actually work.

7.3.9 Attitudes toward agricultural practices

During the research process it was discovered that attitudes toward agricultural practices such as domestic food gardening shaped how practices were taken up, by who and if this knowledge was valued and passed on to younger generations.

When asked if she passed her gardening knowledge on to her grandchildren Castina Gcilitshama (Section 5.5.2) lamented, “Ja well, children, they refuse to help in anyway, in the garden and collecting water. They don’t want to help at all”. When asked to comment on the younger generation’s seeming disinterested attitude toward agricultural practices, Umhlaba (Section 5.4.4) argued that it was a matter of practising something that brings in income as well as wanting to be part of the ‘modern’ culture:

...you know we’re the modernised era. Everybody’s got TV’s, they’re watching...I mean culture has become quite Americanised in the villages...there’s an Americanisation in the way of values, of aspirations to wealth. I mean what people see in the ANC youth league or ANC, it’s money, it’s wealth, it’s bling... It’s a set of values that go with the modernised contemporary culture that people are exposed to...and agriculture doesn’t really fit into that. And the only time it does, and this is where I’ve seen youth totally active and involved, is where they’re making money,

where their experience, either from observing or from participating in agriculture, is a place where they can make money...and that's perfectly justified you know.

It was also found that youth in Glenconnor were not highly interested in gardening practices; they were also described as 'lazy' (see Section 6.4.3-4). Kouga Urban Harvest (Section 6.3.3) also commented on the negative stigma attached to gardening and agriculture: "There is a negative stigma associated with being a gardener and teaching people the value of it, seeing as it's not regarded as a skill that has value, when really, it is the most important skill to have".

Mukute (2010) also discovered that practices such as organic and sustainable agriculture were stigmatised as backward or less advanced. He commented: "The agriculture profession is not seen as 'mental sport' in South Africa, especially by communities that want to move away from being rural and agrarian to becoming modern and industrialised societies (Mukute, 2010: 213). He argued further that youth often do not pursue studies in agriculture because it is not seen as "cool", "sexy" or modern" (Mukute, 2010: 194). In their study Viljoen et al. (2012) also discovered that youth have very little involvement in rainwater harvesting or food gardening practices. They found that youth awareness of rainwater harvesting or food gardening projects in their villages were minimal as was their involvement in gardening activities. When asked, many young people, especially from the Eastern Cape, argued that they did not see themselves being able to make a living off of agricultural activities and also sought to distance themselves from the negative stereotype of food gardens being associated with poverty and HIV/AIDS (Viljoen et al., 2012).

Møller and Seti (2004) also cited lack of interest in the younger generations as a major disincentive to the uptake of homestead food gardening. One of their research participants asserted, "In the past it was the old people who were keen on growing gardens. Now that they are gone, the current generation has lost interest in gardening..." (Møller & Seti, 2004: 30). Some older community members saw themselves as the custodians of traditional beliefs and practices which include obligations to produce sufficient food for the household as well as to protect and use land wisely (Davison, 1988).

It was often cited that the youth were mainly interested in modern consumer interests as one participant explained, "All they think about is doing drugs and consuming alcohol ... If they want something to eat, they would rather buy it in town" (Møller & Seti, 2004: 32). Another

man said, “When I talk to them trying to encourage them to become active in gardening, they just say gardening is for old people like me” (Møller & Seti, 2004: 32). Møller and Seti (2004: 32) argued that “modern technology, westernisation and education have devalued gardening” and that the general view of some in their study is that a person interested in studying agriculture would not be taken seriously. One man explained, “Because they are educated, they sit around and read newspapers while the garden needs to be worked on” (Møller & Seti, 2004: 32). Some older people even blame the parents of these youth for breaking the generational cycle of not showing interest in gardening themselves, thus failing to pass this knowledge on to their children (Møller & Seti, 2004).

Agricultural practices associated with rural life were generally deemed ‘backward’ by youth and ‘progress’ and being ‘modern’ was understood as being attainable only in urban areas. Youth sentiments about agricultural practices were coupled with negative stereotypes of home food production linked to poverty and AIDS (Section 2.2.4). As a result, youth were generally disinterested in agricultural practices and had their sights set on leaving rural areas in search of work or education. Complex socio-economic and cultural processes like these that drive rural communities must be taken into account in order to understand what mediates the learning and practice of rainwater harvesting and food gardening.

7.3.10 Agricultural policies

Evidence from the two case study sites showed that a clash exists between how permaculture trainers and mainstream government agricultural policies viewed rural development and agriculture. Both Earth Harmony Innovators in Cata (Section 5.4.5) and Kouga Urban Harvest in Glenconnor (Section 6.3.3) were permaculture organisations that promote more natural and sustainable methods of agriculture. This is in contrast to government supported commercial farming practices (Section 2.2.3). The influence of international agricultural biotechnology corporations on national policies was also evident as Earth Harmony explained:

This political manipulation does prevent people from learning from each other and doing what is best for themselves and the health of their land. This is a deliberate strategy to keep people locked in a system to keep buying chemicals and seeds and stuff and saying that’s the only way to go and even getting our government to promote it. This is what we’re up against. Even agricultural officers see it yet they are told to move people from subsistence to commercial so anything that is seen as self - sufficient and you’re producing yourself is old and we have to move into the ‘modern world’ and become commercial farmers... I observed a dramatic example of this in a

village where the government introduced the Massive Food Programme. One of the farmers asked me how they would restore the fertility of their fields after this programme had destroyed their land. I asked that if they knew that using powerful chemicals on their land would destroy it how come they agreed to the programme? His reply was 'The government will do what it wants to do anyway'. He was not prepared to make himself unpopular by speaking out when he saw no chance of changing anything by speaking out.

Regarding the power of multinationals such as the Monsanto Company, a multinational agricultural biotechnology corporation, and the global drive from subsistence to commercial agriculture, Earth Harmony continued:

It's not even really the government. Monsanto has targeted high level bureaucrats to further their interests. I mean I saw it happening, guys being taken off to Argentina and Brazil hyped up with this is the way to go. And it's brilliant because now the government is paying all these input costs to Monsanto and their subsidiary companies.

International and national agricultural policies and ideologies being aggressively advanced down to the local level, were rules, in CHAT language, that shaped or mediated the practice and learning of rainwater harvesting and food gardening in the Eastern Cape. Mukute (2010: 209) also identified agricultural and educational policies as factors that shaped sustainable agricultural practices and learning and argued that historically, these policies have generally constrained sustainable agricultural practices.

Interviews with Umthathi trainers also revealed this clash between permaculture methodology and the national government path of agricultural development which supported commercial farming methods and the use of genetically modified organisms (GMOs) (Section 2.2.4). An Umthathi trainer raised two important issues. The first was the Department of Agriculture's (DoA) representatives entering communities and disrupting the work of NGOs that promote sustainable permaculture methods. The second was that certain government departments and multinationals have resources, either in the form of materials or funds, which they offer communities in order for them to adopt government agricultural practices.

...there are groups like in the communities we are training, there are [Department of] Agricultural gardens. So when they saw that we started a group there and the garden is established. And they joined that group and told them that they give them things so they changed from our system to their system. We are telling people to not do intercropping but permaculture so the [Department of] Agricultural people said that intercropping is dirty so they said choose that because they are going to give them

something. So you find that when you do the monitoring they go back to the old strategy of doing gardening mono-cropping (Umthathi trainer 6).

Linked to the clash between government agricultural policies and sustainable rural development and agriculture was the use of genetically modified (GM) seeds. When asked what sustainable rural development looked like to them, Khanyisa (Section 6.3.2) argued that food sovereignty and sustainable rural development went hand in hand:

So to us sustainable rural development means away with GMOs [Genetically Modified Organisms]. So in terms of TCOE funders, we have funders that support organic farming. Organic farming is coming with the use of other alternatives if we take out GMOs. So that's sustainable rural development to us.

At the heart of issues concerning food security, the Trust for Community Outreach and Education (TCOE) (Section 6.3.2) placed food sovereignty at the centre of its interventions (TCOE, 2010:9). The TCOE thus worked in partnership with organisations such as the African Centre for Biosafety (ACB) who encouraged seed sovereignty and defined it as “the ability of producers to make socially and ecologically sustainable decisions about what and how to produce” (ACB, 2012: 4). Addressing contradictory agricultural ideologies, agendas and methods Viljoen et al. (2012: 71) argued that the Department of Agriculture (DoA) drew on “agricultural expert knowledge systems approaches” which relied on assumptions of farming, production and skills associated with ‘modernist’ farming and commercialisation and market production. Viljoen et al. (2012: 71) saw these as encouraging a “culture of dependency” as very little skills transfer took place because people did not understand and take up the informal education and skills training they received.

A clash existed therefore between mainstream agricultural policy and alternative agricultural approaches and in understandings of what was meant by concepts such as ‘sustainable agriculture’ and ‘rural development’. Referring to these contradictory agendas Viljoen et al. (2012: 136) argued:

the operations of the different local institutions are at times based on different assumptions and meanings... Therefore ... there is a need to track, account for, and explore the similarities and differences, and the agreements and disagreements that reside in these differing institutions and their discourses and practices.

These conflicting approaches to agriculture were an example of implicit mediation (Section 3.3.1) where implicit mediating processes were understood as not being “the object of conscious reflection” (Wertsch, 2007: 184). These conflicting agricultural schools of thought are an example of Wertsch’s (1998) third claim of mediated action in the way that implicit

mediational tools may have an effect on action that the agent neither foresees nor wants (see Section 3.7.1).

7.3.11 Private versus public land

One of the primary mediating factors that constrained people's rainwater harvesting and food gardening practices specifically in Glenconnor was access to land and formal housing. As discussed in Sections 6.2.7 residents in Glenconnor living on private land were not entitled to water tanks from the municipality, stand pipes or Reconstruction and Development Programme (RDP) houses. Without houses that can support gutter structures, people were unable to harvest rainwater from roofs with tanks.

Elizabeth Flip (Section 6.4.1) explained that private church property such as what the shack dwellers live on in Glenconnor did not qualify for municipal taps or rainwater tanks because they did not live on municipal land: "But then Cacadu put some taps in for the people... Every house has a tap, but not the shacks. I think Cacadu didn't give to the shacks because we stay on private land, the church ground. So people from there we didn't get. It's only the railway houses." Illustrating the importance of the link between access to water and access to land, Evelyn Jackson Section 6.4.4 commented on relying on water from a neighbouring farm: "After a year or two one farmer bought that land where the pump was installed that meant now again we don't have water...". Residents also sought communal land for the purpose of starting community projects such as cooperative nurseries but were hindered because of lack of land and water as Mieta Plaatjies (Section 6.4.2) explained: "There is community land, but the municipality is not clear about what is ours".

Tied to access to land were water and electricity delivery issues in the area (Section 6.2.7).

Discussing the problem of water, a municipal councillor argued:

Kleinpoort and Glenconnor they were actually never, when we took them over they are actually not recognised as towns... That is a problem in itself but we need to deal with that. So really the municipality shouldn't provide any services to them because they are not legally allowed to get those, but you cannot take their water and their sewage. It's a mess! So now water is a problem for them, we seem to be trying to sort that out. Kleinpoort is the problem in terms of water because there is no infrastructure and for the municipality or for any municipality to put proper infrastructure in there it's going to cost millions. And I mean where's the money going to come from (Int.9G)?

In this case the lack of private land has stood as a barrier to people receiving certain municipal services. In other studies it has been shown that insecure land tenure rights have hindered smallholder farmers from investing in their land and thus in rainwater harvesting technologies. In a case study in the Free State for example, a group of women using in-field rainwater harvesting methods and wanting to expand their food production were hindered by lack of documentation showing that land given to them by a local headman was indeed theirs (Viljoen et al., 2012: 121).

7.3.12 Inequality and service delivery along racial lines

Linked to the issues of access to land, service delivery still ran along unofficial racial lines in the Sundays River Valley (SRV). This vestige of South Africa's apartheid legacy permeated pressures between the haves and the have-nots and was an example of how an implicit mediating tool such as race relations affects actions and practice (see Section 3.7.1). Tensions remained around the use of water and who had access to services such as water and electricity. This shapes the learning and practice of rainwater harvesting and food gardening as it determined who was seen to qualify for certain services such as rainwater tanks, land, housing and other forms of infrastructure.

The municipal councillor interviewed for this study commented on this fact:

And then you go along the racial lines again. They are not getting as good services as the white people in town. It's realities that we live in and that's the problem. But then you also have the people that's got the biggest mouth, but they are also the biggest rate payers so how do you balance and keep everybody happy and provide the same service? And when the town's water is finished, we might sit without water for a day but the people in Baarsig, that's a coloured area, and Mobida [a black area], will sit without water for three, four, five days. The further away from the hub the worse it gets... And clean drinking water. I mean we're going against our constitution. Everybody should have access to clean safe, drinking water and we're not complying with that (Int.9G).

Highlighting the disparity between wealthy white farmers and poorer people living in the town Evelyn Jackson (Section 6.4.4) commented:

Sometimes white people come with big trucks here and take our water that is what we not happy about. We fight with them... Farmers had water and we did not... We stole water from close farms because the water we had access to was very dirty.

Commenting on inequality of water allocation in the Sundays River Valley area Khanyisa (Section 6.3.2) argued:

That is where we are struggling. When we talk about land reform and rural development there is also to be included water reform. That's why you find our black emerging farmers, because there are water boards, I mentioned the case of Kouga, the white commercial farmers are using all the water boards which makes it difficult for these black emerging farmers cause they have to sometimes pay a large amount and most of the time the water is closed. So how are they going to produce?

Service delivery still ran along unofficial racial lines in these areas and as the ward councillor mentioned above, the further people lived from the main towns such as Kirkwood, the longer it took to fix water shortages or get dry toilet systems serviced. Historical injustices such as the apartheid system can therefore be understood within Wertsch's (1998) fourth claim of mediated action which states that mediated action is historically situated while his fifth claim states that mediation both empowers and constrains action. This could be seen playing out in the lives of research participants as South Africa's racialised past still determines which groups of people qualify for services such as water, sanitation, land, housing, health and education

7.3.13 Failure to engage with existing knowledge networks

Although not directly related to household rainwater harvesting and food production another mediating process impacting on the learning and practice of agricultural methods was the failure of certain projects to take advantage of existing knowledge networks. Referring specifically to the smallholder irrigation scheme in Cata, Umhlaba (Section 5.4.4) commented that the BRC failed to consult the large existing body of knowledge and research around the challenges and successes of irrigation schemes in South Africa:

They didn't look at the guidelines that we had developed... which are practical and useful ... all of the mistakes that have been made the last 30 years which the whole research was about – to say hang on, this is what seems to work and this is what doesn't work.

Relevant knowledge networks existed that communities and projects could draw upon but sometimes this knowledge was not consulted due to lack of interest or unawareness of its existence. As Burt and Berold (2012) argued, existing knowledge needs to be mediated by an actual person and must address the contexts in which it is used. Lack of access to information was also cited as a problem by Møller and Seti (2004) in their food security study in Grahamstown.

7.3.14 Summative perspective: Implicit and explicit mediating processes that shape rainwater harvesting and food gardening practices

The above findings show that numerous and complex social, cultural, historical, economic, political and ecological dynamics mediated the learning and practice of rainwater harvesting and food gardening. These different mediating processes include concerns around training, challenges around funding, material tools, seasonal factors that impact upon practices, age, conflicting economic opportunities, unemployment and migration, seasonal work cycles, attitudes toward agricultural practices, agricultural policies, matters around land, issues of inequality and service delivery and the impact of existing knowledge networks.

Many of these mediating processes are implicit in that they occur in the discourses and practices embedded in the everyday lives of the research participants. These are found in the form of the larger economic and political structures that cause unemployment (Section 5.3.3 and 6.2.3), for example, or the social structures that shape the dynamics of power and trust in communities (Section 7.3.1.6). Wertsch (2007: 184) reiterated that implicit mediating processes were “not the object of conscious reflection and not externally or intentionally introduced”. The social worlds of Cata and Glenconnor thus implicitly shaped these practices through psychological tools such as language, signs and socio-cultural institutions.

The contextuality of some of these mediating processes was also important to bear in mind. Some were specific to a certain contexts as, for example, in the case with seasonal work cycles in the Sundays River Valley (Section 7.3.8) or conflicting economic opportunities in a community such as Cata with many development programmes on the go (Section 7.3.6). What is important in surfacing these mediating processes is to understand how they mediate the learning and practice of rainwater harvesting and food gardening practices by either constraining and/or enabling them.

7.4 Conclusion: Rainwater harvesting and food gardening practices and learning

Chapter Seven has presented data to answer four main questions aimed at guiding an exploration of the learning and mediating processes within female rainwater harvesting and food gardening practices. These included: Why are they learning? How and what are they learning? What are the prominent mediating processes shaping their learning? The first section (7.1) considered why female rainwater harvesters and food gardeners were involved

in these practices. It was found that they undertake these practices for water security in terms of quantity and quality, to have water closer to their locations of use and to save time usually spent on collecting water from rivers or communal taps. In terms of food security, women grew food gardens with social, economic and intrinsic motives.

The second section (7.2) presented data as to how rural women were learning their rainwater harvesting and food gardening practices. It was found that they learn through various learning processes, both formal and informal. These included learning through observing, from experienced others, from the group, from trainers, through mediating tools and through networking. The various rainwater harvesting and gardening techniques that the women learned were also presented in this section. The third section (7.3) highlighted the different implicit and explicit mediating factors that either constrain or enable the practice and learning of rainwater harvesting and food gardening. Table 7.2 below summarises the main findings that answer the five sub-questions: Who is learning and practising rainwater harvesting and food gardening? Why do women in Cata and Glenconnor learn? How do they learn these practices? What do they learn? And what are the mediating processes that shape these practices? These questions were used to guide data presented in Chapters Five, Six and Seven.

Table 7.2: Synthesis of the main findings of how the learning and practice of rainwater harvesting and food gardening practices are mediated (adapted from Mukute, 2010: 215 and Engeström, 2001: 138)

Sub- topic	Main conclusions and value to the study
History of rainwater harvesting practices <i>(History)</i> (Chapters Five and Six)	The different but related histories of rainwater harvesting and food gardening practices revealed that these practices were introduced in response to social and ecological risks such as poverty and water and food insecurity.
History of individual case studies <i>(History)</i> (Chapters Five and Six)	The historical background of a case study provides the context in which a practice may be introduced and learned. It also indicates the kind of enablements and constraints that are likely to arise. These may be associated with socio-economic conditions, ecological conditions; water and agricultural policies; societal values and attitudes; or affordances and power relations. Learning and development interventions need to take these into consideration in order to be relevant and effective.

<p>Female rainwater harvesters and food gardeners motivation to learn <i>(Why do they learn?)</i> (Chapter Seven)</p>	<p>Learning of female rainwater harvesters and food gardeners is influenced by both intrinsic and extrinsic factors. Extrinsic factors include the need for water security in terms of both quantity and quality; the need to have water close to their homes to save time and energy; to produce food for themselves, families and neighbours; and to generate food for surplus income. NGOs are also a driving force behind these practices being introduced in these communities. Intrinsic motives included personal and community well-being and health as well as people planting because they grew up planting and say that it is in their blood.</p>
<p>How rainwater harvesters and food gardeners learn <i>(How do they learn?)</i> (Chapter Seven)</p>	<p>Individuals practising rainwater harvesting and food gardening have different ways of learning, through both informal and formal learning processes. Much of their learning has a practical orientation and includes learning through observing and experience. They learn from experienced others within their groups. They learn within their groups and from trainers. They also learn through mediating tools and through networking and teaching others.</p>
<p>Mediating processes that shape the learning and practice of rainwater harvesting and food gardening <i>(Constraining and enabling factors)</i> (Chapter Seven)</p>	<p>Complex and interacting mediating processes shape the learning and practice of rainwater harvesting and food gardening. These include processes around: training; funding; tools; seasonality; age; unemployment and migration; seasonal work cycles; attitudes toward agricultural practices; agricultural policies; private versus public land; inequality and service delivery along racial lines; and failure to engage with existing knowledge networks</p>

From evidence provided in Chapters Five, Six and Seven it was apparent that it was not only cultural-historical factors that influenced learning in rainwater harvesting and food gardening practices but also identity and the personal attributes of individuals as well as social, material and physical factors such as social dynamics within communities, attitudes toward agricultural practices, access to housing, having access to the correct tools, ecology and weather patterns. The implication of surfacing these mediating factors is to bring to the fore the complex social, cultural, historical, political, economic and ecological processes that impact upon how people learn and practise certain activities. These must be taken into consideration when developing learning projects or resources if they are to be appropriate for the contexts and experiences of the communities they wish to engage. When researchers track practices as they unfold within their specific contexts then they will gain a deeper understanding of what drives and motivates people's practices.

Chapter Seven has considered mainly how *implicit* mediating factors shape learning and practice. The following chapter (Chapter Eight) presents the findings from Phase Two of this research study in which an *explicit* mediating tool, the question-based learning resource (QBLR) (Section 1.2 and 1.3), was introduced back into the community out of which it was developed (Cata) and into a new context of a second community (Glennconnor). The purpose of doing this was to explore if and how an explicit mediating learning tool such as the QBLR addresses the experiences of the people from which it was developed and if and how it extends learning within these contexts. The following chapter thus presents data from focus group discussions around the QBLR in both case study sites.

PHASE TWO

CHAPTER EIGHT

THE QUESTION-BASED LEARNING RESOURCE: EXTENDING LEARNING OUT OF AND INTO PRACTICE

8.0 Introduction

The previous chapter presented the explicit and implicit mediating processes inherent in the learning and practice of rainwater harvesting and food gardening and how these enable and/or constrain these practices. Chapter Eight is concerned with addressing the wider WRC research programme's challenge which is that most learning resources used in resource-poor environments do not 'connect' with people's experiences. This chapter thus explicates how mediating tools for rainwater harvesting practices and food gardening might be more effectively constructed. Chapter Eight makes up Phase Two of this study and addresses the second research question:

How can a question-based learning resource extend the learning of practices A) out of a specific context and practice (Cata), and B) into a different context but same practice (Glennconnor)?

In order to answer this question, analysis was guided by three sets of questions:

Phase Two

1. **How** was the resource developed and **why**? What are the **links** between the **context**, **practice** and the **resource**? What is the value of developing a resource out of a context informed by the mediational processes?
2. **How** was it **piloted**? How did people respond? What questions were people interested in and why? What broader discussions developed around these questions? What questions did people not understand?
3. How did it **extend** their **learning**? What questions did it not address? How can it be adjusted for different contexts?

The first part of this chapter describes how the question-based learning resource (QBLR) was developed out of a particular context (Section 8.1). The second part of this chapter explains how the resource was piloted in each of the two sites and the response of focus group participants to particular sections: questions they found interesting, broader discussions around these questions and questions they struggled with (Section 8.2). The third part of the chapter discusses how the QBLR extended learning further in these two contexts by looking at what questions were not asked, what new knowledge was learned as well as how the resource can be adjusted for a different context such as Glenconnor (Section 8.3). As discussed in Section 4.5.4 the data presented in this chapter is based on 14 focus group discussions held in the study sites (seven in each site).

The aim of this chapter is to highlight the relationship between the rainwater harvesting and food gardening practices out of one context (Cata) and how these were used to inform the development of a QBLR which was then fed back into the same context (Cata) as well as into a different context (Glenconnor/Kleinpoort). It thus presents a dialogue between the QBLR, people's practice and their particular contexts.

8.1 Developing the resource in context

The aim of the QBLR is to stand as a tool or knowledge resource that will extend the current way in which learning occurs in communities. It was developed to support ongoing learning in context rather as a stand-alone learning tool as is the case with many mainstream learning resources (Burt & Berold, 2012). The research team thus wanted to see if it would act as a platform for dialogue between research knowledge and local knowledge. Local knowledge here means knowledge held by people living in a particular context as well as specialists who have worked in the area as detailed in Chapters Five, Six and Seven. The purpose of the overall research project was to assess the way in which learning emerges *from, and in relation to context and practice*, potentially providing a new perspective on mediation and social learning processes (see Section 2.4.4 and 3.2). For this project, the existing practice of rainwater harvesting and food gardening using rainwater tanks in Cata Village was used as a case example, background detail of which is contained in Chapter Five and Seven. The resource was developed in response to and in support of this practice.

Power relations in the production of cultural tools

It is vital to consider the relations of power and control embedded in the production of cultural tools and their use such as the QBLR. Wertsch's tenth claim of mediated action (Section 3.7.1) stated that power and authority are inherent mediating tools and argued that "the forces that go into the production of a cultural tool often play a major role in determining how it will be used" (Wertsch in Daniels, 2008: 62). Burt and Berold (2012: 3) found that in general, research knowledge in South Africa "is not presented in a way that is understandable to non-specialists" which points to the hegemonic scientific discourse that speaks above the very audience at which it is aimed. One of the key findings was that learning resources are more likely to be used when developed "*with* people rather than *for* people" (Burt & Berold, 2012: 6). Developing the QBLR *with* people was thus an attempt to shift the power gradient from addressing people's needs (*we know what you need*) to creating a space for the development of opportunities (*let us work together and listen to what you need*). Because of the integral role water plays in local issues such as agriculture, health and basic human rights, developing learning resources in partnership with communities places water issues alongside these concerns. Various stakeholders then have an opportunity to voice their different interests. The acknowledgment of multiple perspectives can potentially create opportunities for social learning processes (Collins et al., 2007; Wals, 2007; Mukute, 2010; Masara, 2010).

Another way power relations come into play through designing a learning resource in this manner is through the very people consulted. The fact that it was developed from the questions people had regarding their own rainwater harvesting and food gardening practices offered the users a certain amount of power but was not without its problems. It was important to consider who was consulted during the development of this learning resource within Cata as well as to consider the power held by individuals who acted as mediators and re-interpreted knowledge for the communities they worked in. Sensitive and knowledgeable mediators were shown to be effective in facilitating the learning of water practices but had to be critical and reflexive about their practice and what power relations were embedded in these relations (Burt & Berold, 2012; Denison et al., 2011c).

Described below is the process of how the QBLR was developed highlighting the **relationship** between the **context**, **practice** and the **learning resource**. Developing the QBLR occurred in six phases: 1) understanding the context (Chapters Five and Six), 2)

developing the draft resource, 3) reviewing the draft resource, 4) translating the resource, 5) review by research participants, and 6) the final re-write.

Phase 1: Understanding context

The first phase of developing the QBLR was to understand how people learn community-based water management practices in their contexts of practice. Charles Phiri's (2012) Masters work comprised the first part of this research phase as he focused on *how* people learn in the context of three water management practices: the Working for Water community of practice which cleared invasive alien vegetation, the Water for Food community of practice which harvested rainwater to grow food gardens and the Cata Agriculture Project which was a smallholder irrigation scheme. The aim at this phase was to determine what knowledge circulated in community based water management practices and how people have learned or are learning these practices. My research added further detail and depth to these earlier insights and the data produced influenced the development and progress of the learning resource booklet.

Phiri's Masters research (2012) showed that learning was most effective when it was incorporated into and supported practices that communities were already involved in, such as rainwater harvesting practices in Cata. Phiri (2012) also found that learning happened mostly through sharing, conversations, and storytelling, rather than through the use of learning resource material. The research team realised that if a knowledge resource was to contribute to the shared space of learning, it would have to be woven into the stories or accounts already being told around this practice (see also Chapters Five, Six and Seven). This was to ensure that it became part of the ongoing conversation of learning already taking place in these communities. His research pointed to the fact that research knowledge needs to be presented in a way that supports the practices that people are already involved in. The introduction of new knowledge through training programmes was important for changes in practice to occur but this 'new knowledge' needed to be carefully linked to existing cultures of practice, knowledge flows and knowledge needs in order for it to hold meaning in these contexts (Phiri, 2012; see also Chapters Five, Six and Seven). For the development of the QBLR resource we interpreted this to mean **knowledge based on research and experience should be developed around questions and choices that have emerged from people's practice.** I

also deepened the analysis of learning and mediation thereof after the start made by Phiri (2012) (see Chapter Seven).

Phase One A of this study raised questions out of or in relation to rainwater harvester's accounts of their practices in order to investigate their relevant knowledge needs and interests (Chapters Five and Six). In order to uncover the questions that rainwater harvesters and food gardeners had of their own practices, interviews and observations were carried out with individuals (Section 4.5). I then constructed rich narrative accounts around these practices from not only primary research participants (as found in Chapters Five and Six) but from other people of interest to the broader project as well.

Phase 2: Developing draft resource

The objective at this phase was to establish the knowledge that rainwater harvesters were *interested in*. We read through the narrative accounts of rainwater harvesting and good gardening practices and looked for questions people were already asking about their practices. With the help of Tim Wigley from Earth Harmony Innovators (Section 5.4.5) questions of practice were identified. The questions that emerged are presented Figure 8.1.

<p>SECTION 1: HARVESTING RAIN WATER Why are rain water tanks so important? (Q1S1) What kind of rain water tank should I buy? (Q2S1) Is it worth spending money on a rain water tank? (Q3S1) How much does a tank cost? (Q4S1) What if I can't afford a rain water tank? (Q5S1) How do I install a rain water tank? (Q6S1) Where is the best place to put a rain water tank to catch water from a roof? (Q7S1) What size tank do I need? (Q8S1) How do I know how much water I have in my tank? (Q9S1) What do I do about overflow from my tank? (Q10S1) How can I harvest ground water? (Q11S1) Can I use a tank to harvest ground water? (Q12S1) How do I build a catch pit? (Q13S1) Using ponds to harvest water: advantages and disadvantages (Q14S1) Reservoirs: advantage and disadvantages (Q15S1) What are the most important things about managing my tank? (Q16S1) What can go wrong with my tank? (Q17S1) How do I maintain my catch pit? (Q18S1) How do I maintain my reservoir? (Q19S1)</p> <p>SECTION 2: FOOD SECURITY AND RAIN WATER HARVESTING How can I use the soil in my garden to collect and store water? (Q1S2) What happens when rain falls on the land? (Q2S2) What methods can I use to harvest water in the soil? (Q3S2) How do I keep the soil in my garden healthy? (Q4S2) How can we involve young people in gardening? (Q5S2) How can we support each other to have water and food all the time? (Q6S2)</p> <p>Appendix: An awareness exercise from Earth Harmony Innovators</p>

Figure 8.1: Questions identified from narrative accounts of rainwater harvesting and food gardening practices. Key: Q1S1= Question 1 Section 1

The questions were refined and formed the different questions responded to by the QBLR. The sections and corresponding questions presented below form the original draft version of the QBLR. The final edited version is discussed in *Phase 6* of this section and can be found in Appendix 1.

Wigley also helped to answer these questions and the research team developed a draft written Question Based Learning Resource booklet (see Figure 8.2 below) that had question and answer sections (see Appendix 8 for draft QBLR booklet).

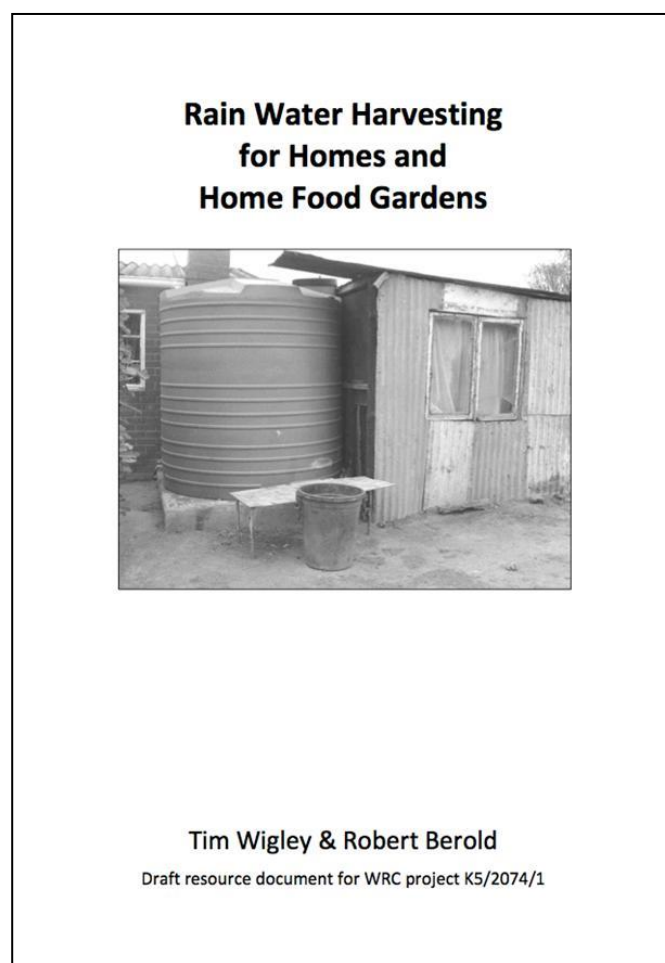



Figure 8.2: Cover page of draft QBLR booklet



Nothemba Languva of Skafu demonstrates the difficulty of drawing water from her underground reservoir

What are the most important things about managing my tank?

Keep the tank clean

It is important to make sure that the water going into the tank is clean. If you are harvesting rain water from your roof, this means making sure your roof and gutters are kept clean.

Bolekwa Ntusi says: "When we were given our tanks we were told they were now our responsibility. They provided us with small ladders so we can go inside the tank and clean it. You need to always monitor the gutters, they are plastic, they don't break, but they bend."


It is also worth making a strainer with fine chicken wire to cover the hole where the gutter

goes into the down pipe. This stops leaves from falling into your tank, also birds and mice.

Keep light and sun off the tank

Make sure the lid of the tank is on properly so that no light gets into the tank. We do this because when sunlight gets in, algae start to grow in the water – this makes the water green and undrinkable. You can plant trees or vines to make shade.

It is best to keep the sun off the whole tank, not just the lid. A fully shaded tank keeps the water fresh, and a shaded tank lasts longer because sunlight slowly destroys plastic. You can see this with old tanks that have been standing in the sun, they turn a whitish colour.



Granadilla plants protect these water tanks from direct sunlight

Figure 8.3: Example of representative page from the draft QBLR

During analysis I further refined the questions in the QBLR into four different categories of questions: (1) systems/deep knowledge, (2) practical/technical, (3) personal well-being/safety, and (4) societal (see Sections 8.2.1.2 and 8.2.2.2)

Phase 3: Review draft learning resource

The third phase of developing this learning tool included a review by the research team as well as by specialists mostly on the reference group of the larger WRC project, practitioners as well as several university students involved in rainwater harvesting research and activities. In their review the research team reflected on questions pertaining to how the QBLR was developed. They asked how the research process and the production of the learning resource could have been carried out more closely, for example, with the writing team visiting the research site in order to gain a fuller understanding of the context as a whole. Questions of context were also raised in terms of the usefulness of the QBLR into other contexts as it was developed in a very specific context. This question was answered when it was piloted in Glenconnor. This will be addressed in Section 8.2.2.2.

Specialists reviewed both the content and style of the QBLR and made suggestions such as needing to focus on deeper socio-economic questions, the need for more illustrations, using a more conversational tone and being clear about the target audience. The research team then reflected on the specialists' comments. Questions raised from this reflection included: Who is your target audience? What do they know? What do they need to know? What type of learning resource will best support communication and learning? A booklet? A poster? A demonstration? A knowledgeable person in the community? How do you foresee the target audience (the community) using the learning resource? How will you establish if the learning resource is used as planned and is there room for improvement and change? The QBLR was then rewritten according to the review by both groups (research and specialists) and the reflections by the research team.

Phase 4: Translating the learning resource

The research team felt that it was imperative that a learning resource be in the same language as the context it was developed out of or applied to (see Section 7.3.1.11) for justification of this). The resource was thus translated into both isiXhosa as it was to be piloted in Cata, a primarily isiXhosa-speaking community, as well as Afrikaans for the Afrikaans-speaking community of Glenconnor (see Section 4.5.4). The research team employed the services of Monde Ntshudu (Section 4.5.2), the isiXhosa translator and focus group discussion facilitator on the project, as he was familiar with the content and as an experienced facilitator could help ensure the text was accessible. Ntshudu commented that certain difficult concepts in the English version would not be a concern as difficult terms would be explained in the vernacular. Ewald Kruger (Section 4.5.2) translated the learning resource into Afrikaans as well as helped with the mediation of the learning resource in Glenconnor as addressed in Section 4.5.4.

Phase 5: Review by research participants

The fifth phase of developing the QBLR involved piloting it in the context from which it was developed (Cata) as well as seeing how it was used and responded to by community members in a different context (Glenconnor). The piloting phase was very important as the team needed to explore how people engaged with the learning resource. The writing team needed to see if it would enhance the way in which learning was taking place in these communities and if it addressed the knowledge networks already operating between people. This piloting

phase was carried out by myself and two research assistants, Monde Ntshudu and Ewald Kruger and is described in detail in Section 8.2.

Phase 6: Final re-write

After the piloting phase, the findings from both sites were interrogated as a research team. The team explored how the learning resource mediated learning by looking at: What questions in the booklet interested people and why and what other questions they had which the booklet did not address. It helped researchers understand how the learning resource mediated learning and how different questions were linked to people's practices and experiences. After reviewing what emerged from the piloting phase, the editors re-wrote the QBLR (see Appendix 1).

8.2 Piloting the learning resource: Cata and Glenconnor/ Kleinpoort

The aim of piloting the QBLR was to observe how participants engaged with it as well as to see how they interacted with each other. The learning resource was not meant to be a perfect product in terms of rainwater harvesting practices but was to be used as a learning and dialogue platform between participants and the facilitators. The learning resource could be considered the first level of dialogue while the focus group discussions were the second level of dialogue. The motive for conducting focus group discussions was to collect data from individuals as members of a group. The piloting process took place in Cata and Glenconnor/Kleinpoort (also see Section 4.5.4).

8.2.1 Cata

Monde and I conducted seven focus group discussions in Cata village from Tuesday 29 October to Friday 2 November, 2012. We recruited focus group participants ourselves by approaching people we had interviewed on previous field visits and who were somewhat familiar with our concentration on rainwater harvesting and food gardening practices. The groups of people we worked with ranged from those who gardened, either had tanks or did not, or who were part of WfF or were not, were middle to old-aged and who were literate and illiterate. My four primary research participants (see Chapter Five) from this village also attended these focus group discussions. On recruiting participants we showed people the booklet (the isiXhosa version) and Monde explained what the focus group discussions would

entail. We handed out the QBLR booklets to people who said they would come and we asked them to read through them at home before attending the focus group discussions.



Figure 8.4: Monde recruiting a participant for a focus group discussion (Cata, November, 2012)

8.2.1.1 Working with the QBLR

Focus group discussions were conducted in isiXhosa with isiXhosa QBLR booklets as all our participants either spoke and/or read in isiXhosa. When participants came to the first focus group discussion it was found that most had not read through the learning resource which supported findings that learning resources are more likely to be used when they are mediated by an actual person (Burt & Berold, 2012). Due to bad weather, the focus group discussions were confined to a room in the Cata Community Hall so no practical demonstrations were carried out. Other than supplying a loose set of questions for focus group discussions and assisting Monde where required, I did not guide Monde's facilitation style. I observed how he worked with the learning resource and how research participants responded to both his style of facilitation as well as the learning resource.



Figure 8.5: Monde facilitating a morning focus group discussion (FG1C) (Cata, November, 2012)

It was suggested by my supervisor that when working with the resource we should leave it up to focus group participants to decide what sections and questions they wanted to discuss. Introducing discussions in this manner allowed us to determine what questions people from Cata were interested in. Examples of some of these guiding discussion questions were: What questions are you interested in and why? Which question would you like to discuss first? What do you remember from the section we just read and why? What section was helpful to you and why? What section did you not understand or had trouble with and why? What have you read in here that you didn't know before? Can you do this at home? (For a detailed list of the kinds of questions we used to loosely guide discussion, see Appendix 15) Depending on the group, Monde would usually ask what question the group wanted to start with. In order to accommodate any illiterate members or members with bad eyesight (common amongst the older focus group participants), he read through all the different questions in Section One for example so everyone knew what questions were there and then asked the group which they would like to focus on. More often than not he would read the particular section chosen, ask participants whether the question was addressed to their satisfaction or not and then discuss the information further.



Figure 8.6: Monde facilitating an afternoon focus group discussion (FG2C) (Cata, November, 2012)

8.2.1.2 Response to QBLR

We knew people were interested in certain questions because we allowed focus group participants to decide for themselves questions and sections they would like to discuss. This provided a good indication of what people were interested in and how the discussions around these questions reflected their experiences around their practices. Piloting the QBLR in Cata was unique as the booklet was developed out of the Cata context from the narrative accounts of many of the individuals who participated in the focus group discussions. Seeing

themselves and their accounts of their tanks and gardens in the booklet elicited great excitement and enthusiasm from some participants.

The first group (FG1C) chose the following questions for discussion:

1. What if I can't afford a rainwater tank? (Question 5 Section 1-Q5S1)
2. Why are rainwater tanks so important? (Q1S1)
3. What do I do about overflow from my tank? (Q10S1)
4. What size tank do I need? (Q8S1)
5. What are the most important things about managing my tank? (Q16S1)
 - Keep the tank clean
 - Keep light and sun off the tank
6. How do I install a rainwater tank? (Q6S1)
7. Can I use a tank to harvest ground water? (Q12S1)
8. How do I maintain my catch pit? (Q18S1)
9. Reservoirs: advantage and disadvantages (Q15S1)
10. How can I use the soil in my garden to collect and store water? (Q1S2)
11. How can we support each other to have water and food all the time? (Q6S2)

The second group (FG2C) chose the following questions for discussion:

1. Is it worth spending money on a rainwater tank? (Q3S1)
2. What if I can't afford a rainwater tank? (Q5S1)
3. Using ponds to harvest water: advantages and disadvantages (Q14S1)
4. Reservoirs: advantage and disadvantages (Q15S1)
5. How can we involve the younger generation in gardening? (Q5S2)
6. What can go wrong with my tank? (Q17S1)
7. How do I keep the soil in my garden healthy? (Q4S2)
8. What happens when rain falls on the land? (Q2S2)
9. What size tank do I need? (Q8S1)
10. Where is the best place to put a rainwater tank to catch water from a roof? (Q7S1)

As noted earlier (Section 8.1 *Phase 2*) I analysed these questions and placed them into different categories. I then tabulated the results of the different categories of interest to each focus group in Cata. Table 8.1 below presents the results of this analysis.

Table 8.1: Different categories of questions focus group participants in Cata were interested in

Focus group	Category question	Category question	Category question	Category question
	Systems/deep knowledge	Practical/ technical	Personal wellbeing/safety	Societal
FG1C	(Q1S2)	(Q5S1), (Q10S1), (Q8S1), (Q16S1), (Q6S1), (Q12S1), (Q18S1), (Q15S1)	(Q1S1)	(Q6S2)
FG2C	(Q4S2), (Q2S2),	(Q5S1), (Q14S1), (Q15S1),(Q17S1), (Q8S1), (Q7S1), (Q3S1)		(Q5S2)

Motives for choosing these questions:

Below is a presentation of the questions participants were interested, how these addressed their situated practices and the broader discussions these questions stimulated. Participants did not always give explicit reasons as to why they chose certain questions for discussion but generally it can be inferred that most of the time it was because these questions focused most specifically on their interests and concerns around their practices. When asked why they chose Q5S1 (What if I can't afford a rainwater tank?) for example, FG1C answered "...as we know now that the weather is unpredictable and we might be facing a drought soon after all these rain. It is sad to be unable to harvest this water and at the same time knowing it will not always be available. That is why we want to know if you can't afford a tank what are other alternatives of harvesting water" (FG1C.p1). Another participant in reference to Q10S1 (What if my tank is overflowing?) and when asked if the discussion in the booklet was a true reflection of their experience, stated that, "...it is the true reflection of what we said. It is exactly the practices that we do when planting or doing work related to the garden" (FG1C.p.3). Linked to the contextuality of the QBLR and the relevance to participants' lives, one participant stated in relation to Q12S1 (Can I use a tank to harvest ground water?) "It is good that we are learning about all kinds of rainwater harvesting techniques. Presently in Cata there is a lot of rain and plenty of water available" (FG1C. p.5). Another commented further, "This is not going to last forever the drought is coming, so it make sense that we

learn these ways of harvesting rainwater so that we use whatever rainwater harvesting tool in our disposal to store water for future use” (FG1C.p.5).

Broader discussions from questions chosen:

Many of these questions also worked as catalysts or a platform around discussions on broader contextual issues in the community.

- Q5S1 (What if I can't afford a rainwater tank?) stimulated a discussion around the issue of **volunteerism** and the **broader challenges of working in groups**. One focus group participant explained:

Volunteering is very difficult; people do not want to do that even though sometimes it helps them... I think many people have an experience of groups not working well and lots of uncertainty in terms of who is going to do what and when and that is why people are reluctant to be members of the groups such as WfF and rather prefer to work alone and losing out from the opportunities and privileges of being a member of a group (FG1C. p. 2).

This same question elicited a discussion around the challenges of working in groups in the second focus group. One participant stated, “People need to be patient because being a member of a group does not automatically guarantee you a tank, one has to be patient” (FG2C.p.7). Others were more optimistic as one member argued, “It is understandable that people do not have money to buy tanks, but with the help of saving together and share at the end of the year then people will be able to buy tanks” (FG2C.p.7).

- Linked to the discussion around working in groups were frequent comments about focus group participants who were not members of WfF who expressed an interest in **joining WfF**. One focus group participant stated, “... I am not a member of WfF but now this information encourages me to be part of WfF” (FG1C. p.3).
- Q16S1 (What are the most important things about managing my tank?) created a platform for participants to talk about the **contextual problems** they faced with their **plastic rainwater tanks and cement reservoirs** (see Section 7.3.3.1). Even though this section did not address the issue of reservoirs, this question led to a discussion around the problems people have in Cata with their cement reservoirs. One participant argued:

There are about four members of the WFF who were given reservoirs. These reservoir are not working at all, my own reservoir is useless for me. It is located right in the middle of property and the fact that it does not have a

proper lid that you can close and lock it remains a threat to my small children as they play on top of it sometimes. So I decided to ask someone to seal it off completely to protect my children. I don't have a reservoir now because of that (FG1C.p.4).

Another participant explained that some of their gutters were too large to fit into the holes of their tanks so they cut bigger ones in their tanks but these holes let in dirt and debris (FG1C.p.3). Another participant has had constant problems with extracting water out of her reservoir and stated, "It is very difficult to get water out from the reservoir..." (FG1C.p.4). These discussions are indicative of the more specific challenges individuals faced in their practices.

- A second discussion around the advantages and disadvantages of reservoirs was prompted by Q15S1 (Reservoirs: advantage and disadvantages) indicating the **specific problems community members experienced with their reservoirs**. Confirming the problems primary research participants such as Nothemba Languva (5.5.1) and Sisiwe Khiba (5.5.4) had with their reservoirs, one person commented, "Most of our reservoirs in Cata are leaking, the problem is that people who built them did not use the right amount of cement; they used less causing it to crack easy" (FG1C.p.5). Another participant suggested, "The best ways to access reservoir water is using a ladder; also you can use a pump, to pump water out of the reservoir" (FG1C.p.5). This same question (Q15S1) elicited the same frustration around broken reservoirs in the second focus group. As one participant stated, "The difficulty with this reservoir is that out of four people benefited from reservoirs, three are not working and I would not mind demolishing it" (FG2C.p.7). Another person added, "The reservoir would be useful if it was in a good condition, I have done everything I can in my power to fix it, buying cement, silicon but nothing works" (FG2C.p.7).
- Q6S2 (How can we support each other to have water and food all the time?) facilitated a discussion around **reciprocity, group dynamics and perseverance**. One participant commented, "In a group it is easy to help one another because you know some day you will receive help from the same person" (FG1C.p.6). On the topic of the challenges of working within a group another participant argued, "In a group you find different people: some work hard (commitment) some are lazy (talk too much) and the later are trouble makers especially when the group is funded. They are destroyers of groups" (FG1C.p.6). In terms of persevering another participant

reasoned, “People must understand that success does not come easy one has to be very patient, so as members of group they should understand that through perseverance, we will see the fruits of our efforts” (FG1C.p.6).

- Q6S2 (How can we support each other to have water and food all the time?) **invited critique** from FG2C. Further on in the section is a comment made by Monde in the booklet **about the future of Cata and the unsustainable nature of development projects in the village**. FG2C did not agree with this comment and argued:

We are happy and agree with all the comments made by us except Monde Ntshudu`s comments on Cata ecotourism programme which are not the true reflections of what is presently happening in Cata. We don`t believe that is true because the tourists keep coming and there are lots of activities (FG2C.p.6).

- A discussion around **parenting, differences between the generations and changes in society** was stimulated by Q5S2 (How can we involve the younger generation in gardening?). The general consensus was that children were disobedient and had no interest in gardening or similar practices. One participant argued, “Our children complain about working on school gardening projects and they don`t want to do the same work at home” (FG2C.p.8). Another commented on different parenting styles, “It really depends on how you bring up your children. Some parents are weak and too soft to their children, some are hard and really push their children, and you cannot teach somebody else`s child. You can only be responsible for your own” (FG2C.p.8).

Remarking on discipline in the home and within the state a participant said:

I think we are living in different times compared to our generation, there is so much different between this generation and our generation. This generation is very disobedient of their parents and the laws of this country makes easy for them to continue with their disrespect (FG2C.p.8).

Observing the effect changes in society and culture have on children, a participant said, “It is very difficult for parents to bring up their children as our children are exposed in many things that distract them from doing good things such as cell phones and social networks”

(FG2C.p.8).

- A discussion around **taking ownership for one`s tank** was prompted by Q17S1 (What can go wrong with my tank?). Remarks made by participants in FG2 focused on taking responsibility for tank installation. People commented that the information under this section made them understand that they should be present when their tanks were being installed. One participant commented, “It is very important to be on watch

and present when someone installs your tank” (FG2C.p.8). Another person noted, “The information is good but it is the responsibility of you to oversee the installation of your tank” (FG2C.p.8). Remarking on ownership of development projects in general, a participant stated, “In our community you need to be around to make sure everything is done properly” (FG2C.p.8).

- Q4S2 (How do I keep the soil in my garden healthy?) highlighted many different issues in addition to caring for one’s soil. The section included topics such as placing bones and old cans in the soil to release minerals, the planting methods of previous generations, using natural pesticides and maximising land use to obtain food security. This question thus prompted many different responses from participants around issues of **self-sufficiency and using sustainable practices**. One person commented, “People need to work in order to eat” (FG2C.p.8). Another person agreed, “When all current projects are finished in Cata, what are we going to eat? It comes back to bread and butter issue, how can we sustain ourselves? These projects are temporary in most cases” (FG2C.p.8). “The only sensible thing to do for us here is to think about the resources we have in our disposal, no doubt we have land to plant crops, therefore let us work on our gardens and improve our capabilities of land use to benefit us” (FG2C.p.8). Demonstrating the way in which the QBLR booklet addressed people’s experiences directly one lady said, “I have been putting old cans and bones under my soil and have seen how effective that is in making soil produce better crops” (FG2C.p.8).

Questions not fully understood:

Participants struggled with understanding certain sections due to difficult terminology or did not clearly understand the function of certain tools or how systems worked.

- An example of this was the conversation that took place around Q5S1 (What if I can’t afford a rainwater tank)? One participant said that if he could not afford a tank he would build a catch pit to collect and store water:

If I cannot afford the tank I will have to build a catch pit. I must take care of this catch pit by regularly cleaning it and covering to prevent too much sediment entering it and other small garden creatures that can die in there. Whereas in most cases the majority of community members would have drums to harvest water but building a catch pit is the best option when you can’t afford a tank (FG1C. p.1).

As explained further in the QBLR (Q12S1-Can I use a tank to harvest ground water? and Q13S1-How do I build a catch pit?) catch pits are the means by which one can prevent silt from collecting in one's tank and they are not storage units for water. Perhaps this participant was thinking of building a pond as an alternative to having a rainwater tank and was **conflating a catch pit with a pond**.

- Another example of **confusion around terminology and function of tools** was the discussion that took place around Q16S1 (What are the most important things about managing my tank?). One participant during this discussion posed the question, "How can you make sure then if the water is clean when your gutter is unable to strain water entering the tank?" (FG1C.p.3) A gutter's function is to carry water and not to strain water; this is of course what the participant could have meant but it was unclear if they were clear on the terminology and function of gutters and strainers.
- One participant in discussion around the issue of using limestone to neutralise the acidity of rainwater (Q16S1-What are the most important things about managing my tank?) stated "We usually advise people to use Jik to purify water when their water tank is dirty but from what we have learned from this booklet changes everything and we believe it's much safer than Jik" (FG1C.p.4). This participant was confusing purifying the water from harmful bacteria with neutralising the acid in the water. This **conflation of processes** can lead to serious health consequences.
- An example of participants **experiencing difficulty in understanding the information and concepts presented in a question** was the lack of response to Q1S2 (How can I use the soil in my garden to collect and store water?). The facilitator commented that there was very little discussion around this section and that "...members mostly repeated what was written in the booklet. I think to them this was really something new and they needed time to digest this information" (FG1C.p.6).
- One participant had **trouble understanding the different terminology** used in Q14S1 (Using ponds to harvest water: advantages and disadvantages) and stated, "I am not sure here whether the booklet talks about furrows or ponds, it is not clear to me. There are so many words here that are used and are bit confusing. Ponds, catch pits for example" (FG2C.p.7). This person thus felt overwhelmed with all the new terminology presented and possibly the language in this particular section was too technician.

General feedback from groups:

- **QBLR as a platform for discussion** – Participants stated that the focus group discussions provided a platform for everyone to speak and encouraged those who were usually quiet in public spaces to find their voice. One participant stated, “We are happy that everybody had a chance to contribute in discussions; this really opened up a platform for those who don’t usually speak in public” (FG1C.p.4).
- **Knowledge as “pure gold”** – There were many positive responses from the second group in terms of the things they learned during these discussions. One participant commented, “I regard this knowledge as gold; it is the best investment one can make for life” (FG2C.p.9). Another person said, “This booklet opens my mind and this means I will be able to be creative and get more food for my family” (FG2C.p.9). Another participant agreed; “The more knowledge you have the better chances of success” (FG2C.p.9). One lady confessed, “I don’t mind leaving my household chores, and come here because the knowledge I get here will enable me to secure food for as long as I live” (FG2C.p.9).
- **Learning together in groups** – Participants observed that discussing the QBLR as a group helped them learn. Comments included:
 - “It is important to work in a group, because it is where knowledge is shared. In a group we teach one other, I learn from you and you learn from me” (FG1C.p.4)
 - “Learning together changed us for better” (FG1C.p.4)
 - “In a group we are able to help each other, e.g. if one member do not have seedling you can share what you have with him and he will do the same to you” (FG1C.p.4).
- **Extending knowledge to younger generations** – When asked how the QBLR could accommodate illiterate or visually impaired participants, people suggested that children or grandchildren read the booklet at home to them, thus inviting them into the broader knowledge project of the booklet. As one person said, “We can also ask those who can read, especially children, to read to them. You can pick a specific topic in the booklet and ask your grandchild/child to read out on that topic” (FG2C.p.7). One participant commented, “This booklet will be a useful resource to WfF members;

it will also attract interest from children, they are hungry for knowledge and like to read. When they read all this information and watch us implementing it will encourage them to follow in our steps” (FG2C.p.7).

- **A written resource seen as having more authority** – One participant explained that his daughter was more inclined to believe a written booklet on rainwater harvesting over what he told her verbally. He explained: “My daughter just asked me to help her with her school work; they wanted her to come with different ways of collecting water. So this book came at the right time. I told her about furrows and catch pits, she did not believe me.” When he showed her the booklet he explained, “...they were more likely to believe what was written in this booklet than what I said to them, though it was the same thing” (FG1C. p.4).
- **Easy to use** – Despite some sections proving challenging and confusing with new terminology, people mostly felt that the booklet was accessible and easy to use. One participant commented, “This information is so simple such that someone can understand it from reading straight from the booklet” (FG1C. p.5). Another commented, “We can use this booklet as a ‘How to...’ booklet, in other words as a guide on how to do things related to water harvesting for household and garden” and “The information is so clear; you can use the booklet when installing your tank” (FG1C.p.5).
- **Encouraged to share knowledge** – One of the WfF members that participated in the focus group discussions stated, “We, as community and members of WfF, are ready to educate anyone who have interest on how water is harvested from our community and even other communities” (FG2C.p.8). When asked how the booklet could accommodate illiterate or visually impaired participants one participant suggested, “We can assist each other by making sure those who can read the booklet can demonstrate practically to those who can’t read how to do certain things that the booklet talk about. It will be easy to do this with your neighbour or people in a same group” (FG2C.p.9).
- **Observation** – For some of the older generation whose access to education was limited while growing up, they enjoyed being part of the focus group discussions as they felt they were being taught again and they were hungry for knowledge.

8.2.2 Glenconnor/Kleinpoort

Ewald and I conducted seven focus group discussions in Glenconnor and Kleinpoort from Friday 25 January to Wednesday 30 January, 2013. We recruited focus group participants with the help of Jimmy Plaatjies, Mrs Plaatjies' husband (Section 6.4.2) who was a Community Development Worker and thus active participant in Glenconnor. Unlike in Cata, he contacted people to attend focus group discussions. We showed him the QBLR in Afrikaans and explained to him what the focus groups would entail. The groups of people we worked with ranged from those with tanks and those without, those who had gardens and did not, were young adults to old-aged, literate and illiterate. My four primary research participants from this area (Chapter Six) were also part of these focus group discussions. As we did not do the recruiting ourselves we could not give the booklet to participants before the focus group discussions so only introduced it at the focus group discussions. We were unable to find enough people for two *consistent* focus groups in Glenconnor so worked in Kleinpoort for our third focus group. Kleinpoort is a 25 minute drive from Glenconnor (see Section 1.4.2).

8.2.2.1 Working with the QBLR

Focus group discussions in Glenconnor were all conducted in Afrikaans with both Afrikaans and isiXhosa QBLR booklets. Most participants were more fluent in Afrikaans but several were more comfortable with isiXhosa and asked for a booklet in isiXhosa. Literacy varied amongst the participants. Our first two focus group discussions were held in the Methodist Church in Glenconnor. On the second day Ewald Kruger, the Afrikaans facilitator, asked that we move to someone's house so as to make the discussions less formal and also to have tanks and gardens to look at. As with the case of Cata, I did little to guide Ewald's facilitation style. Ewald has much experience with training and teaching, running part-time in-service teacher training courses for the Professional Development Centre at Rhodes University. His experience in teaching was evident in the creative way he worked with the QBLR. In order to optimise the learning opportunities during the focus group discussions he employed different facilitation techniques while taking into consideration the low level of formal education of most participants.

One of the first techniques Ewald used was an exercise of *self-reflection* where participants were asked to reflect on their childhood experiences of water in terms of use and what they learned about water and from whom. The reason for using self-reflection was two-fold: 1) to anchor participants in their own experiences of water and hence create curiosity in the process, and 2) to gain a sense of participants' experience of mediated learning.



Figure 8.7: Ewald conducting a self-reflection exercise (FG1G) (Glennconnor, January, 2013) (*Notice participants have no QBLR booklets in front of them – they are merely reflecting*)

A second facilitation technique Ewald employed was *small group discussions* where participants were divided in two groups (each group had an equal share of participants who could not read) and tasked with reading a particular section decided upon by the group. They then fed back their understanding of the issues covered in a plenary discussion. This served two purposes: 1) to see how well the resource would be understood if accessed unaided by a mediator, and 2) to motivate in-group participation as each group would want to demonstrate their understanding of the text to the other group.



Figure 8.8: Participants in their small group discussions (FG1G) (Glennconnor, January 2013) (*There was a young adult who could read in this group. The two other participants could not read due to bad eyesight*)



Figure 8.9: Participants in their small group discussions (FG3K) (Kleinpoort, January, 2013) (*Another young adult was asked to be in the group in order to read out the section*)

A third technique Ewald used was *plenary discussions* which were used to clarify information in the booklet and to share experiences (see Figures 8.10 and 8.11).



Figure 8.10: A plenary discussion (FG1G) (Glenconnor, January, 2013)



Figure 8.11: Plenary session (FG3K) (Kleinpoort, January, 2013)

A fourth facilitation method used by Ewald was what he termed '*read-to-do*'. Ewald noticed the presence of rainwater tanks and gutters in the vicinity of the training venues and decided to enhance the learning process by practical application of the information in the resource. Participants were taken to inspect the tanks and to corroborate the information in the text with their observations in the field. For this purpose they were asked to take the booklet with and on occasion of uncertainty they were referred back to the resource to either clarify misconceptions or to verify factual information.



Figure 8.12: Participants in FG1G digging a planting circle as a 'read-to-do' exercise from the QBLR (Glenconnor, January, 2013)



Figure 8.13: Participants in FG3K discussing the parts of a tank in a 'read-to-do' exercise (Kleinpoort, January, 2013)

8.2.2.2 Response to QBLR

The first group (FG1G) chose the following questions for discussion:

1. Why are rainwater tanks so important? (Q1S1)
2. What kind of rainwater tank should I buy? (Q2S1)
3. Is it worth spending money on a rainwater tank? (Q3S1)
4. What if I can't afford a rainwater tank? (Q5S1)
5. How much does a tank cost? (Q4S1)
6. How do I install a rainwater tank? (Q6S1)
7. Appendix: An awareness exercise from Earth Harmony Innovators (pp.46-48)
8. What methods can I use to harvest water in the soil? (Q3S2)

The second group (FG2G) chose the following questions for discussion:

1. How much does a tank cost? (Q4S1)
2. How do I install a rainwater tank? (Q6S1)
3. What size tank do I need? (Q8S1)
4. What if I can't afford a rainwater tank? (Q5S1)

The third group (FG3K) chose the following questions for discussion:

1. What kind of rainwater tank should I buy? (Q2S1)
2. How can I harvest groundwater? (Q11S1)
3. How do I install a rainwater tank? (Q6S1)
4. How do I know how much water is in my tank? (Q9S1)
5. Where is the best place to put a rainwater tank to catch water from a roof? (Q7S1)

6. Appendix: An awareness exercise from Earth Harmony Innovators (pp.46-48)
7. What methods can I use to harvest water in the soil? (Q3S2)
8. How can I use the soil in my garden to collect and store water? (Q1S2)
9. What happens when rain falls on the land? (Q2S2)

As in Section 8.2.1.2, I also present the results of the different categories of questions asked by focus group participants in Glenconnor and Kleinpoort. See **Table 8.2** below.

Table 8.2: Different categories of questions asked by focus groups in Glenconnor and Kleinpoort

Focus Group	Category question	Category question	Category question	Category question
	Systems/deep knowledge	Practical/ technical	Personal well-being/safety	Societal
FG1G	Appendix	(Q2S1), (Q5S1), (Q4S1), (Q6S1), (Q3S2)	(Q3S1), (Q1S1)	
FG2G		(Q4S1), (Q6S1), (Q8S1), (Q5S1)		
FG3K	Appendix, (Q1S2), (Q2S2)	(Q2S1), (Q11S1), (Q6S1), (Q9S1), (Q7S1), (Q3S2)		

Motives for choosing these questions:

Below is a presentation of the questions participants were interested, how these addressed their situated practices and the broader discussions these questions stimulated. Carrying out the reflection exercises with each focus group highlighted the fact that they have grown up in a very different socio-ecological context to participants in Cata (as discussed in Chapters Five and Six). In their reflections on childhood and learning and working with water, a general theme of water quantity and water quality emerged. Referring to the scarcity of water in the area and the rainwater his family used to collect, one participant said, “That was also only used for drinking; it was like holy water because the Karoo doesn’t have plenty of water. I grew up with my grandma ... And I learned not to waste a single drop (FG2G.p.1). Another woman explained, “My mother told us to use two buckets water for washing in that small bucket and a bit more for rinsing. Even making tea for visitors, we had to count how many

visitors and how many cups and only that amount of water we were allowed to use” (FG3K.p.1).

Referring to the quality of the water, another said, “My father explained fresh water is very scarce because the borehole water was very salty and you couldn’t drink it” (FG3K.p.1). Like many of the female participants a woman explains how she was taught to clean the water she collected as a child: “I grew up with my grandmother, and she always told us not to waste water. We got the water from the river and I was told to put ash in the bucket and then after about an hour the water was usable” (FG1G.p.1). A telling and rather humorous story of how people adapted to brackish water in the area was told by a participant: “There was also borehole water but it was salty and my father and grandfather never wanted tea or coffee with dam water, they liked the salty taste. Even if we made a mistake by using fresh water we had to add a pinch of salt to their coffee” (FG1G.p.2). Other accounts convey a real sense of what it was like to grow up with scarce and brackish water as cited in Section 6.2.7.

When asked what they would like to learn during these sessions one participant said, “I want to know how to catch the water that just runs away when it rains. I am talking about the water that runs over the ground in the yard” (FG1G.p.1). Another said “When I think of a garden I think it needs water to grow, so we need to learn more about water” (FG1G.p.1). Referring to the problem of rainwaters damming up and flooding around Glenconnor, one lady explained: “At my place when it rains the water dams up and if it really rain it comes into the house, so where is that water going to in the end?” (FG1G.p.3).

Broader discussions out of questions chosen:

Many of these questions also worked as catalysts or a platform around discussions on broader contextual issues in the community.

- Q3S1 (Is it worth spending money on a rainwater tank?) prompted a wider conversation around the **urban/rural divide, differences in the younger and older generations, social issues** being addressed around meeting points such as communal taps as well as **relying on government for handouts**. In relation to a story in the learning resource booklet of the man whose daughter refused to carry water on her head because of her hairstyle the youngest participant in the first group commented, “The city girls won’t want to do it, but those from the farm will do that. But I won’t want to do that, I am not sure why but it just doesn’t feel right” (FG1G.p.7).

Regarding the younger generations one participant argued, "...It is good to have a tank I don't disagree, but it has made the children lazy and even if you send them to the shop they want to get paid" (FG1G.p.7). Still another conversation around social issues and water developed around this section of the booklet as one participant commented, "What is happening now, we have tap wars. In the olden days the women socialised at the taps and sorted things out at the river or dam but nowadays we do that at the taps, many things come out at the taps" (FG1Gp.7). This same question stimulated a discussion around expectations of the government for tanks and donations. One participant commented, "You must fight with government to give you a tank" to which another replied, "But if you wait until government gives you the water you want it may not happen, so I say rather buy. It is a good investment for you and your children even if it takes three years to have enough money to buy one" (FG1G.p.7).

- Indicative of the **contextual challenges concerning water (quantity and quality)** and the necessity for rainwater tanks, one participant commented on the low municipal water pressure in Glenconnor in relation to Q1S1 (Why are rainwater tanks so important?). Another explained, "We need tanks because the water in the tap smells of chlorine, it is not nice for drinking" (FG2G.p.2). Another commented, "And the tap water needs a lot of soap, it is brackish" and still another, "Ja, and often when you leave it in the bucket for a while you can see some red stuff at the bottom of the bucket" (FG2G.p.2).
- A discussion around the health and safety of using discarded tar drums from road works also developed from a discussion around Q5S1 (What if I can't afford a rainwater tank?). A participant suggested that if people did not have the money for a rainwater tank that they use these drums. Participants and the facilitator then asked how safe this is in terms of water quality and chemicals leeching into the water. One participant suggested, "That may cause a health problem over 20 or 30 years" (FG1G.p.7).
- A lively conversation ensued, indirectly, around the division of labour between the sexes. The conversation developed around the problem of water damming up in a focus group participant's yard. It was suggested that he grow grass to absorb the rain but he protested because then he would have to cut the grass. He also explained, in jest, that the reason the soil in his yard was so hard and unable to absorb rainwater

was because the women in his family sweep all the top soil away and this would not allow grass to grow either. This comment was met by loud protestation from the women in the group (FG1G.p. 12).

- In the second focus group a conversation around **division of labour, gender and water** developed during the reflection exercise on using and learning about water during childhood. One participant explained, "...as a little girl I walked with a big bucket on the head, me and my two older sisters ... I had two brothers too but they thought hard work was for the women only" (FG2G.p.2). This same participant thought this division of labour between the sexes has changed: of her husband, she said, "It is 50/50 now..." (FG2G.p.2). Her husband agreed and added, "So we need to teach the boys from small they must work too" (FG2G.p.2). Another participant thought that young girls learned this division of labour from older women and explained, "I think the girls see from the other women, so they start to think it is only women who must do the work" (FG2G.p.2).
- A discussion around the issue of **unemployment** and the specific challenges Glenconnor residents experience around living on **private or municipal land** linked to **government handouts** developed around Q4S1 (How much does a rainwater tank cost)? One participant pointed out, "Most people here don't have work so they can't afford to buy tanks" (FG2G.p.3). A participant living on private land explained why she was not entitled to receive a donated tank from the municipality like some people in Glenconnor; "The problem is where we stay is not municipal ground but belongs to the church so we didn't get tanks like the others did and they still fighting now whether we are entitled to the same municipal services or not" (FG2G.p.3).

Questions not fully understood:

Participants also struggled with understanding certain sections due to difficult terminology or unclear graphics and illustrations.

- **Unclear pictures** confused some participants. A picture of a zinc tank (Q2S1-What kind of rainwater tank should I buy?) lying on its side confused a number of participants before they discussed the meaning of the picture as a group. One participant said, “For example on page 3 where the tank is lying sideways, I didn’t understand immediately what is going on there” (FG1G.p.6). One of the other participants then explained the picture in its relation to the section to the participant who did not understand. Regarding the same picture, another participant said, “Some of the pictures is not very clear, like that one of the tank on it is side. But I understood after we talked about it” (FG1G.p.13). The section does not explicitly explain the picture and therefore readers must infer from the story as to why the tank is lying on its side. Focus group 3 (FG3K) was also unclear about this particular picture before it was explained to them by the facilitator (FG3K.p2).



Figure 8.14: Graphic in QBLR which confused focus group participants

- Some information in Q3S2 (What methods can I use to harvest water in the soil?) was found to be **too technical** for some participants. Regarding the section on swales and vetiver grass one participant said, “But that information on page 31 and 32 is too difficult. That is also not for people like us who live on flat ground” (FG1G.p.13).
- One participant had **difficulty translating and understanding** two comparative narratives to systems or **deep knowledge information** with regard to the Awareness Exercise (pp.46-48). She explained, “What I don’t understand is when the rain drop says there was nothing to hold on to” (FG3K.p.3). The section she was referring to was describing what happens to rain when it falls in a village devoid of trees. Another participant then explained to her, “I think that means the leaves on the trees, because

in the village there aren't any trees" (FG3K.p.3). To which she replied, "Now I see, so the leaves makes the rain come down slow so it falls softly and doesn't cause damage to the soil" (FG3K.p.4).

General feedback from groups:

- **Accessible language** – The language used by the booklet was accessible to most participants as one participant commented, "As Marilize was reading to me I found the language used is easy to understand" (FG1G.p.6).
- Many participants felt that the way the focus group discussions were held was a **safe and relaxed learning environment** to share ideas and experiences. As one participant commented, "I appreciate all you too, I even thought about yesterday's discussion last night ... I felt free to talk and they know I am always zipped-up in other meetings. But the way we are talking here I feel free to share my experiences" (FG1G.p.10). Another said, "You gave us confidence in ourselves and empowered us with knowledge. We can now share that information. People will say those people think out of the ring, out of the box" (FG1G.p.13).
- **Learner-centred teaching approach** – One participant also commented on the fact that the focus group discussions were not run like rote learning exercises and explained, "What I liked about all this is that you were not an educator who goes da-da-da and say to Anna now what is the answer? But everyone wanted to talk and wanted to prove himself. It was open and all felt free to talk" (FG1G.p.13). In his field report Ewald observed, "... participants benefited from the learner-centred approach and felt free to express themselves and enjoyed the interactive nature of the sessions. In response to how the learning process was different to what they experienced as children they said that the sessions allowed them to make *sense* of the information and created *understanding* of the importance of water harvesting" (Appendix 12 for *Ewald's Field Report*).
- **Ready to share knowledge** – Others expressed the desire to share this new found knowledge with a wider community. One participant commented, "I think this information must go out to the public. I only joined the discussion yesterday but I have learned a lot already. Even the people on the farms need awareness" (FG1G.p.13). Another said, "I am going to share this information with my husband because he is interested in water and plants" (FG3K.p.5). Another participant said, "I

also want to share with the school because they have a vegetable garden there too” (FG3K.p.5).

- **More pictures required** – Some participants felt that there needed to be **more pictures**. One participant suggested, “The pictures, more of them and better ones” (FG1G.p.6). It is not clear if by “better ones” he meant better quality or more relevant and easier to understand.

8.2.2.3 Summative perspective: Piloting the QBLR

From the findings above it can be seen that the QBLR created a dialogue between people’s practice and their particular contexts. As a learning tool it facilitated dialogue between local knowledge and expert knowledge as well as stood as a platform for discussions around broader social issues in the two contexts. It spoke to their experiences, engaged with existing bodies of knowledge as well as introduced them to new concepts and knowledge. From the general feedback from the two sites the QBLR was viewed as accessible and easy to use. It encouraged people to share their knowledge and to include younger generations in these practices. Participants enjoyed learning in groups around the learning resource and it stimulated conversation around wider social issues in their communities. In answer to the first and second set of guiding questions to the second research question (Section 8.0) of this study, one is able to appreciate the value of developing a learning resource in line with the mediational processes already at play in people’s practices as they are able to engage with this knowledge because it relates to their experiences. The following section considers how the QBLR extended learning in the two study sites.

8.3 Extending learning in and out of context

The following section explores how the QBLR extended learning in the two contexts by looking at, what previous knowledge was confirmed, what new knowledge was learned, what questions were not asked as well as how the resource can be adjusted for a different context such as Glenconnor.

8.3.1 Findings from Cata

Previous knowledge confirmed:

- Some of the information confirmed participants’ knowledge as one participant commented, “Even for WfF members the booklet is very handy in that these

techniques were not clear but now this booklet is making them very explicit” (FG1C.p.5). Confirming this, another participant stated, “Some of us have already been practising some of these techniques but some have never been exposed, especially non-WfF members, it was a good idea to invite us all so that we also learn about water harvesting” (FG1C.p.5).

- With relation to Q2S5 (What happens when rain falls on the soil?) people remembered the knowledge they learned from Tim Wigley’s workshops. One participant noted, “I remember this information in a workshop which was facilitated by Tim” another said, “Tim said it is very important to cover your soil with grass so that the soil always has humus” (FG2C.p.9).

New knowledge learned:

- Participants were enthusiastic about learning around Q8S1 (What size tank do I need?) concerning the **relationship between tank size and roof** as they had never thought about this before. One participant stated, “This teaches us a lot. Really, no wonder why sometimes other tanks find it difficult to fill up by rainwater even when there is a lot of rain. So what I learned is that, if I have a small roof I should not buy a very big tank. You must know how much water your roof can collect when it is raining” (FG1C.p.3). Another participant exclaimed, “This really opens up our minds; it tells you that before buying a tank look at your roof first” (FG1C.p.3). Yet another participant said, “... I never knew there is a link between size of my roof and the tank” (FG1C.p.3). This question elicited similar responses from participants in the second group. Participants commented, “None of us ever thought that we should consider the size of the roof before buying a tank” and another, “Of course, every person would like to have a bigger tank but now, how much water your tank will be able to harvest in relation to your roof is something to think about before buying a tank” (FG2C.p.9).
- Another new concept participants learned was around the problem of the acidity of rainwater Q16S1 (What are the most important things about managing my tank)? One participant stated, “I do believe now that rainwater has acid in it because I was told by the doctor I have too much acid in my body. So I learned new things here”.
- Participants were empowered with their new knowledge on how to install a rainwater tank (Q6S1). Participants said that this information was very valuable to them and that

they could replicate this at home. A participant commented, “This information is empowering us because from now on we are not going to ask or pay anyone to install a tank for us, will do it ourselves” (FG1C.p.5). Another said, “The information is so clear; you can use the booklet when installing your tank” (FG1C.p.5). When discussing Q17S1 (What can go wrong with my tank?) participants in the second focus group agreed that, “At least now we know what to look for when installing a tank” (FG2C.p.8).

- Participants learned about the importance of frogs and other creatures to the general health of their gardens and rainwater harvesting ecosystems. In response to Q18S1 (How do I maintain my catch pit?), a participant commented, “It is true that we would kill frogs and other amphibians found in our gardens because we did not know the role they play in enhancing the fertility and health of the soil” (FG1C.p.5). With this new knowledge, participants were more willing to share their environment with these animals.
- The information in a deep knowledge/systems question such as Q1S2 (How can I use the soil in my garden to collect and store water?) was new to participants and difficult for participants to conceptualise and grasp.

Questions not asked by the QBLR:

Focus group discussions also revealed questions not asked or answered in the QBLR. One question posed to Monde was linked to Q5S1 (What if I can't afford a rainwater tank?) concerning stokvels and joining groups that raise funds by contribution. One participant asked:

- **How is this person going to pay without having a source of income (FG1C.p.2)? (practical question)**

Another question asked was linked to Q16S1 (What are the most important things about managing my tank?). The participant asked:

- **How can you make sure if the water is clean when your gutter is unable to strain water entering the tank (FG1C.p.3)? (practical question)**

8.3.2 Findings from Glenconnor/Kleinpoort

Previous knowledge confirmed:

- None of the participants in the focus groups in Glenconnor or Kleinpoort explicitly said that the information in the QBLR confirmed any of their previous knowledge. It was evident however during practical walk-about sessions observing rainwater harvesting systems that participants already knew a lot. An example of this was in a discussion around a broken cement tank before participants had been introduced to the QBLR. When asked what the usual problems with concrete tanks are a participant responded, “Sometimes they leak and you don’t know where. Also you can’t easily find out how much water is in them” (FG1G.p.4). This same participant continued, “And the cement tanks you have to get inside with wire and cement and try to fix it. I know I fixed tanks with my husband ... But the advantage of the cement tank is that it keeps the water cold” (FG1G.p.4). When prompted by the facilitator and asked what other kinds of rainwater tanks there are a participant answered, “Zinc tanks, but they rust after while” (FG1G.p.4). This is exactly the information related to Q2S1 (What kind of rainwater tank should I buy)?
- A similar walk-about session with the second focus group (FG2G) *before* reading through the QBLR demonstrated how much people knew about tanks already. On inspecting the same cement tank the facilitator asked why it was installed where it stands and a participant responded, “There’s a tree here, so I think it is for the shade” (FG2G.p.3). Q16S1 (What are the most important things about managing my tank?) addressed the issue of providing shade for one’s tank to protect it from the harmful effects of the sun. When looking at two tanks connected together another participant observed, “... and the water goes from that one to this one because that one is higher than this one. So you don’t need a pump because gravity lets it flow from the full one to the empty one” (FG2G.p.3).

New knowledge learned:

- By simply listening to the older participants reflecting on how they grew up valuing water because they had to spend time collecting and purifying it, one of the youngest members of FG1G began to realise **how valuable water was**. Commenting on this new knowledge she said, “When I grew up as a child, water for me was just

something that is just there because I am from the young generation, but now I have started to see that water is something of value” (FG1G.p.3).

- Participants also learned many practical things in relation to **planting circles and soil retention methods** under Q3S2 (What methods can I use to harvest water in the soil)? One participant commented, “What I didn’t know is that one must make a wall around the circle to prevent the water from running away. Also I didn’t know about putting card box in there” (FG1G.p.11). Another commented, “That part in the book that talks about compost and that you can even put card box in the hole and also that if you plant a tree it must be close to where there is moisture” (FG1G.p.6). Two participants, one from FG1G and one from FG3K, also offered their own explanations for things such as why not to bury plastic in the planting circle. As one explained, “My understanding about plastic is that it doesn’t break down for many years, so no plastic stuff must go into your plant circle (FG3K.p.4). Still another participant was creative and suggested digging multiple planting circles and connecting them with furrows (FG1G.p.12).
- As with the focus group participants in Cata, participants in Glenconnor felt empowered with their new knowledge concerning Q6S1 (**How do I install a rainwater tank**) and Q7S1 (Where is **the best place to put a rainwater tank to catch water from a roof**)? In response to Q6S1 one participant commented on learning “that the tank needs to stand on something so you can fit a bucket under the tap and also that you need to put it on the corner where the gutters come together” (FG1G.p.6). Like focus group participants in Cata, participants in Glenconnor felt that they could hold contractors accountable when they get tanks installed. As one participant says, “I will now be able to show contractors to make sure the base is level when they put up tanks. Many times they don’t know what they are doing. I won’t sign the ‘I am happy’ letter until it is done properly. So this is self-empowerment, I will say ‘No that is wrong’ but also I can say ‘This is how it should be done’” (FG1G.p.9). It is interesting however that focus group participants did not mention that with this new knowledge they would be able to install rainwater tanks themselves.
- While doing a practical walk-about of her rainwater harvesting system, a participant learned the value of inspecting her gutters closely and making sure there are no leaks: “I can see now there are tiny holes in my gutter, honestly I have never noticed that

because you don't look when it is raining" (FG1G.p.9). During the same walk-about one person noticed a piece of pantyhose cloth tied around the opening of the tank tap. When he asked her what it was for she explained, "That is to filter the water because dust and leaves get into the water" (FG1G.p.8). From this, many people in the focus group learned a **new water filtering technique**. One participant said, "I have learned from Anna to make that filter to clean the water from dirt" (FG1G.p.9).

- Participants thoroughly enjoyed the Awareness Exercise (pp.46-48) and expressed their **new understanding of ecological systems** that this section taught them. This exercise was linked to a particular problem a participant was having with rainwater damming up in her yard. Making a connection between her surroundings and this section, one participant explained, "... there are places in the veld where the trees are plentiful and the surrounding areas are green. Now I understand from what we read in the booklet that the soil there cannot be hard like it is here but it must be soft. So the rainwater goes straight into the soil" (FG1G.p.11). The participant whose yard it was made a similar connection between what was read and the grass absorbing water in her yard, "Ja, I can see even here where there are patches of grass that it must rain a lot before it starts to dam up" (FG1G.p.11). Commenting on the function of leaves, another participant explained, "What was interesting to me is that the leaves work like a shock absorber when the rain is coming down hard" (FG1G.p.11).

This exercise led to participants sharing ideas with each other and extending their learning by paraphrasing or re-explaining what they had understood most clearly. An example is one participant who said, "My understanding is similar to what the others have said already, but to add that if the leaves on the ground rot and help the soil to absorb the water then it won't run off and causes erosion. So it is the compost that makes the soil soft" (FG1G.p.11).

Participants in the third focus group discussion also learned new knowledge about how the forest as a system makes use of rainwater. One participant explained his understanding and then extended it by using a metaphor; "I see now, that is why the rainwater doesn't cause erosion because it doesn't run off but is absorbed by the soil. Not sure it is the right way to put it, but it is like a sponge" (FG3K.p.3). Still another explained, "What I found new and very interesting is that in the forest the rain doesn't cause mud and the shoes remain dry. And the leaves, if I understood correctly, play an important role in this" (FG3K.p.3). Another

participant confirmed this by saying, “Now I see, so the leaves makes the rain come down slow so it falls softly and doesn’t cause damage to the soil (FG3K.p.4).

- Related to the Awareness Exercise and **soil moisture retention methods**, participants also learned by observing a practical demonstration of digging into the soil around a participant’s yard. The soil was hard and as the facilitator explained, “Participants notice with surprise that the soil is moist deeper than they expected. Another bucket of water is added while the group returns to plenary inside” (FG1G.p.12). Later on participants “...notice that the second bucket of water has not been absorbed because the deeper layers of the soil are hard and deprived of compost” (FG1G.p.12).
- The idea of **stokvels** to buy water tanks were novel to some participants. In relation to Q5S1 (What if I can’t afford a rainwater tank?) one participant said, “The idea of the stokvel is very good. People don’t think one can use a stokvel to buy a water tank!” (FG1G.p.13). A participant from the second focus group had a similar idea of a stokvel: “... this idea of the stokvel is new to me for buying a tank but it is a good idea as long as the group of people is not too big. And it must be the right people” (FG2G.p.4).
- Participants were also exposed to new ideas of the **kinds of rainwater tanks** available. In relation to Q2S1 (What kind of rainwater tank should I buy?) participants commented, “I learned a lot because I didn’t know much about the plastic tanks” and “I always thought that the underground tanks are the best because I grew up with them” (FG2G.p.4).

Questions not asked by the QBLR:

Focus group discussions also revealed questions not asked or answered in the QBLR. One question posed to the group was linked to a contextual problem community members experienced in Glenconnor. The participant asked:

- **At my place when it rains the water dams up and if it really rain it comes into the house. So where is that water going to in the end (FG1G.p.4)? (technical/practical or systems question)**

Another question not addressed in the QBLR which is telling of the water quality issues in the area was:

- **I want to ask which water is the best, rainwater or water from a bore hole (FG1G.p.4). (personal well-being/health question)**

One question posed to the group was linked to a practical activity of observing a rainwater tank at one of the focus group discussion venues. One participant asked:

- **What are those ridges that I see that goes around the Jojo tank (FG1G.p.4)? (technical/practical question)**

A further question not addressed by the booklet:

- **How often should I water my garden (FG1G.p.6)? (technical question)**

Another question not addressed by the booklet:

- **What are the names of some organisations that can help us with tanks (FG2G.p.4)? (practical question)**

Adjusting the QBLR for a different context

The piloting process and analysis also considered how the QBLR could be adjusted to better suit another context such as Glenconnor:

- The resource must address **problems with flooding** in response to the many comments on flooding in people's yards. As one participant clearly explained it, "Because most of Glenconnor is flat we can't use the suggestions for Cata because they have hills and mountains. So we need more practical ideas how to harvest water from flat surfaces. It will be the same at Kleinpoort. Or, how to make one's garden in such a way that it has soil at different levels, like steps (FG1G.p.13). With regard to the section on swales and vetiver grass (Q3S2-What methods can I use to harvest water in the soil?) one participant said, "But that information on page 31 and 32 is too difficult. That is also not for people like us who live on flat ground" (FG1G.p.13).
- In relation to the problem of **water scarcity and quality** it was suggested by a participant that more emphasis should be placed on **conserving water** as well as learning how to clean it. The participant suggested, "People have become more aware of conserving water. I think the booklet should draw more attention to how to check for leaks in your gutters and how to filter the water" (FG1G.p.13).
- Some participants felt that Q10S1 (What do I do about overflow from my tank?) was not adequately answered and suggested, "The booklet should also say **how to harvest**

the overflow from your tank if you don't have a second tank, for example the use of drums" (FG1G.p.13).

8.3.3 Summative perspective: How learning was extended

Table 8.3 below presents a summary of the questions people were interested in the focus group discussions. Most of them were technical/practical questions which makes sense as the largest section, Section One, was mostly comprised of technical/practical questions.

Table 8.3: Summary of questions of interest in each site

Site	Category of question	Category of question	Category of question	Category of question
	<i>Systems/deep knowledge</i>	<i>Technical/practical</i>	<i>Personal well-being/safety</i>	<i>Societal</i>
Cata	(Q1S2), (Q4S2), (Q2S2)	(Q5S1)x2, (Q10S1), (Q8S1)x2, (Q16S1), (Q6S1), (Q12S1), (Q18S1), (Q15S1)x2 (Q14S1), (Q17S1), (Q7S1)	(Q1S1), (Q3S1)	(Q5S2), (Q6S2),
Glennconnor/Kleinpoort	Appendix,x2 (Q1S2), (Q2S2)	(Q2S1)x2, (Q5S1)x2, (Q4S1)x2, (Q6S1)x3, (Q8S1), (Q11S1),(Q9S1), (Q7S1), (Q3S2)x2	(Q1S1), (Q3S1)	

The QBLR acted as a platform for dialogue between participants' practices and their specific contexts as well as extended participants' learning through: 1) grasping new concepts, 2) engaging in broader discussions around questions, 3) listening and learning from each other, 3) making observations during practical sessions, 4) asking for clarification on things not understood, 5) asking new questions, and 6) having old knowledge confirmed.

- The first extension of learning for participants was in the **new knowledge they were exposed** to such as the relation of house roof size to tank size (Q8S1) as was the case for focus group discussions in both sites which people expressed they had never

thought of before. One participant commented, “This really opens up our minds...” (FG1C.p.3). Participants also learned deep knowledge/systems material such as how healthy soil collects and stores water (Q1S2). Some comments confirming this new knowledge included: “...there are places in the veld where the trees are plentiful and the surrounding areas are green. Now I understand from what we read in the booklet that the soil there cannot be hard like it is here but it must be soft. So the rainwater goes straight into the soil” (FG1G.p.11).

- A second way in which the QBLR extended participants’ learning was by **stimulating discussions** around not only water issues but broader societal concerns. Examples of this included discussions around the importance of central meeting points in towns or villages such as communal taps where people settle disputes and exchange information. Issues around water quality and quantity also emerged from a water-scarce context such as Glenconnor. Another prominent theme to emerge in both sites was the changing times in South African society and the implications for raising children in a more modern culture where growing gardens and being self-sufficient is not necessarily valued by the younger generation. The pitfalls and challenges of working in groups and co-operatives was also brought up in a context such as Cata where people have experience in working together on development projects. Also to emerge out of the Cata context was the contradiction between the success of development projects in the village and then not relying on these projects because they are seen as being unsustainable in the long term. Out of reflection exercises in Glenconnor and Kleinpoort the subject of the division of labour and gender around water collection and use was also raised. The contradiction of relying on government for handouts versus learning to be self-reliant also emerged in Glenconnor.
- **Listening and learning from each other** was also an important way in which learning was extended. By merely listening to the older focus group participants reflecting on the importance of water a younger participant learned about the value of water. There were other instances where the learning was more explicit as in the instances when participants would actively assist each other in understanding concepts. For example, while reading the Awareness Exercises one participant from FG3 in Kleinpoort explained her confusion: “What I don’t understand is when the rain drop says there was nothing to hold on to” (FG3K.p.3). Another participant then

explained to her what happens to rain when it falls in a village devoid of trees. She then understood and verbalised her new knowledge for clarity's sake: "Now I see, so the leaves makes the rain come down slow so it falls softly and doesn't cause damage to the soil" (FG3K.p.4).

- **Making observations during practical sessions** was another way participants learned new knowledge. For example, during a walk-about session in a participant's yard, the group learned a new water filtering method by covering the mouth of a tank tap with pantyhose. As one participant commented, "I have learned from Anna to make that filter to clean the water from dirt" (FG1G.p.9). The rest of the focus group then agreed that they had all learned this new technique and thus one person's observation led to a whole group learning something new.
- Another way learning was extended around the QBLR was when **people asked for clarification on concepts, diagrams or pictures that were unclear**. More often than not participants felt comfortable enough to express their confusion and then a discussion would follow around the section in question. Often participants would clarify pictures or concepts for each other without the facilitator's help. As one participant commented, "Some of the pictures is not very clear, like that one of the tank on it is side. But I understood after we talked about it" (FG1G.p.13).
- **Asking questions not found in the resource** also led to the extension of focus group participants' learning as they were thinking beyond what was found in the resource and back into their immediate contexts. In Glenconnor they asked several new questions, with the most prominent being how people can prevent flooding and damming up of their yards. This is how the resource can be adjusted for a new context such as Glenconnor. Another question was asked around the ongoing issue of water quality, specifically if rainwater or borehole water was better quality (FG1G.p.4). A practical question from Cata was how a person contributes to a stokvel without an income (FG1C.p.2). While Ewald provided some solutions he also prompted participants to come up with solutions themselves.
- Lastly, the QBLR extended participants' learning in that it **reaffirmed previous knowledge** people already knew but didn't realise they knew by repackaging it in a different way, a more systematic way perhaps. One participant in Cata explained,

“Even for WfF members the booklet is very handy in that these techniques were not clear but now this booklet is making them very explicit” (FG1C.p.5). Reminding participants of knowledge they learned during Earth Harmony workshops (Section 5.4.5) a participant commented, “I remember this information in a workshop which was facilitated by Tim” (FG2C. p.9). When prompted by the facilitator during a focus group discussion in Glenconnor and asked what other kinds of rainwater tanks there are, a participant answered, “Zinc tanks, but they rust after while” (FG1Gp.4). This is exactly the information related to Q2S1 (What kind of rainwater tank should I buy?).

8.4 Conclusion

This chapter presented findings from focus group discussions and addressed the second research question. The aim of piloting the QBLR was to see if and how it extended learning around rainwater harvesting and food gardening practices by introducing new forms of knowledge in relation to existing knowledge. In the development of the QBLR (Section 8.1), a form of pedagogy was adopted which connected the ‘everyday’ concepts or knowledge of research participants to the ‘scientific’ concepts of the ‘expert’ knowledge. According to Vygotsky (Section 3.3.3), the way people make sense of and internalise new knowledge is by making the connection between scientific and everyday concepts. By developing the QBLR in this way, one avoids the risk of the QBLR becoming an item out of context instead of an item out of *a* context which can result in seeing the resource as a floating item (which it is not). The QBLR is thus part of a process of moving in and out of context.

This chapter also presented research participants’ interests in particular questions related to their practices as well as presented broader discussions that developed around the learning resource. The QBLR thus achieved the function of standing as a platform for a dialogue around different issues of not only rainwater harvesting and food gardening but of broader social issues around water and food security. As presented above (Section 8.3.3) the QBLR extended participants’ learning through new concepts, catalysing discussions around broader topics, creating a platform for participants to listen and learn from each other as well as to make observations during practical sessions. Through the mediation of others and the learning resource, concepts and issues were clarified, new questions asked and old knowledge confirmed. Chapter Eight has thus illustrated how mediation does not lift off the practices of research participants but is embedded in their very practices. The QBLR related to people's

‘everyday’ concepts and practices in how it was developed (directly out of peoples’ experiences) and it extended learning by introducing ‘scientific’ or ‘expert’ knowledge and linking ‘everyday’ concepts to these via a process of re-mediation, which I discuss in the next chapter.

The following and final chapter (Chapter Nine) discusses the research findings by drawing on the insights gained from the literature and presents a more in-depth interpretation of the findings across Chapters Five, Six, Seven and Eight. The themes emerging from these chapters are used to frame Chapter Nine, thus presenting a dialogue between theoretical propositions and the findings in order to locate them in the broader social and theoretical landscape.

PHASE THREE

CHAPTER NINE

MEDIATION AND LEARNING: ENGAGING WITH THE IMPLICIT AND EXPLICIT

9.0 Introduction

This study worked with rural South African women who are usually considered the most vulnerable when it comes to socio-economic risks and shocks (Section 2.1.2). Working with the most vulnerable groups in rural South African communities usually means working with single, older women with limited or no income, with limited or no alternatives and with limited formal skills and education. As revealed by the contextual profiling data, and the women involved in this study, it has emerged that they are also in the most need and the ones most receptive to rainwater harvesting and food gardening methods as a livelihood strategy against poverty and food and water insecurity (Section 2.2). They often are the primary caregivers of the home and have to make a small amount of money go a long way each month in order to support the children they look after. Because of the HIV/AIDS epidemic in the country many grandmothers are forced to support and raise their grandchildren due to the parents having died from the virus. As a result, many women still have to support and care for young children in their old age.

This study offers insights into learning which can potentially benefit women such as the eight women I worked with as well as the individuals, organisations and research institutes such as the WRC that seek to support women's water and food security practices [within a South African context]. This study has focused on surfacing the socio-historical, economic, cultural, political and ecological factors that must be accounted for when working with these women. The aim of this study was to better understand rural South African women's lives to be able to take into account and address their history, context, forms of expression, struggles and experiences in order to develop the most relevant and helpful learning resources and programmes. The purpose of this study was therefore to gain a stronger sensitivity to the contextual factors that implicitly and explicitly mediate rural women's learning around water

and food security activities in order to be able to support and strengthen their learning and practice. The aim was to understand implicit socio-cultural and socio-material forms of mediation in order to carry out explicit socio-cultural forms of mediation or, put another way, to engage with the explicit in the context of the implicit. The broader focus of the study within the WRC project was the mediation of water knowledge for democratic engagement with water management practices at a community level as explained in Chapter One.

The mediation focus of this study was two-fold, and involved:

- 1) Examining mediation within and emergent from water management practices (the focus in this study being on rainwater harvesting using water tanks in rural food growing contexts amongst women farmers at household level) broadly articulated as **implicit socio-cultural and socio-material forms of mediation**, and,
- 2) Examining mediation as this emerges in and through socio-cultural learning interactions via mediation agents (e.g. NGOs and other training organisations) and via a carefully constructed question-based learning resource for use by mediation agents (based on the findings emerging from 1) broadly articulated in the thesis as **explicit socio-cultural forms of mediation**.¹⁸

This chapter synthesises the findings of this study with a discussion based on the interface between the implicit and explicit mediating factors identified in Chapters Five, Six and Seven and the extension of learning with the use of an explicit mediatory tool discussed in Chapter Eight. Drawing across Chapters Five, Six, Seven and Eight, where detailed findings of the study are shared, this chapter will discuss, in a more synthetic way, the essential findings and meaning of this study (Section 9.1). I then discuss recommendations as to how mediation within social learning processes may be understood and harnessed in the context of rural community based water and food security practices (Section 9.2). Finally, I conclude with a

¹⁸ This stark contrast between implicit and explicit socio-cultural forms of mediation is only for analytical purposes and, as discussed in Chapter Three (Section 3.3.1), these forms of mediation overlap and cannot be neatly separated. Explicit mediation in this study, for example, is not only interpreted as 'explicit' in relation to the introduction of the question-based learning resource or interactions with mediating agents but can be found within the rainwater harvesting practices themselves such as rainwater tanks being installed with the help of others. Similarly, implicit mediation is not only interpreted in relation to the socio-cultural mediations in the narratives of research participants but can also be found in the use of the QBLR such as body language, cultural experiences and individual histories of learning and education of the focus group participants.

reflective perspective on the research, pointing to how the research may be extended in the future (Section 9.3).

9.1 Key findings in the study

Before discussing the findings of this study it may be useful first to remind the reader of the key research questions that this study sought to address:

Research Question 1: *What are the mediating processes evident in and surrounding the learning of rainwater harvesting in the context of women's water and food security in rural communities?* (addressed in detail in Chapters Five, Six and Seven)

Research Question 2: *How can a question-based learning resource extend the learning practices in this context?* (addressed in detail in Chapter Eight)

Additionally, and in order to provide a more synthetic perspective on the research questions outlined above in relation to the key interest of the study, it is also important to keep in mind the central activity that this study focused on: rainwater harvesting for food production using rainwater tanks (see Section 5.1). Keeping the central activity in focus is key because mediational modes hold significance in relation to the activity in which the mediation is taking place as I have argued in Chapter Three and as is also shown in the data across the thesis. Lektorsky (2009: 84) argued that:

Some contemporary followers of Vygotsky think that it is possible to study mediating processes without taking activity into consideration. In reality it is impossible to understand mediation and its different modes if one does not take into consideration the connection between definite modes of mediation (e.g., definite signs and sign systems) and the corresponding activity, as only this activity gives meaning to the means of mediation. The same thing that is used as a means of mediation has different meanings and mediates different processes if it is used in different kinds of activity.

The different mediational factors surfaced in chapters Five through Seven therefore only have meaning or significance within the context of the central rainwater harvesting and food gardening activity. A rainwater tank, for example, will have a different mediation in the context of home food production to that of its use in a high school activity system. The connection between the different modes of mediation and the activity in which it takes place is what must therefore be the focus.

Keeping the above in mind, I discuss the findings of this study in the following sections, guided by three key statements that relate to the research questions and core interest of this study: (1) learning is embedded in context in relation to the activity, and this is an emergent, dynamic and iterative process (Section 9.1.1); (2) implicit and explicit mediation processes interact in relation to the activity (Section 9.1.2); and (3) the interaction of implicit and explicit mediation has implications for learning, facilitation of learning and associated learning resource development in rural water and food security practices (Section 9.1.3).

9.1.1 Learning embedded in and emergent from context in relation to rainwater harvesting and food production

One of the first findings of this study is that learning is embedded in and emergent from context in that it is mediated by implicit and explicit processes within each context. Situated learning theory supports the finding that learning is embedded in context in that learning is understood as a social and cultural activity in which the interaction between people's cognitive attributes and the external world is what is emphasised as opposed to only the cognitive attributes that people possess (Boaler in Daniels, 2008). Learning is therefore embedded in context in that it is the interplay between the person, other persons and the context that matters. One of the three considerations of mediated action Wertsch (1998) makes is that the socio-cultural embeddedness of human action is always built into one's analysis when looking at the involvement of cultural tools in mediated action. Lektorsky (2009: 83) argued that "Activity exists only as mediated. This is its specific characteristic... If individual behaviour is not mediated, it is not an action understood as part of activity."

Situated learning theory argues that "... knowing is always situated and therefore is particular to particular settings and communities" (Fenwick, 2012: 4). Detailed contextual profiles of Cata (Chapter Five) and Glenconnor (Chapter Six) were thus essential in situating the research participants in their particular contexts in order to understand the specific mediations to their learning and practice of rainwater harvesting and food production. Detailed narrative accounts of each research participant then deepened the understanding of how learning is embedded in context in that although commonalities existed within their narratives, each person's story reflected individual and dominant factors that mediated their learning around the central rainwater harvesting and food gardening activity, which in turn also mediated changes in those contexts and reflected the non-static view of context. For example,

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Nothemba Languva's (Section 5.5.1) practice in Cata is guided by a strong sense of community and the Water for Food ethos. For Elizabeth Flipp (Section 6.4.1) in Glenconnor, rainwater harvesting and food gardening practices are mediated and constrained by unemployment and economic migration. For Bolekwa Ntusi (Section 5.5.3) one of her roles as a community health worker makes her encourage people to grow their own food. Part of her identity as a parent also mediates her practice as she passes on her rainwater harvesting and food gardening knowledge to her children. The lesson from each individual narrative is that specific contexts yield specific and different mediating factors and thus mediate learning and knowledge in different ways.

An understanding of learning as embedded in context in this study was supported by a relational understanding of context as “a weaving together of people and their tools in complex networks” (Edwards, 2005: 5) (see Section 3.1). Context is thus understood dialectically as “tightly coproducing” in that learning is *in* and *with* context, not separate from or applied to context (Niewolny & Wilson, 2009: 9). This relational view of context was contrasted with a container view of context which gives rise to decontextualised and abstracted knowledge and is inadequate to explain how learning takes place between individuals mediated by social, organisational and technological artefacts. In light of the broader project of supporting agency and change-oriented learning, container views of context deliver a stable and static world: they keep people and their practices in their place and therefore are unable to facilitate transformational learning processes (see Section 2.3.3 Acknowledging how context shapes action and learning links to environmental education theories of risk and sustainability and how environmental issues and risks are constructed by people's social practices and their activities Irwin (2001: 74) argued “... nature can no longer be represented as an external category [only]¹⁹. Statements about the natural world represent social and institutional constructions”. Therefore, different contexts lead to different interpretations of risks and therefore different solutions and actions being taken up. An example of different contexts giving rise to different risks is the problem of

¹⁹ I insert ‘only’ in the above quote because Irwin (2001) is a constructivist who believes that reality is socially constructed (including the environment). This cannot be however as critical realism argues that some things in the world exist with or without our social constructions thereof (e.g. water) and this is what is meant by using critical realism as an underlabourer in this study. However, *polluted* water is caused by social practices that involve human meaning making, social practices and learning, as are our responses to polluted water or water scarcity etc.).

flooding as well as water scarcity and quality in Glenconnor which was not experienced by people living in a different context such as Cata (see Section 8.3.2). Understanding knowledge and learning as embedded in and emergent from context links to the notion of emergence in critical realism (see Section 3.9.2.2); context thus allows researchers and educators to understand more fully how learning is a socio-cultural phenomenon and allows them to understand the implications this has for how knowledge resources are developed, disseminated, used and mediated. An example of this is the broader discussions that emerged in focus group discussions around various themes in peoples' lives as participants engaged with the question-based learning resource: issues of reciprocity, group dynamics and perseverance, challenges of working in groups, the urban/rural divide, the differences in the younger and older generations and various social challenges (see Section 8.2.1 and 8.2.2). This introduces the second finding of how important it is to understand how implicit and explicit mediation processes interact.

9.1.2 Implicit and explicit mediation processes interact in a dialectical relationship to the activity

The second finding of this study is that implicit and explicit mediation processes are constantly interacting in a dialectical process in relation to the activity, whether people are conscious of this interplay or not. Vygotsky's (1978) theory of learning emphasises the interaction or relationship between people and their environment. For Vygotsky (1978), the dialectical relationship therefore between the object and the subject is as follows: as we work on the object, the object works back on us and affects our subjectivity and how we in turn approach the object. In terms of the implications of dialectics for learning, the construction of knowledge is not bound to the external world only nor is it bound to the workings of the mind. Instead knowledge "reflects the outcomes of mental contradictions that result from one's interactions with the environment" (Schunk, 2004: 289). This understanding of the dialectical relationship was useful in this study in theorising the relationship between subject (female rainwater harvesters and food gardeners) and object (the learning and practice of water and food security practices). These practices were imbued with socio-historical residue and their own internal contradictions, bringing together clashes of different knowledge systems, perspectives and voices, thus transforming the subjects' lives and thus themselves.

Before discussing the relationship between the implicit and explicit it is first helpful to differentiate between implicit and explicit mediation again. As discussed earlier in Chapter

Three (see Section 3.3.1) implicit mediation is mediation that occurs in the discourses embedded in our everyday lives (Daniels, 2008: 6). Implicit mediation is often invisible because it is not intentionally introduced into human activity in order to mediate it. From a critical realist perspective it is also possible to see that it is not only discourses that mediate, but also material reality (e.g. the availability or quality of water (Sections 5.3.7 and 6.2.7); historically constituted power relations that lead to unemployment and economic migration (Section 7.3.7); seasonal work cycles (Section 7.3.4); and the lack of material tools such as broken fences or no seeds which constrain garden practices (Section 7.3.3). The generative mechanisms at the level of the real also mediate human activity. Because of the invisible nature of implicit mediation, people may be unaware of what or how something has been mediated. Phase One (A and B) of the research process thus explored implicit mediation as it emerged out of and in context of the central rainwater harvesting and home food production activity as discussed above (Section 9.1.1).

Explicit mediation on the other hand is explicit in two ways. Firstly, when the “materiality of the stimulus means, or signs involved, tends to be obvious and non-transitory” it is explicit (Wertsch, 2007: 180). The stimulus means of the QBLR for example was obvious and permanent in that it was designed with the obvious intention of mediating knowledge around rainwater harvesting and food gardening and it was permanent or non-transitory in that it was in material form of a printed booklet. Secondly, mediation is explicit when another person directs an individual or group and intentionally introduces a “stimulus means” into an activity such as the introduction of the QBLR in the focus group discussions into the two case study sites (Wertsch, 2007: 180). Explicit mediation then is the intentional and overt introduction of a sign “into problem solving activity, often by an outside party” (Wertsch, 2007: 191). It is intentionally introduced into human activity to organise it. Through the introduction of a tool such as the QBLR, Phase Two of the research process thus explored how mediation is explicitly extended within a social learning context. The introduction of rainwater harvesting tanks into the rural community contexts with the help of others, as presented in the narrative accounts of the research participants as well as Sections 5.4-5 and 6.3-4, is also an example of explicit mediation, as was the exposure to explicit training around food gardening (Sections 7.2.4 and 7.3.1).

As was noted before, these two categories of mediation are not neatly separate and can therefore be understood as interacting in a dialectical process in that the construction of

knowledge is not bound to the external world (explicit mediation) only nor is it bound to the workings of the mind (implicit mediation), and in the case of this study, explicit mediation cannot be limited to the development and use of a learning resource, but is an ongoing processes embedded in human activity, as is implicit mediation. According to Schunk (2004: 289), knowledge “reflects the outcomes of mental contradictions that result from one’s interactions with the environment”. Here he is highlighting the interaction between the implicit and explicit or the internal and external world. This dialectical understanding helps to theorise the relationship between the subjects (female rainwater harvesters and food gardeners) and the object or problem space of the activity (the learning and practice of rainwater harvesting and home food production). As shown in this study, through the external rainwater harvesting activity, the subjects or research participants transformed their lives and therefore transformed their internal selves.

The focus of the investigation in this study was therefore not on traditional assumptions about learning and knowledge flows where the ‘knowledgeable other’ imparts and shares knowledge with those that are assumed to ‘not know’ in a uni-directional way (Burt, Lotz-Sisitka & Berold, 2013: 17). Lotz-Sisitka (in Burt et al., 2013) therefore argued for an understanding of knowledge flows as dialectical. She asserted [based on Bhaskar’s critical realist dialectic and reflections that also draw on data produced in and for this study and other environmental education studies in the ELRC] that, “knowledge and learning requires a *dialectical approach to knowledge flow – from ‘what is and what is known’ to ‘what could be’ and back to ‘what is [emerging] and how’*”²⁰ [italics in original text] (see Figure 9.1 below).

²⁰ This dialectical notion of knowledge flow is captured in a WRC project report (Burt et al., 2013) that was developed drawing on some of my research, as well as other research as described in Chapter One (Sections 1.1 and 1.2).

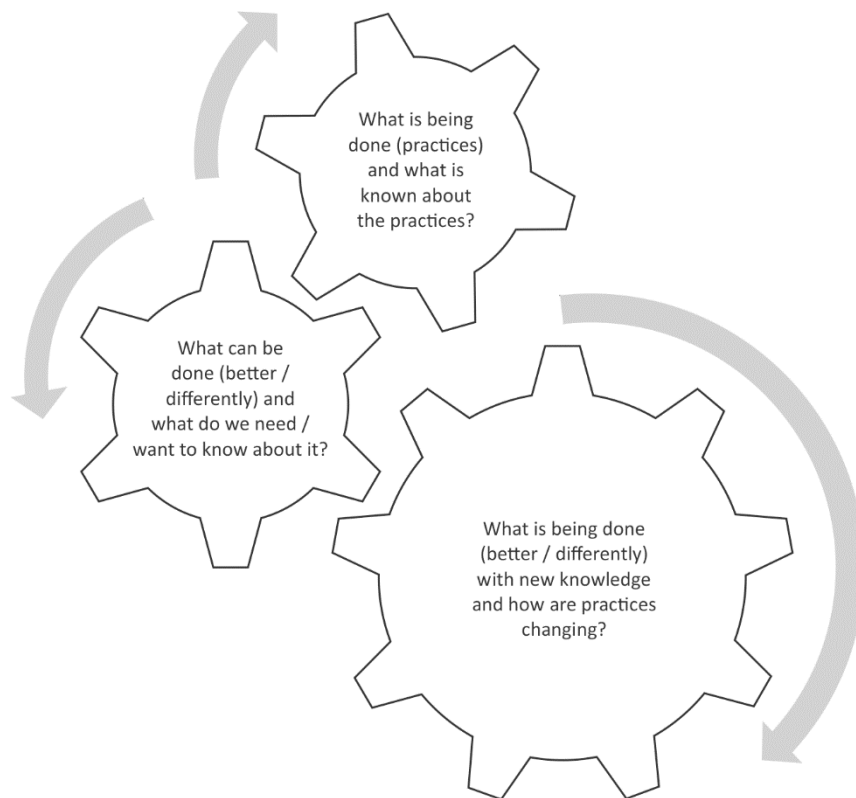


Figure 9.1: Dialectical, emergent ‘knowledge flow’ process (Lotz-Sisitka, 2013)

Understanding knowledge flows as a dialectical process results in knowledge and learning being understood as a reflexive process and not simply as something to be delivered. The implications of understanding the interactions between implicit and explicit mediations for learning and social development in rural areas is that they help make clearer how structure impacts upon agency and vice versa. By being reflexive about these interactions, agents can harness social or cultural enablements and work around and respond to constraints.

Commenting on the importance of this reflexive process Archer (2003: 130) argued “Reflexive deliberations constitute the mediatory process between ‘structure and agency’, they present the subjective element which is always in interplay with the causal powers of objective social forms”.

Examples of this dialectical interaction between explicit and implicit mediation were surfaced throughout Chapter Seven and can be seen playing out in the different reasons research participants gave for taking part in the central activity system of rainwater harvesting and food production, for example: water security (quality and quantity), food security (social and intrinsic), proximity and time and NGO involvement (see Section 7.1). There exists an interplay of explicit and implicit reasons such as intrinsic motives for gardening and the need

for a reliable and better quality supply of water closer to their homes. An example of this interplay can also be drawn from how the research participants learned within the rainwater harvesting and food production activity in that a research participant's learning may have been mediated invisibly at home through a parent's or spouse's gardening practice prior to receiving explicit training concerning this activity (see Section 7.2.2). This implicit mediation may determine how that research participant responds to explicit forms of mediation of specific concepts and horizontal discourses around rainwater harvesting and home food production (see Section 3.3.3).

Section 7.3 then presents in detail how implicit mediating processes interact with explicit ones. For example, when selecting workshop participants, the fact that research participants in Cata were already gardening and involved in those practices (implicit) mediated their position in being chosen (explicit) for the workshops (see Section 7.3.1.2). The interplay of mediating processes and generative mechanisms such as the power dynamics (implicit) within communities and gaining the trust of those who receive training around rainwater harvesting (explicit) affect the uptake of new knowledge and these practices (Section 7.3.1.6). The case of negative attitudes and stereotypes by South African youth of home food production, linked to the generative mechanisms of modernisation, is also an example of how both implicit and explicit socio-economic and cultural contexts dictate the goals and practices they engage in (see Section 7.3.9).

Implicit and explicit mediating processes therefore are constantly interacting, whether one is conscious of them or not. By their very nature, implicit mediating processes are often invisible, making them harder to identify but Wertsch's (1998) analytical framework of mediated action makes it easier to understand the impact of implicit mediating processes on action, as does the stratified ontology of critical realism (Section 3.9.2.1) and Archer's explanations of the primacy of practice and emergence. Although all of Wertsch's ten claims of mediated action are important and useful (see Section 3.7.1), of specific interest to understanding how the implicit and explicit interact is Wertsch's (1998) fifth claim which argues that mediated action has the potential to both enable and constrain learning and action. He argued that because the cultural tools individuals employ in their daily lives are products of social and cultural structures, they have the potential to manipulate us into behaving in certain ways. This is important to the context of women and water and food security practices in South Africa because an understanding of the underlying structural constraints to

these women's learning, decisions and life courses is essential when seeking emancipation from these constraints via support or improvement of their rainwater harvesting and food gardening practice.

This is closely linked to Archer's (2003) morphogenic approach where individuals (e.g. the women in this study) are active agents in their own development but do not act in settings entirely of their own choosing, where structures have the causal potential to either constrain or enable human agency (see Section 3.9.2.2). Archer (2003) reminded us that social and cultural structures do not possess an intrinsic ability to constrain and enable but instead have *causal powers* (both social and cultural) that rely on agents to activate them when they (agents) undertake a project. As can be seen from this study, people are *constrained and/or enabled* by social and cultural mediating processes such as the ones identified in Chapters Five through Eight when they envisage a project or certain course of action that they would like to take. Examples of social causal powers are distributions, roles, organisations or institutions and within this study this was seen playing out in the donation of rainwater tanks by the Department of Water Affairs and district municipalities (see Section 5.4.4 and 6.2.7), follow-up visits by organisations, committed and knowledgeable facilitators and hands-on, practical training sessions which all worked toward enabling home food production (see Section 7.3.1). Examples of cultural causal powers include propositions, theories or doctrines and in this study this was seen in the way certain organisations and trainers approached their training methods (see Section 5.4 and 6.3) and the clash between permaculture methods of gardening and mainstream government methods and policies and the constraints these had on the practices of home food production (see Section 7.3.10).

This study also showed that social and cultural mediating factors also *differentially enable or constrain* the agency of individuals and/or groups in that agents might choose to pursue different courses of action because they are situated in different social contexts (Archer, 2003). An example of this from this study is the differential ways people chose to work around the problem of illiteracy either by learning through practical learning activities or by drawing on the help of those who could read such as school learners, depending on what resources were available to them in their specific contexts (see Sections 7.2.1 and 7.3.1.12). Anticipating and working around enablements and constraints, the two key emergent properties of social constraints and enablements that Archer (2003) identified as being important for reflexivity and agency, can be seen playing out in the lives of the research

participants in this study. In the case of Elizabeth Flipp (Section 6.4.1), for example, she *anticipated* that she would be constrained by unemployment and had a degree of freedom to choose to *work around this* economic constraint by pursuing the course of migration in order to find a job in a neighbouring town. Individuals are thus to some extent free agents acting within social and cultural structures and constraints, and influenced by these, they pursue their own goals, form life projects and can also choose to cease to follow existing norms and rules and suggest others (Sannino, Daniels, & Gutierrez, 2009). Another point pertaining to the constraints and affordances of mediational tools identified in this study is that one can usually only recognise the constraints imposed by cultural tools in retrospect when compared to the present. It is only when a new and further empowering (and constraining) tool is introduced, for example, that the limitations of earlier ones are recognised. This was seen in the lives of research participants whose food gardening practices changed dramatically when they invested in rainwater tanks that were closer to their homes and they therefore did not need to spend time and energy collecting water from nearby rivers or communal tap stands (see Section 7.1). This reflects the views of Vygotsky and Engeström whose work addresses the issue of expansion of cognitive ability and activity. Vygotsky's work is famous for suggesting that development occurs first on the interpsychological plane and then on the intrapsychological plane, a perspective that Engeström took further into his work on the development of human activity after Vygotsky.

Another of Wertsch's (1998) observations about mediated action of relevance to the findings of this study is that it usually serves multiple purposes or goals which are often in conflict with each other (Wertsch, 1998). The goals of the agent may therefore conflict with the embedded goals of the tool (Section 3.7.1). For example, the QBLR was developed around how to harvest rainwater using plastic rainwater tanks. The goals of the research participants may be different from those presented in the learning resource however as was documented in Chapter Eight with some people interested in problems shaped by their particular contexts such as flooding, conserving water in water scarce areas and harvesting overflow from water tanks (Section 8.3.2). Mediated action is therefore not neatly organised around a single, identifiable goal but multiple goals interact and conflict with one another. This was seen in the broader areas of interest that were discussed in relation to the QBLR such as unemployment, the urban/rural divide, the division of labour between women and men, the

differences in the generations and parenting and engaging in sustainable practices (see Sections 8.2.1.2 and 8.2.2.2).

Wertsch's (1998) tenth claim of mediation is also important for a discussion around structure and agency and change-oriented learning in the context of this study. If one of the solutions or driving forces towards social transformation is education then power and authority as inherent tools in mediated action must be acknowledged. This study has shown that socio-cultural settings inherently involve power and authority which are usually located in individuals, ideologies or institutions, to name a few. By focussing on the cultural tools that mediate action, the socio-cultural embeddedness of power and authority inherent in human activity can be addressed. Wertsch (1998) argued that the socialisation of knowledge occurs in an environment that privileges certain knowledge over others due to certain values. This is why certain knowledge is publicly available and other knowledge not, and why certain solutions to problems (the use of GMOs and monocropping) are viewed as inherently more appropriate or powerful when other solutions would work equally as well (seed diversity and permaculture methods). An example of the inherent power of cultural tools in this study is the power of agricultural biotechnology corporations such as Monsanto which aggressively drive the use of GMO foods compared to often less powerful civil society organisations such as the TCOE who call for food sovereignty in the form of non-GMO seeds (see Section 7.3.10). Another example of how power and authority either constrain or enable the lives of research participants in this study was the link between service delivery and inequality (see Section 7.3.12). Only by acknowledging how mediational means shape human action can people challenge why certain cultural tools are used and not others and who decides what cultural tools are used. Researchers and practitioners must therefore acknowledge and seek to understand how power mediates within the context of learning: between social action (agency) and social and cultural transformation and reproduction (structure).

Linked to power and authority is the relation between power, social position and identity (see Section 3.7.1). The social roles individuals occupy and/or adopt also mediate how they teach, learn and practise their rainwater harvesting and food gardening. Most of the people who practiced food gardening in this study were of the older generation and were mostly women (see Section 2.2.4). Some of the women in this study occupied the social position of being the main breadwinners of their households, having to feed their families on tight budgets. It was thus in their interest to learn and practise how to secure water in order to grow food for their

households. The context individuals are embedded in influences the practices they engage in, the social positions they take up and thus their identity construction. An example of this in this study was the way in which it was perceived that some youths construct their social identities as individuals of a ‘modern’ or ‘urban’ culture and sought to distance themselves from ‘rural’, agricultural activities such as rainwater harvesting and home food production (see Section 7.3.9). Working within the specific contexts and therefore with the social positions people occupy is congruent with situated learning theories and is a positive step toward developing relevant and helpful learning resources. Starting with the knowledge people already have of their practice in context will naturally resonate with them, and they can thus build their knowledge further on that familiar foundation. This is in line with Burt and Berold’s (2012: 10) argument that “people need knowledge that is directly relevant to their context that leads them to question their own behaviour, and that of their families, communities, institutions and societal structures such as government”.

9.1.3 The interaction of implicit and explicit mediation has implications for learning, facilitation of learning and social development in rural water and food security practices

Understanding the dialectical interaction of implicit and explicit mediatory processes aids in understanding the interaction or relationship of how people act and learn within their environment. This in turn brings us closer to understanding the dynamics between structure and agency or in Archer’s (1995: 194) words, how “the ‘parts’ and the ‘people’ shape and re-shape one another through their reciprocal interaction over time”. Knowledge and learning is therefore a product of both the internal and external world. Working within the causally efficacious constraints and affordances spoken to above, humans can either transform or reproduce social and cultural structures. This is an important dynamic to understand when trying to bring about societal transformation through education.

Sannino et al. (2009) argued that in order to bring about change in an activity system such as rainwater harvesting and food gardening, re-mediation is needed. Re-mediation is understood as “a process of reflection” where actions are re-mediated or replace an old mediation with a new one and therefore give rise to a new action or even a new activity (Sannino et al., 2009: 84). We seek to change activity systems when tensions and contradictions arise within them by reflecting on these and understanding the possibilities of how to change activity by way of a new mediation. Engeström (2005, in Sannino et al., 2009) referred to this kind of research

as interventionsit methodology. Real change or transformation however only comes about when those under investigation as the objects of research accept the results and are able to suggest a project for generating new activity. Otherwise, the object of research does not change. Sannino et al.'s (2009) re-mediation project is similar to Lotz-Sisitka's (in Burt et al. 2013) dialectical knowledge flows addressed in Section 9.1.2 where learning as a reflexive processes has the potential to bring about social change.

Relevant to this study, this re-mediation process requires an account of the real history of an activity system as well an understanding of the generative mechanisms, events, experiences and processes in order to generate new practice (Sannino et al., 2009). This is in line with Chaiklin's (2012) third claim of Marx and Vygotsky's dialectical tradition where social science research should aim to understand the historical conditions of human life as opposed to merely describing them, and critical realism's commitment to dialectical transformative praxis that is grounded in an understanding and analysis of a stratified ontology (the real, actual and empirical). This current research study can be understood as a kind of reflection on human activity (rainwater harvesting and food gardening) in order to change its objects (to shape improved practices of rainwater harvesting and food gardening). Although mine was not an interventionist study, I positioned the research as the first step toward transformation by presenting an understanding of the real history of the central rainwater harvesting and food gardening activity system (Chapters Five and Six) and its real entities and generative mechanisms (Chapter Seven and Eight). I took account of the history, the generative mechanisms and emergent properties, as well as the real events in order to be able to reflect on these in the hope that these be taken further in future studies in order to bring about change.

The development and introduction of the QBLR into the two case study sites can be understood as a re-mediation process in and of itself. It developed or emerged from the implicit and explicit mediations that I observed in and through the contextual profiling and activity systems analysis of the research participants. As a team we then reflected on and reinterpreted the questions and learnings of research participants as described in some detail in Chapter Eight. Research participants' actions were reinterpreted, or given a new mediation, and as a result generated another collective activity: discussions groups around the QBLR. The re-introduction of the QBLR into Cata and Glenconnor was then another re-mediation or iteration process for engaging with the central activity, the potential of which could still be

further explored outside of the scope of this study. This re-mediation process showed that learning resources cannot simply be ‘dumped’ on people because learning is emergent from people in their specific contexts (see Section 1.6.1.1). The implication for understanding the interaction between the implicit and explicit therefore alerts researchers to the socio-cultural dynamics inherent within social learning processes, and the importance of re-mediation. Sannino et al. (2009) regarded re-mediation as an important process of double stimulation, which in Vygotsky’s theory was seen to be central to the development of higher order thinking, and in Engeström’s work is seen to be central to the development of new human activity. Development of new human activity in response to social-ecological degradation and risk is one of the key objectives of environmental education, hence the need for a more in-depth and nuanced understanding of the importance of mediation and re-mediation.

Research into change-oriented learning and sustainability practices within this study has led to three important findings. The **first research finding** is that **learning is embedded and emergent from context**. With reference to the mediation of learning, learning must be situated in specific socio-cultural and social-ecological contexts and practices, and the learning must emerge from the context of the practices. This finding addressed the first research question and was answered in Chapters Five, Six and Seven.

The **second research finding** is that **implicit and explicit mediation processes interact in a dialectical relationship in relation to the activity**. Understanding learning and knowledge as dialectical results in learning being understood as a reflexive and emergent processes, thereby opening up a space to change the activity and ultimately move toward social transformation. This finding addressed the first research question and was answered in Chapters Five, Six and Seven.

The **third research finding** concerned with change-oriented learning is that **the dialectical interaction of implicit and explicit mediation has implications for learning** in that when learning is situated in the context of practice it can be expanded in ways that lead to changes in practice. This has further implications for the facilitation of learning and how learning resources are developed in the nexus of rural water and food security. This finding addressed the second research question and was answered in Chapter Eight.

9.1.4 New knowledge contribution

This study contributes to new knowledge in two areas: the environmental education (EE) field and the water knowledge sector.

Within the field of environmental education, in which this study is located, this thesis makes a new contribution to the body of knowledge concerned with socially mediated learning and situated learning approaches, captured in the three sections above. As discussed in Chapter Two (Section 2.3), over the past 40 years the socio-historical origins of environmental problems has been acknowledged putting forward environmental education as a response to these risks. Authors in the field of environmental education and social learning call for more reflexive ways of thinking and acting in a world that is constantly changing. As our world and the problems we seek to solve keep changing, we ourselves need to be changing. As routine problem solving will not work and has not worked so too routine methods of teaching and learning, of simply dumping or downloading information onto people, will not work and has not worked. The concept of mediation thus argues for the importance of accounting for different lived experiences and the social and cultural systems that impact upon our lives and how we as humans either maintain (morphostasis) or change (morphogenesis) these (see Section 3.9.2).

As indicated in Chapter One, when the WRC project that this study formed part of was initiated, it was in response to findings by Burt and Berold (2012) that learning resources only worked if mediated into the context of practice. However, the conceptualisation of mediation was limited to a notion of mediation as face-to-face learning interaction. This study has significantly deepened this understanding of mediation in the context of the WRC project in that it has highlighted the importance of being aware of and understanding the different institutions and regimes that impact on the lives of rural South African women. This has been demonstrated through the narratives of each woman, bringing out their voices and drawing attention to both the implicit and explicit mediating factors which either constrain or enable their practice and how they work with or work around these. This study also has a wider application to the field of environmental education in that it puts a strong case forward for how learning resources should be developed out of these contexts as opposed to separately from them.

The study has also shown that the concept of social learning is variously interpreted, with little emphasis on mediational means and processes. The study achieves its contribution through the carefully considered way in which mediation is theorised and presents the theories pertaining to this field as well as the empirical and social realist insights gained through the study, i.e. via an iterative and abductive engagement with theory and empirical data. One of the understandings of what social learning is is a process that uncovers what people want to learn, how they learn, how people overcome personal biases and group thinking and how people can become more sensitive to alternative ways of knowing, valuing and doing as opposed to what people should know or be able to do. One of the ways to uncover how people learn or what they want to learn is by understanding the different mediation processes impacting upon their lives. The literature reviewed on mediation (Chapters Two and Three), contributes to a new understanding of what mediation looks like in the context of social learning in that I present in detail *how learning is embedded in context* (Chapters Five through Seven) and also *how learning emerges in relation to context via interactions between implicit and explicit mediation processes* offering a dynamic and relational perspective of context (Chapter Eight), and what this means for learning and development in the rural nexus of water and food security practices, with a specific focus on women food gardening practitioners.

At an international level, this study also contributes to the growing body of knowledge on cultural historical activity theory as it shows the dialectical relationship that exists between implicit and explicit forms of mediation as these are embedded in, arise from, and are externally mediated into activity systems in rural community contexts. Even though authors such as Sannino et al. (2009: 94) considered mediation ‘*the key*’ to the understanding of activity, Engeström (in Sannino et al., 2009: 94) argued that he found it “somewhat amazing that in the recent theoretical discussion concerning the concept of activity, very little attention is paid to the idea of mediation”. Engeström (in Sannino et al., 2009: 94) asserted further that mediation is “the first prerequisite for any fruitful elaboration” into activity. In my literature search I was also hard pressed to find studies that focus specifically on the relationship between implicit and explicit mediation, more so in the southern African context. The study thus also contributes to the emerging body of southern African cultural historical activity theory research in environmental education (Mukute, 2010; Masara, 2010; Lindley, 2014; Olvitt, 2012) as none of these scholars have theorised mediation in any detail, although such mediation processes are visible in their studies.

The second area of knowledge contribution of this study is within the water sector itself. The production and use of water knowledge in the water sector in South Africa has been identified by the Water Research Commission as problematic (Burt & Berold, 2012; Lotz-Sisitka & Burt, 2006). As has been noted before, within the water and agricultural sectors many knowledge learning resources are available but most are too technicist or too little is known about which ones work best and why (Burt & Berold, 2012; Viljoen et al., 2012). One of the goals then of this study was to gain a better understanding of these implicit and explicit mediating factors that shape water knowledge and people's practices (within this study, specifically to do with the knowledge and practices of rainwater harvesting and food gardening in rural areas amongst rural women) in order to demonstrate to this sector the kinds of factors that need to be accounted for when developing, disseminating and mediating knowledge resources in such contexts. This study therefore contributes to new knowledge through *piloting a learning process* itself for how to develop learning resources in a way that is sensitive to and engages with with the different mediating factors that play out in the lives for whom the learning resources are developed.

This process of developing learning resources also suggests an emancipatory bent to the work as it seeks to put the power and agency back into the hands of the actual people who have and use the knowledge on a day to day basis. This then responds to a call from authors such as Viljoen et al. (2012: 133) who found that agricultural extension services are delivered in a "directive and modernist top down approach" where local farmers are "relatively passive recipients of this science and knowledge". With a background in anthropology which sensitised me to contextual factors and approaching this study through an educational lens, I have worked with the data in a way that has surfaced and presented the nuanced mediating processes that affect the learning and knowledge around water issues in rural contexts. This way of working and this focus on research is relatively new to the water sector in South Africa, and it gains significance in the light of an emergent interest in more complex social science studies in the water sector which has traditionally been dominated by natural sciences and engineering (Munnik & Burt, 2014). Of interest to the national and international community is the sociological context in which the study was conducted, i.e. the context of rural poor women's food security enhancement, which is well recognised as a critical area for emancipatory practices and vulnerability reduction (e.g. in all regional climate change policies such practices are foregrounded as requiring urgent attention).

This study also drew on a wide discipline base for conceptualisation from the fields of philosophy, psychology, sociology, anthropology and education. The field of philosophy was drawn upon, for example, when discussing the ontological basis for the study of a relational ontology as reflected in critical realism and social realism (see Section 3.9). The implication of a relational ontology for a study such as this is that the object of study is acknowledged as moving and dynamic, as located in particular social, historical, ecological and economic contexts which it influences and is influenced by. It is out of this dynamic and fluid space, where actors are positioned (or socially embedded) in relationships and stories that shift over time and place, that real meaning and interaction arise. This study thus focused on the mediational processes that shape learning, examining the interplay of practices, structures and mechanisms *across time and place*.

The fields of developmental psychology and sociology were also heavily drawn on in order to explicate Vygotsky's theory of mediation and the social formation of the human mind (see Sections 3.1 to 3.7). The relational notions of 'practice', 'culture' and 'context' and their implications for human development and learning are widely theorised within the discipline of anthropology as well, and these perspectives helped to provide further nuance and insight into the educational research questions of the study. The implication of understanding practice, culture and context as dialectical, relational and recursive is that it shapes how mediation is understood in this current study. Learning rainwater harvesting and food gardening practices therefore are both shaped by and shape the context in which they occur.

The education field is the primary field in which this study is situated and was drawn on heavily in order to make sense of the growing body of knowledge around socio-cultural theories of development and learning as well as education's role in addressing sustainability challenges (Chapters Two and Three). In this study sustainability is understood as having more to do with seeking systemic change as opposed to merely linking social, environmental and economic systems together. By piloting a new process of developing learning resources, this study attempts to move towards new ways of operating within the educational system, albeit in a small way. This study has also considered the relationship between various theories carefully, for example, I have related Vygotsky's (1978) mediation theory with Archer's (2003) notion of agency, thus showing how the concept of 'agency', 'mediation' and 'context'

are related in human learning and change.²¹ Constructing a coherent argument across all these different disciplines was challenging but I endeavoured to ensure that the literature reviewed carries a strong internal order.

This study has also sought to demonstrate considerable rigour in its research design, conduct and in the detail of how it was presented. In terms of the design and application of field instruments, this study has combined CHAT with narrative inquiry as a methodology in order to provide the explanatory space to interpret practice as activity and explore the link between event and context, thereby exploring the mediating processes inherent in practice and providing insight into how to develop context-specific learning resources. Combining these two methodologies produced a richly textured research design, enabling me to lift out both the the implicit and explicit mediation factors in research participants' lives. CHAT and its activity system heuristic provided an organised way to make sense of detailed cultural historical data. The narrative approach then complemented CHAT in that it firstly provided personalities from behind the data as well as a voice for each research participant and secondly, through telling research participants' stories through narratives, I was able to surface the mediating processes which became evident through the themes in their stories, as well as insights into agency and change. This was helpful as implicit mediating processes are especially difficult to identify, and was also aided by critical realism's commitment to depth ontology (see Section 3.3.1). I also employed traditional research methods such as semi-structured interviews, observations and focus group discussions in investigating how implicit and explicit mediating processes interact. As discussed before (Chapter Four) combining these research tools enabled me to produce a rich data set which also contributed to my attempts to ensure that the study's findings are both valid and trustworthy. This study has therefore sought to contribute to new knowledge in the socio-cultural field of education and development as well as in the water sector.

9.2 Recommendations and conclusion

²¹ The contemporary relevance of this can perhaps be seen in the conference theme and focus of the International Association for Critical Realism conference held in July 2014 by the International Centre of Critical Realism (ICCR) at London Institute of Education. The conference sought to focus on the work of Vygotsky in relation to critical realism. It is also interesting to note that Iskra Nunez has recently published a book (2013) on a critical realist approach to cultural historical activity theory.

As stated across the thesis, the core focus of this study was the contextual mediation of the practice and learning of rainwater harvesting and food gardening and how explicit mediation expands social learning in this context. The findings of the study revealed that social learning in rainwater harvesting and home food gardening is both implicitly and explicitly mediated by socio-cultural, historical, political and economic processes and tools, as well as by agentive factors. The implicit and explicit interact all the time, whether people are conscious of this interaction or not. This interaction needs to be taken into account in order to understand how they interact in learning environments because they drive a complex non-behaviourist social learning process of how people think, act and learn.

In terms of identifying new and emerging issues worthy of investigation, this study recommends that research institutes such as the WRC, NGOs, tertiary institutions and any other bodies who seek social transformation through the vehicle of education need to take the following recommendations into account:

1) The interaction between explicit and implicit mediating processes in specific contexts needs to be understood when developing learning resources and implementing social and environmental development interventions.

Water practices and water knowledge take place within a specific cultural landscape marked by its own social, economic, knowledge and material culture (Strang, 2004). Decisions around how to use and manage water are thus often informed by broader social structures and mechanisms such as the cultural values of a particular society. This is important to keep in mind when considering technologies or solutions that are often assumed to be able to be ‘exported’ from one context to another. Of particular concern to this study is the argument that technologies and ‘solutions’ cannot merely be exported from context to context and that the contextual factors and social processes of each particular context need to be accounted for as they act as mediators of learning, practice and participation in very specific ways (Lotz-Sisitka & Burt, 2006). Many assumptions are made about how people learn and the different mediating processes (implicit and explicit) that have bearing on this learning are usually not considered. These mediating processes need to be understood (as explicated in depth in Chapters Seven and Eight) when designing learning resources and development projects. This study has shown that in understanding that learning is embedded in and emergent from

context, new contextually relevant re-mediation learning resources can be developed that can become more accessible to their audiences.

2) Further research can be undertaken through re-mediation or expanded learning phases in order to bring about actual change within these rainwater harvesting and food gardening activity systems.

As explained above and in other chapters (see Sections 3.8.4 and 3.8.6) this study does not enter into what Engeström (2001) termed the expanded learning phase where the object of an activity system is reflected on, changed or generates a new activity. As this study considers the historicity and mediating processes of the activity system only, there is therefore scope to take the study further into the re-mediation or expanded learning cycles. The methodology and process followed to develop the QBLR (see Section 8.1) can also be extended or piloted in other contexts in order to test if it is an effective way of designing knowledge resources that resonate with people's contextual practices and their learning.

3) Taking account of of the practicalities of the lives of women on the ground when seeking to implement educational interventions in rural and peri-urban contexts in South Africa.

When seeking to implement educational interventions on the ground with women in rural contexts in South Africa it is important to account for several practicalities in their lives such as relevance of content, individuals worked with, managing expectations, practical training sessions, follow-up support, language, time and space. When working with these often busy and responsibility laden women, it is important that educational or developmental interventions speak to the realities of their lives. Relevance of content points to the very subject of this thesis in developing learning resources alongside the individuals and groups they are intended for so as to create a space in which to reflect and improve on the practices in which they are engaged in. One of the mediating factors for successful educational and developmental interventions which surfaced in this study is to work with individuals and groups who are already interested in and working on a certain practice (see Section 7.3.1.2).

When working with women on the ground in these interventions expectations must also be managed (Section 7.3.1.3), training must be kept practical which also speaks to relevance of content (Section 7.3.1.4) and follow-up support must be offered alongside these interventions

(Section 7.3.1.9). As discussed in Section 7.3.1.11, language is also an important mediator of learning. Educational interventions must therefore be engaged with in the language of the groups they are intended for.

In terms of time, practitioners and researchers must not only be specific and clear about the time required from women when working with them on interventions (see Section 7.3.1.7) but must also be cognisant of the time of year these are commenced and implemented. For example, as was explained in Chapter Four and Five, educational interventions may not be a priority of focus for community members when important year end religious and cultural ceremonies such as initiations require women's time and energy in their households. Space is also an important practicality to account for when working with women on the ground. Many of these women do not have their own transport or live in small villages where public transport is not available. Means for them to get to training or meeting venues must be therefore be arranged. Taking account of practicalities such as these of women's lives on the ground may potentially determine the success of educational interventions.

In conclusion, this thesis stands as a reminder to listen more carefully to the voices that have been silenced by the vast amounts of literature, books, manuals and programmes based on 'expert' knowledge. The water sector (as well as other sectors such as the agricultural and development sectors) has seemingly forgotten to listen to the most important people to consult: the people for whom the water knowledge is produced. As testament to this, many of the water knowledge and learning resources produced are inaccessible and irrelevant to the daily water and food security activities of the people and communities at which they are aimed. In the hope of bringing about any kind of sustainable socio-ecological transformation through learning and education, practitioners, NGOs, and research institutes such as the WRC and universities have to start engaging people within their particular contexts. They need to understand why they do the things they do, what drives them, what they are struggling with, how they think they can solve them, what they want to learn, what they know already, how they want to learn and to also identify the things that implicitly mediate people's activities without them realising it. Taking the time and effort to listen to and understand the lived experiences of rural South African women is a step towards emancipation and empowerment of this group as it acknowledges and legitimises their valuable knowledge and important roles concerning food and water security. Co-creating and collaborating on educational

interventions invites individuals and communities of practice to engage and reflect fully on their practices as opposed to being passive recipients of information. The overarching message of this thesis then is that the lived experiences of individuals are the starting point when producing and designing (water-related) knowledge and learning materials for practices at a community level. If the idea is to facilitate learning that supports people's agency, then the relationship agency has to the mediating processes that either constrain or enable learning and practice, also needs to be understood, as shown across this study.

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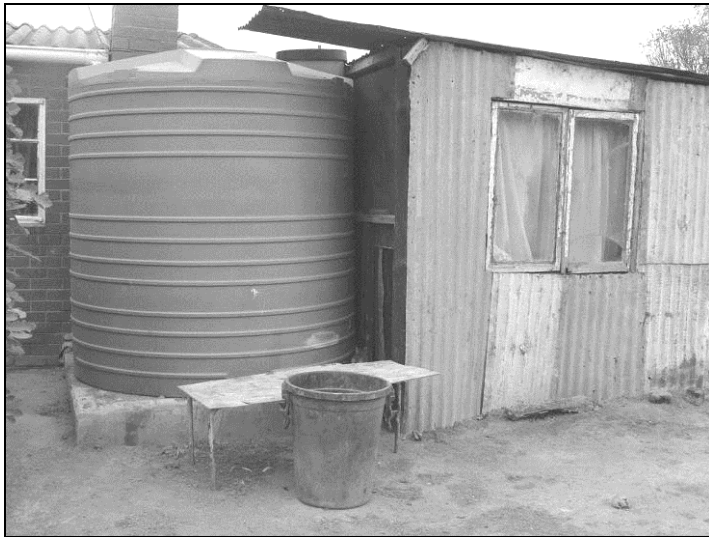
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APPENDICES

Note: Appendix 1 is included at the end of this thesis. All other appendices can be found on the CD that accompanies the thesis.

- Appendix 1 Final version of Question Based Learning Resource (QBLR)
- Appendix 2 Sample of primary research participant interview (Cata) and contextual interview (Glenconnor)
- Appendix 3 Excerpt from field journal of sample observations
- Appendix 4 Sample letter of informed consent
- Appendix 5 SANPAD workshop meeting minutes
- Appendix 6 Sample of semi-structured interview schedule (Cata)
- Appendix 7 Sample follow-up interview schedule (Cata)
- Appendix 8 Draft Question-Based Learning Resource
- Appendix 9 Sample socio-demographic information form (focus groups-Glenconnor)
- Appendix 10 Sample Kouga Urban Harvest workshop programme
- Appendix 11 Sample of Border Rural Committee Annual report
- Appendix 12 Monde Ntshudu and Ewald Kruger focus group discussion reports
- Appendix 13 Umhlaba Rainwater Harvesting Tank Installation Statement of Responsibility and Maintenance Guidelines handover forms
- Appendix 14 Earth Harmony Innovators trainers' list of indicators for garden success
- Appendix 15 Focus group semi structured interview schedule

Rain Water Harvesting for Homes and Home Food Gardens



Tim Wigley & Robert Berold

Resource document for WRC project K5/2074/1

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WELCOME!

What is this book about? It is about different ways to harvest (catch or collect) and store water.

Here is an outline of each section.

Section 1: My Water Needs invites each one of us to think carefully about water in our own lives. It opens the way for us to bring our own knowledge and challenges into the book as we read it.

Section 2: Using Tanks to Harvest Water. This tells us about different kinds of tanks, how they work and how to get the best from them. We also hear from people who already have tanks.

Section 3: Working with Nature to Store Water. How to work closely with nature to harvest and store water in the soil.

Conclusion: Has this book been useful? What we have learnt from this book, and how to continue to improve our water harvesting systems.

Who is the book for? It is for people who help rural communities to use knowledge to improve their lives. Such people are often called mediators and sometimes they may be called Mediators.

Where does the information come from? The information was collected by *researchers* who spoke to people living in two places in the Eastern Cape – Cata near Keiskammahoek and Glenconnor near the Sundays River. Residents in these places told the

researchers about their experiences with water. The writers of the book used this information along with information from experts who know about methods for collecting and storing water.

word help: *researcher* – a person who gathers information (by talking to people, reading, observing, or doing experiments).

SECTION 1: OUR WATER NEEDS

[Mediator, please refer to Mediator Note 1]

Let us start by talking about our own water needs and looking carefully at the water that is in our own home and yard. To do this we will answer three important questions that will make this book useful for us.

Question 1: What do I need water for?

This is an easy question, but the answer is not the same for everyone. Some people already have water for drinking and washing but they need water for gardening. Some people have enough water, but it is too dirty to drink. Do you have enough water for the needs of your family? If the answer is no, then tell the group about your water needs.

Question 2: Where (in the yard) is the water flowing when it rains?

Look carefully at the way water runs in your yard when it rains. You will notice that it runs fast over hard earth or cement but slowly over grass.

Does your roof have gutters? Does it have downpipes?

Do you have a water tank next to your house?

Let us look at some examples.

- Mrs Jojozi's house has no gutters, so the rain water runs off the edges of the roof. When it

falls on the ground it makes many small streams and pools around the yard.

- On Mr Mpofu's house the water runs from the roof into the roof gutters and then down the downpipes. But Mr Mpofu has no tank to collect all this water. In his yard you see rain water coming out of the downpipes and running over the ground. This water has made two channels across Mr Mpofu's yard and in one place it lies in a muddy pool.
- Mrs Tyatya has gutters and a short downpipe that takes all the roof water into a small storage tank.

Question 3: What is the best way to catch (harvest) rain water for our needs?

Now we need to look both at what we want and what we have already.

- Mrs Jojozi wants clean water at all times. Sometimes there is no water in her yard tap and sometimes the water from the tap is muddy. She says she would like gutters on her house and a down pipe and a storage tank.
- Mrs Tyatya already has a storage tank but it is very small. In the dry season she needs extra water for her vegetable garden. She says it is too expensive to get a bigger tank. She is looking for another way to store water.

There are a few different ways that we can catch and store water. These are:

- in a pond (this is simply a hollow in the ground that holds some water),
- in a dam
- in an above-ground tank (like a Jojo tank for example),
- in a below-ground tank, which is also called a reservoir.

(We will discuss these water storage methods in Section 2.)

Another way to meet our water needs is to *channel* water via a *furrow*.

word help: to *channel* water means to move water in the direction that we want it to run. A *furrow* is a ditch which is dug by somebody.

Another way to store water is to help the water to soak into the ground. (Section 3 tells us about different ways to get the soil to hold water.)

Now that we know what each person’s water needs are, let us find out how we can use different kinds of water tanks.

SECTION 2: USING TANKS TO HARVEST RAIN WATER

[Mediator, please refer to Mediator Note 2]

In this section we look at different kinds of tanks and think about which kind of tank to use. We discuss collecting roof water in a tank and collecting ground water in a tank or *reservoir*.

word help: a *reservoir* is a large tank that is bigger than most plastic or metal water tanks. It is usually built with cement. It can be built above or under the ground. Municipalities build very large reservoirs to store water for towns. Smaller reservoirs are used by farmers and rural communities.

Why are rain water tanks important?

Rain water tanks give us water security for our homes. They store water for use in our houses or gardens. If the water from the municipal tap runs dry we can use the water in our tank. The water in tanks can be used for drinking because it comes straight off the roof into the tank.

A Cata resident says: “With a tank you are able to store water for future use. Even if there is no rain, you still have access to water – this is all because of water tanks.”

Another resident says tanks save time and labour because they are able to harvest water even when you are absent: “To collect rain water you don’t have to be at home when it is raining.”

People in the Cata area say they cannot rely on the municipal water supply and sometimes the local taps break.

Mrs Bolekwa Ntusi describes how people in Nyanga near Cata cannot rely on tap water: “There will be a call from one community member that the water in the taps is available. We all go and line up for that water, but the water usually runs out before all of us actually get to it.”

Mr Elliot, who is from the Glenconnor area, says he is glad to have a water tank because the water from the municipal taps is sometimes dirty. A Cata resident says, “Tank water tastes far better than river water, and you don’t have to spend time cleaning the water before drinking. It is healthier than our river water.”

Another reason that many people want tanks is that some young people no longer want to fetch water in the way that their parents did.

Feelings about water fetching: Most people want water tanks in their homes. But, as with any change, there are things gained and things lost. In the old days women would go down to the river together, so fetching water was a social activity. It was a time when they found out about each other’s lives so that it was easier to offer support when needed, or to celebrate good things. In communities that have water tanks, this communal activity of water fetching has fallen away. But there are still many households where people have to go and fetch water manually. Some young people do not want to spend time doing this.

An elderly man from Nyanga (near Cata) told the researchers

that he bought a tank for his household partly because of his children’s attitude: “My youngest children, especially the girl, didn’t want to go to the community tap. Traditionally when they go and fetch water they put the bucket on their head, but this generation no longer want to do this, they worry about their hairstyles. For them, fetching water is old-fashioned. This is why I decided to buy a tank.”

Rain water tanks are very useful for watering gardens. Mrs Ntusi says she suffered badly in the drought of 2006-2007 because she did not have a tank, so she could not water her vegetable garden. Now she has a tank so she can water her vegetables even when there is little rain.

In Cata and Glenconnor all the people that the researchers spoke to said it was a good idea to buy a water tank. The tank is right at the house so they don’t need to waste time fetching water from communal taps, or from the river.



Another good reason to get a household water tank is that clean water helps us to stay healthy. For example, people who have water at home find it easier to wash their hands after using the toilet, or

before preparing food, eating, and caring for children or sick people.

What kind of rain water tank should we buy?

There are three choices: corrugated iron tanks, plastic tanks, or ferro-cement tanks.



Corrugated iron tanks are strong, but after a few years they begin to rust and start leaking. You can patch leaks in corrugated iron tanks. An elderly man in Nyanga has filled the cracks in his tank many times. He managed to use the tank for 40 years. “The tank is very old now,”

he says, “I can’t fix it anymore.” This man now has a plastic tank.

Ferro-cement tanks are made by plastering cement over wire mesh. The materials for ferro-cement tanks are cheaper than those for other tanks, and they last longer. To build a ferro-cement tank will need help from someone who knows how it is done. And we must pay this person to build our tank. The tank must be built at the place where it will be used and it cannot be moved once it is built.

Plastic tanks are the most popular. JoJo is the most common brand, but there are others too. Some people have been lucky to get assistance from an NGO or government plan for plastic tanks. Jojo tanks are guaranteed to last for five years, and many have lasted as long as 20 years. They need to be protected from the sun. Some people have used shadecloth to do this, others have planted trees near their tank, or grown creepers over the tank.

In Cata and Glenconnor, all the people that the researchers spoke to said it was a good idea to buy a water tank. The tank is right at their house so they don’t waste time fetching water from communal taps or the river.

How much does a tank cost?

Tanks are expensive: for example, in April 2013 the price of Jojo tanks at Pennypincher’s in Grahamstown was R9 250 for a 10 000-litre tank and R3 700 for a 5 000-litre tank. In this case it is cheaper to buy two smaller tanks than one big one. In any case, smaller tanks may be easier if your roof is not very high, so the water can run down from the roof into the tank. When you buy a tanks (or tanks) you therefore need to think about the price and the size that the roof can accommodate. There are sometimes “specials”, so it is a good idea to shop around and check different suppliers. Mrs Castina Gcilitshama bought a tank for cooking, cleaning and washing: “I used to take the washing to the stream, carry it on my head – and it is so far! So I thought, if

I can buy a tank it will mean that I can have water here and don't need to go down to the stream. So as soon as I got money – it was pension money – I decided to buy this tank.”

Mr Joseph Njameni from Ndela says he cannot afford a rain water tank: “I just have to depend on the rain for my garden because the municipal taps are often not working. I would like to have a rain tank. But I'm not working, so I don't have money, that's the problem.”



Mr Joseph Njameni depends on rain water for his garden – he would like a tank

[Mediator, please refer to Mediator Note 3]

It is very difficult for people to find so much money, but some people manage to do this by starting a savings club or stokvel. When everyone is saving

together and encouraging each other, it feels like less of a burden.

A few years ago in Cata many people were given free rain water tanks by the Department of Water Affairs, Working for Food project. The tanks were distributed by the Border Rural Committee, an NGO working in the Eastern Cape. The Working for Food project invited community members who were gardening, or interested in starting gardens, to come together and support each other. Each member household was given three or four JoJo tanks, to be used for food gardening. The project also donated tanks to elderly people and to those who were struggling financially. A total of 50 families received rain water tanks.

To get support from NGOs we need to know their rules. For example some NGOs support groups but not individuals. Mrs Plaatjies from Glenconnor expresses her frustration about this: “There is an NGO group who wants to give us tanks but you must be registered as a group. We might have to work and work for maybe three or four years before the group gets money from growing vegetables. People don't like that. People want money now. They don't want to volunteer.”

How do I install a rainwater tank?

It helps to first look carefully at other people's tanks before you install your own. You can also get advice from neighbours who have installed tanks.

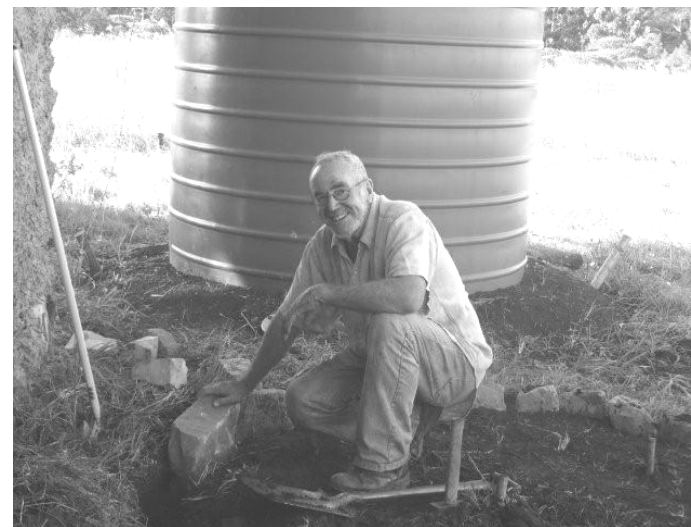
Two important things to know about installing tanks are:

- The top of the tank must be lower than the gutters of the roof. This is because water has to flow off the roof into the tank. (As we said earlier some people may need a 500-litre tank instead of a 10 000-litre one if the roof is not high.)
- The tank must stand on a firm and level base. The base can be made of soil or cement (note: this book does not provide information about cement bases, but a builder should be able to advise you).

Here's how to make a soil base: First put the tank in its place. Make a circle of stones around the tank. Then take away the tank. Fill the space inside the stones with soil. Stamp the soil so that it is firm. Take away any stones or sharp things that can make leaks in the bottom of the tank.

The soil base must be even (no lumps or ridges) and flat (no tilting to one side). To check that the base is flat use a spirit level. This is something you can borrow from a builder. When we put a spirit level on the ground it shows us if the ground is flat or tilted. It is important to place our tank on a strong

and flat surface and to prepare the surface with care.



Tim Wigley placing a circle of stones around a tank to begin making a base

On some tanks the tap is very near to the ground so there is not enough space to put a bucket under the tap (we can see this in the photo below). We can fix this by digging a hole under the tap for our bucket. Or we can fit a pipe onto the tank and put our tap at the end of the pipe somewhere away from the tank. But we must make sure that the tap is lower than the bottom of the tank, otherwise we will not be able to use all the water in the tank.



If the tap is near to the ground we can dig a hole for our bucket

Where is the best place to put a rainwater tank to catch water from our roof?

The best place is directly under the roof gutter, where we normally attach the downpipe. If this is not possible we can put the tank anywhere that is near to our house. But the tank must be downhill from our house, and the top of the tank must be lower than the roof gutter. We can then run a pipe

from our gutter to the tank. This pipe must be buried under the ground to the bottom of the tank base, and then it must come up to the top of the tank.

This pipe must be wide enough to carry water from a heavy rain. If the pipe is not wide enough, water will overflow from our gutter and be lost. It is cheaper to put a tank next to the house because a long pipe adds to the cost.

How do we maintain our tanks?

In the earlier section called “Why are rain water tanks important?” we learnt that we can get clean water from the roof of our house. However dirt can get into our tank if we do not install it properly and look after it. To make our tank work well we need to make sure that the gutters, pipes and the lid of the tank all fit properly.

People in Cata describe some of the problems they have had with tanks:

“Some gutter downpipes are too wide to fit into the hole provided for them in the lid of the tank. So some people make a bigger hole on the side of the tank lid to get the gutter downpipe into the tank. It is difficult to strain the water coming through this gutter: as a result anything can get into the tank making water difficult to clean.”

“Some people leave the lids of the tanks open because the gutter can’t fit into the hole and this results in tank water being dirty.”

“The lids of these tanks are loose, the water gets dirty easily.”

Group discussion: What are some solutions to these problems? For example, making our own filters and repairing lids.

What size tank do we need?

We already know that rainwater tanks can be different sizes, from small 500 litres up to 10 000 litres. The most popular size that you will normally see is 5 000 litres. If you have enough water coming off your roof and would like to store more than 5 000 litres you will need to find out if it is cheaper to buy one 10 000-litre tank or two 5 000-litre tanks. We saw earlier that at hardware shop in Grahamstown it was cheaper to buy two small tanks, but it is not the same everywhere, so you need to check prices. It is less work to install one big tank and also less maintenance. If you choose a big tank and the tank is higher than your roof gutter, then you need to position the tank away from your house lower down. Then a pipe is used to lead water from the gutter to the tank. You need to think about all of these things before deciding what size tank to get.

It also helps to think about how much water you can catch and how much water you need. Let us say, for

example, that your normal household use is 100 litres per day and you want the tank to hold water for 90 days (three months). This means you need to store 9 000 litres, so you should buy a 10 000-litre tank or two 5 000-litre tanks. On the other hand, if it rains a lot in your area, a 5 000-litre tank could be sufficient, as it will fill up once a month.

It is no use getting a big tank if your roof is too small to fill that tank. So before you choose a tank check how much water our roof can catch. First measure the area of your roof in square metres (sq m). Then find out how much rainfall is expected in your area per month. Every millimetre (mm) of rain produces 1 litre of water for every 1 square metre of roof.

For example, if we have 60 square metres of roof and we get 100 mm of rain (this is about average for Cata for a month of the rainy season) we will get 6 000 litres of water per month off our roof.

Mr Plaatjies of Glenconnor told us that rain is not plentiful in the Sundays River Valley. He said that even when his tank is full he uses the water only for drinking and cooking. This way he saves as much water as possible, since he doesn’t know when it will rain again.

Measuring and recording rainfall: To measure rainfall, we need a rain gauge: this is like a measuring jug in the shape of a cone and it has numbers on it. It must be installed outside in an open place. After rain we can see how full the rain

gauge is and read how many millimetres of rain have fallen. It is helpful if at least one person in the village keeps a rain gauge.

Each morning after there has been rain, we read the rain gauge to see how many millimetres of rain fell the previous day. Then we record the amount in a book, then empty the rain gauge. School children enjoy practical examples of the things they learn at school, so it is a good idea to get their help. It will encourage their interest in nature and science.

How much water is in our tank?

This is easy. We must knock on our tank just like knocking on a door. We will hear a dull sound where there is water and a different (hollow) sound where there is no water. Start knocking at the bottom of the tank and move up until the sound changes. This tells you where the water level is.

Some tanks have calibrations (marks like those on a long ruler or a tape measure) on the outside marked 500 litres, 1 000 litres, 1 500 litres, 2 000 litres etc. If your tank does not have numbers, you can mark it yourself with a permanent marker (khoki pen) or paint. Now you measure the height of your tank. If it is a 5 000-litre tank, you make a mark exactly half way to the top. Mark this "2 500 litres". Then divide the distance between the bottom and the half-way mark by five. Make five marks and write 500, 1 000, 1 500, 2 000, 2 500. Then do the same for the top half of the tank and mark these 3 000 then 3 500, 4

000, 4 500, and the top one is 5 000. Now it is easy to check how much water is in the tank.

What do I do about overflow water?

If your tank is too full, water will overflow. Overflow water has to be led away from the tank and the house in a trench, otherwise it can cause damage.

An elderly man from Nyanga said: "This tank has overflowed many times. This is why I'm planning to dig a trench It's a long trench, so as soon as the tank floods the water will come out far away from the house."

How can we harvest ground water?

We have talked about getting water from the roof, but it is also important to harvest the runoff water that falls on the ground. This runoff water can be used to improve our yard and garden. Another good reason to harvest runoff water it is to stop flooding and soil erosion on our own plots and on the property of people who live down the hill from us.

We spoke to one man from Nyanga, who harvests groundwater for his garden. He has seen that the runoff water causes flooding of his neighbours below him. He plans to use trenches to prevent this:

"What I am using is especially for us people on the top, because the water starts here. It helps the downhill people, because this water is actually destructive when it rains a lot. It destroys people's houses and property. If people

dig trenches at least they will slow down the water.”

You will learn more about trenches in Section 3.

Can we use a tank to harvest ground water?

Yes we can harvest ground water into a tank. But only if the ground is on a steep slope like a hillside. The ground where the runoff water is flowing has to be higher up than the top of the tank. Because the water runs over the ground, we also need a *catch-pit* to stop soil and sand from getting into the tank (some people call a catch-pit a *silt* trap – silt is very fine soil). In the next section we will talk about building a catch pit.



Tanks storing rain water collected when it flows over the ground. Note: to get the top of the tanks lower than the catch pit it was necessary to partially bury the tanks

Most catch-pits are made from a 200-litre plastic drum that is buried in the ground. A furrow leads the runoff water into the catch-pit drum, and the soil and sand sinks to the bottom. Just below the top of the catch-pit drum there is a pipe that leads water from the drum to a storage tank (this is another storage tank, not the same as the one next to our house).

Collecting ground water works well for a group of homes on a slope. The downhill neighbours can harvest runoff from the uphill plots. If all the homes on the slope harvest runoff from the uphill neighbours, it will reduce soil erosion and flooding.

How do we build a catch pit?

Rain water running along the ground carries silt and gravel with it. We don't want silt to collect at the bottom of our tank (or our reservoir) because it is difficult to get it out. That is why we build a catch pit – to stop the silt from getting into a tank or reservoir.

To build a catch pit you first dig a trench to carry away the water that will flow over the ground. This trench must catch the water running down the slope and take it to the catch-pit. At the bottom end of this trench, dig a hole for a 200-litre plastic drum. This plastic drum is the *catch-pit drum*.

Near the top of the drum make the right size hole for a pipe fitting. The fitting must be big enough for a pipe that is at least 50 mm wide, otherwise the

water will flow out too slowly. Then clamp a pipe onto the pipe fitting. This pipe will take the water from the catch pit drum to the top of our storage tank. Now dig a trench for this pipe so that you can bury the pipe at least 60 cm underground to protect it from being damaged. Bury the pipe all the way to the tank, then add an elbow fitting so that the pipe can turn and run up the tank. In fact you need two elbow fittings, because a second one is needed to lead the pipe into the hole at the top of the tank.

[Mediator, please refer to Mediator Note 4]

How do we use ponds to harvest water?

If we do not have a tank, we can harvest and store water through ponds or small dams.

Two Cata residents who have experience with ponds are Mr Dumisani Khiba and Mr Sisiwe Khiba. They say that the best way to water your garden if you do not have a tank is to make a pond in the garden and dig furrows from the pond to the plots in your garden. “This is how we watered our gardens long before the tanks arrived,” they said.

Ponds and small dams are a cheap and effective way to store water that runs over the ground. If the soil is mostly clay, then the soil itself will hold the water well. But if the soil is sandy, the water will drain away and be lost. To make a pond work in sandy soil, we have to line the pond with a waterproof lining. There are different ways to do this. The

easiest way is to line the pond with chicken wire and then plaster it with cement.

Ponds can be dangerous to children and livestock, so we must fence them properly with good gates.

Some of the water in a pond will be lost through *evaporation*. We can reduce water loss from evaporation if we cover our pond with shade cloth, and if we grow trees around the pond to shade the water and block the wind.

<p>word help: <i>evaporation</i> – when water turns into water vapour</p>
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Underground tanks

An underground tank, which is also called a reservoir, is a safer and less wasteful way to store water than a pond, but it is much more expensive.

Reservoirs are usually built with bricks that are plastered to make them waterproof. They have to be built well, by an experienced builder. Poorly built underground reservoirs can leak and they are not easy to fix because the whole structure is underground.

Several Cata residents have had problems with leaking reservoirs.

Mrs Phumzela from Nyanga said: “My reservoir is leaking slowly, and it is making my garden so wet that I can’t plough. I will try and use silicon to fix it when it dries out.”

Brothers Dumisani and Sisiwe Khiba from Nyanga said: “Since the reservoir was built it has been leaking. We tried to fix it with silicon but that did not help, and it leaked again. We can admit that we do not have a reservoir in reality.”

Mrs Nothemba Languva of Skafu says her reservoir stores the water well, but she does have one problem with it. Being underground, the water level is sometimes very low, making it difficult for her to scoop water out. As a result, she says, “It’s very hard work to get the water and it hurts my back.” She has been using 2-litre plastic bottles to draw the water from the reservoir to fill the drums around her garden. When the water level gets too low, she goes to the community taps for her water. Mrs Languva says one solution would be a pump or anything that would help her to get the water out easily.

Sometimes people use a ladder to get water from a reservoir, this works best when there are two people.



How do we keep our tanks clean?

The best way to keep a tank clean is to make sure that the water going into the tank is clean. If we are harvesting rain water from the roof, we must keep the roof and gutters clean.

Mrs Bolekwa Ntusi says: “When we were given our tanks we were told they were now our responsibility. They provided us with small ladders so we can go inside the tank and clean it. You need to always monitor the gutters. They are plastic, they don’t break, but they bend.”

When a tank is installed we should make sure that there is a strainer (sieve) covering the hole where the gutter meets the downpipe. If there is no strainer covering this hole we can make one with fine chicken wire. This stops leaves from falling into the tank, as well as birds, mice and frogs.

Frogs: Frogs and toads are very useful in the garden. In fact these amphibians are a sign of a healthy eco-system, and we should protect them. They feed on insects that eat our plants. Many people have strong beliefs about frogs. Some traditional leaders advise people not to drink water where frogs live. In KwaZulu-Natal some traditional leaders have told people not to have rain water tanks because frogs sometimes fall into the tanks and die.

Make sure the lid of the tank is on properly so that no light gets into the water inside the tank. Sunlight allows algae (green slime) to grow in the water and this makes the water green and undrinkable. Always try to keep the sun off a water tank, especially the

lid. A fully shaded tank keeps the water fresh, and the tank lasts longer because sunlight slowly destroys plastic. We can see this with old tanks that have been standing in the sun – they start to look white.



Granadilla plants protect these water tanks from direct sunlight

How do we reduce the acidity of rain water?

Rain water is slightly acid, so it helps to put a piece of limestone the tank. This will neutralise the acidity of the water, keeping it fresh and healthy.

What can go wrong with tanks?

Sometimes tanks are not installed properly in the beginning. If the base of the tank is not firm and level, it will sink or move when the ground gets wet. If there are sharp stones in the base, the heavy

water pressing down on the stones can make holes in the bottom of the tank. If the fittings for the tap are not screwed in tightly and sealed well, the tap will leak. So from the start, spend time making sure your water tank is installed properly, and check the fittings regularly.

The main problem with the tanks in Cata is leaking taps. Castina Gcilitshama commented: “The only problem I’ve had with my tank is that it leaks where the tap joins the tank. I think this was because it was not installed properly. I got someone to fix it, and since then it has been fine.”

How do we maintain a catch pit?

Every time it rains, silt will collect at the bottom of the catch pit drum. It is best to clean out the drum after every rain. If we don’t do this, our drum will soon be full, and the silt will flow into our storage tank. Cleaning the catch pit after every rain also helps to stop mosquitoes from breeding.

It is a good idea to leave a plank or pole standing in your catch pit so that frogs and toads that fall in can climb out. If there is no place for them to climb out, you will find dead frogs and toads in the catch pit, and this will affect the water quality.

How do we maintain a reservoir?

Once there is silt in an underground reservoir it is very difficult to remove it. So it is best to stop the

silt from getting in. The way to do this is to look after your catch pit.

We already know that we must keep sunlight out of our tank, and it is the same for a reservoir. To stop algae from growing we must keep the sun out by covering the reservoir.

SECTION 3: USING NATURE TO HARVEST RAIN WATER

[Mediator, please refer to Mediator Note 5]

In this section Mr Tim Wigley of Earth Harmony Innovators shares his knowledge about different ways to harvest water by working closely with nature, especially for growing food.

Let us first talk about why we want to work closely with nature to harvest water.

Here Mrs Bolekwa Ntusi of Nyanga explains how harvesting rain water has made a big difference to the *food security* of her family:

“Before I got tanks I would only plant at a certain time of the year. After the harvest I used to have to abandon the garden and wait for the next season for planting. But since I’ve been a member of Working for Food, a gardeners’ support group, we have learnt a lot of techniques.

Before we planted our garden we dug a 3-metre hole and put tin cans in there. Then we dug trenches and furrows in such a way that when the water comes, the trenches can distribute the water across all our vegetable beds, and each bed will retain some amount of water. This way allows us to always have a crop in the garden throughout the year, so now we don’t wait for a certain planting season. We always have food.”



Mrs Bolekwa Ntusi in her food garden

Mrs Thandiwa Ngxafana from Nyanga village has a part time job at the pine plantation, but it is not enough. She says, “That is why I go back to my garden. I can’t rely on the job, it’s not enough to feed my family.”

Mrs Nothemba Languva, who has diabetes, helps to maintain her health by keeping a garden: “By eating fresh vegetables I keep my diabetes under control.” The garden also helps her financially because she sells some vegetables.

Growing our own food is not only useful for ourselves, it also allows us to help others, and so in this way it restores our sense of belonging to a community. An elderly woman in Ndele started growing food when she retired because she could no longer afford to buy vegetables. She says, “It is

nice to have a garden because I am able to feed lots of people, for example when my father-in-law passed away.”

Before Mrs Languva had a garden she needed to ask her neighbours for food. Now she plants mealies, potatoes and beans to feed her family. She says “Things are much better”.

Mrs Bolekwa Ntusi encourages others to improve their food security by growing vegetables:

“Some households complain that they don’t have food. I encourage them to have a garden. Even if you don’t have money, if you have land you can grow something. As the Working for Food group we do try and encourage people to plant gardens because fresh vegetables assist a lot in fighting diseases. We go further and encourage families to have chickens, even one or two, so you can have eggs and meat. Not everything in life that matters has to be bought. If you have your own garden and small livestock, you will have access to food whenever you need it.”

How can we use the soil in our gardens to collect and store water?

If you look at nature, you will see that soil holds water well if it is rich in *humus*.

What is humus? Humus, also called decomposed organic matter, is made from dead plants and leaves as well as animal matter, including dung. Humus enriches the soil and helps it to hold water.

The rain soaks into the soil much more easily if the surface is covered with vegetation (plants, leaves, grass, trees). So, if we want our soil to soak up rain water, we must make sure that it is always covered with vegetation.

Imagine two different environments: one with the soil covered with vegetation and one with very little vegetation.

When soil is completely covered with plants and trees we notice that underneath the vegetation there is a layer of decomposing plant matter. We also find that the soil itself is rich in humus. When there is little vegetation we noticed a lot of bare ground baked hard by the sun. There will be hardly any humus in the soil, so it is unable to absorb water.

What happens when rain falls on the land?

What happens to the soil if it rains after a period of drought? In places where the soil is well covered with vegetation and healthy, the rain falls first on the leaves of the plants, then it drips softly onto the decomposing plant matter, then it soaks deep into the soil. In places where the soil is bare and baked hard, the rain falls directly into the hard soil.

Because very little water can penetrate into hard soil, most of the rain runs off. This run-off water moves faster and faster as it flows down the slope and it takes some soil with it. This soil from the surface layer is called *topsoil*.

Now let us picture what happens in these two landscapes after two or three weeks without any rain. In the place where the soil is well covered, the plants are able to use some of the water (moisture) that is stored in the soil. There is very little evaporation because the soil is well covered and protected from the sun and the wind. However, in the places where the soil is bare, the small amount of water that did soak into the soil has now dried out.

Some older people say there was more rain when they were young. But Tim Wigley says this is not true: "The rainfall records for any area will probably show that the rainfall is much the same. What has changed is that rain is no longer absorbed the way it used to be. The land is much drier, even though we have had the same amount of rain."

Tim says if we take a small amount of soil from the floor of a healthy forest we will see millions of very small living creatures called *micro-organisms*. "A piece of healthy soil just the size of the end of your small finger will contain more than six million living organisms. A piece of soil the same size, taken from a field that has been ploughed and treated with chemicals, will have between zero and three living organisms in it!"

Most of the micro-organisms in the soil are good for plants. They break down organic matter (dead plants and animals) and turn it into humus. The humus acts like a sponge and holds water in the soil.

Forty years ago our agricultural lands had an *average* of 20 per cent organic matter. Now they have only 1 per cent.

[Mediator, please refer to Mediator Note 6]

What can we do to harvest water in the soil?

If we can help our soil to become rich in humus, it will hold more water. We can help nature to do this by digging kraal manure and compost into the soil. This will attract earthworms. Earthworms help to keep the soil healthy and they like rich soil.

[Mediator, please refer to Mediator Note 7]

We can also stop soil being washed away by shaping the land in special ways, and by using plants to hold the soil. The methods we will discuss are a) digging furrows, b) making swales, c) planting vetiver grass, d) making planting circles, and, e) digging deep trench beds. The best way to learn about each of these methods is to see how someone else is doing it on their land. But this is not always possible, so let us see how much we can learn by talking about it together.

[Mediator, please refer to Mediator Note 8]

Furrows

Mrs Wandiswa Ndlazulwala from Nyanga says the best technique she has been taught is digging furrows. She has seen that by distributing water in furrows, she can grow food in her garden throughout the year.

There are two ways we use furrows to collect water. We use furrows to direct water to where we want to collect it, for instance in a tank or in a planting circle. We also dig furrows across a slope. These furrows must be exactly on the contour so that water flowing down the slope is slowed down and spread all along the furrow so that it can soak into the ground. Both these methods help to make our gardens more productive.

We should make trenches and swales wherever there is water flowing down a slope. The size of the trenches we dig depends on how much water flows when it rains. The trenches should be big enough to catch all the water, even in a heavy rain.

If we want to collect the water and store it for our garden in the dry season then we must dig our trench across the slope at a slight angle so one end is higher than the other. When it rains, the trench will channel the water to the lower end, where we can collect it.



A good example of a trench collecting water at the top of a garden. This water can now be put to good use instead of flowing over the garden causing soil erosion. A problem has been turned into an opportunity.

Sometimes people see the water that flows when it rains as a threat rather than an opportunity and they dig furrows down the slope to direct the water away from their home and garden. These furrows run down the slope speeding up the flow of water and causing soil erosion and problems for people further down the slope.

There is also the Water for Food method. To do this we bury coke cans and blankets under the soil to hold the moisture. (This method is described on page 40 after planting circles.)

Swales

A swale is a *ditch* that is built along the *contour* of a hill. There is a raised earth wall on its lower side. Swales are an excellent way of harvesting water down a slope, they work even on a very gentle slope.

word help: a *ditch* can also be called a *trench* or a *furrow*, but a furrow usually describes something shallower than a ditch.
contour: a contour is a line on a map showing all places at the same level or altitude.



This swale holds the runoff water that comes from the slope above

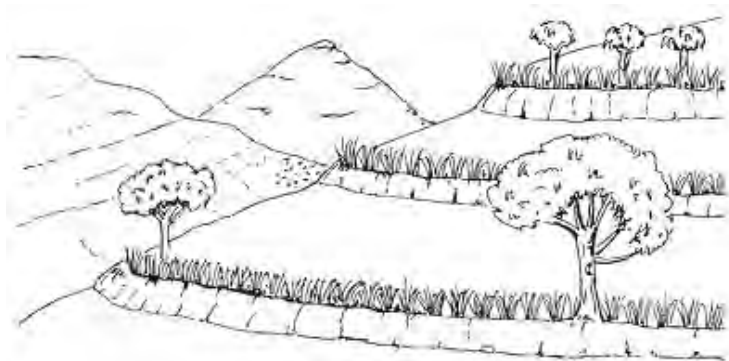
When we dig a furrow for a swale, we put the soil that is removed on the lower side of the furrow making a low 'wall'. This low wall holds back the water coming down the slope even if the furrow becomes very full. A swale must be built along the contour line so that it is level right across so that the water does not run from one side of the swale to the other. This means it stays equally wet all along

the swale furrow and the water soaks into the soil. The water lying across the swale soaks into the ground. The slope just below the swale will get a lot of water so it is a good place to plant fruit trees.

When there is a big rain, water will sometimes flow over the low wall of the swale all along the contour. But as the flow of the water is gentle, it does not cause erosion damage.

Remember, swales work only if they are dug exactly along the contour line, so you have to mark the contour very accurately before you dig. There is a tool called an A-Frame that you can make yourself to mark a contour. It is easy to make, easy to use and very accurate (see the catalogue that goes with this resource).

Vetiver grass



Vetiver grass planted along the contours of a hill

Another way to look after the soil and preserve water is to plant a type of grass called vetiver along

the contour. The diagram above shows us how this can be done. Vetiver grass has deep, strong roots that hold back water and release it slowly down the slope. The thick leaves of vetiver grass trap silt, so that soil builds up around the grass over time. After a few years the soil built up by the line of vetiver grass will be higher than the level of the soil below the line of vetiver. It will look as if someone has built a step in the slope. Plants grow well in this deep moist soil.

If you plant a half circle of vetiver grass below a tree growing on a steep slope the grass will trap water and silt. Vetiver grass does not spread – it only grows where you plant it – and its strong roots keep out the kinds of grass that spread and interfere with the growth of fruit trees.

Planting circles

A planting circle is a round pit that can be made in places where you can see rain water flowing in a natural furrow.

You dig the pit 60 cm deep (it must be up to your knees) and 2 metres across.

Now use the soil that comes out of the hole to make a low wall around the edge, with a gap in this for the furrow that leads the water into the circle. Then fill the hole with anything that will decompose and



make compost. You can use mealie stalks, branches, weeds, bones, cardboard and paper, or tin cans – but not plastic or glass. Some tin cans, like cold drink cans and beer cans, are made of aluminium and these ones are bad for our health so we must not use them for planting circles or trench beds.

You fill the hole right up to the top of the wall of soil around the edge, and then cover everything with dry grass. You can now plant beans, sweet potatoes, and pumpkins on the circle of soil. You can also plant trees a little distance (about 3 metres) away from the circle. The roots of the trees will grow into the hole and enjoy the rich, moist compost that forms there. As the material in the hole decomposes and makes compost, the level will drop, so you need to keep adding material to keep it level.

A small planting circle is very productive because it holds and uses all the water that was previously flowing away and being lost.

Deep trench beds

Deep trenches work in the same way as planting circles. You dig a pit where you want to make a garden bed. Into the pit you can throw mealie stalks, branches, weeds, bones, cardboard, paper and tin cans – even worn-out blankets and clothes. Then cover this up with the soil you have dug out of the pit. Then plant your vegetables on top.

A deep trench catches and stores the water that soaks down. The plant roots will go deep down because of the extra water and compost.



An example of a well made trench bed

Tied ridges (also known as amdanyana)

This method is especially useful in fields. It helps to ensure that you get a crop to harvest even when there is a drought.

Instead of ploughing and planting in the usual way you form raised ridges following the contour as closely as possible. Between each ridge you leave an open trench. These trenches are formed when you dig out the soil to make the ridges.



You plant the crops on each side of a ridge. The trench between the ridges collects rainwater. Small walls across the trench (see arrow) prevent water from flowing away along the trench and this water soaks into the soil under the ridges.

Some people do not want to use this method because the trench takes the place of one or two rows. But people who have tried this method say it is very good in a drought because they get a crop even when normal planting fails. In good years when there is enough rain this method produces good results because the plants on the ridges get more moisture and nutrients and produce a bigger crop.

How do we keep the soil in gardens healthy?

If we regularly feed our soil with manure or compost and keep it covered with plants or plant matter, the soil's micro-organisms and earthworms will maintain it for us. Our soil will keep on getting more fertile and better able to absorb rainfall.

An elderly lady in Ndela uses natural compost, such as cow dung, for her garden: "I use natural things to

grow my garden. To chase away moles, I take chicken bones and then put them under the ground – then the moles don't come and eat my potatoes." This lady learnt all her skills from her father.

Adding bones also raises the fertility of the soil. The soils in the Eastern Cape are very short of phosphorus, and plants need this mineral to develop good roots. Bones decompose slowly, releasing phosphorus into the soil. Tin cans decompose slowly too, releasing iron into the soil. As we said earlier, we must remember not to use the aluminium beer cans and cold drink cans. Mrs Nothemba Languva looks after her soil by putting old tin cans and old blankets in her trenches.

Covering the soil keeps it healthy in two important ways. First it prevents the sun and wind from drying out the soil. Second it protects the micro-organisms that build the soil because sunlight kills these organisms.

Tim Wigley, who has run many workshops for Working for Food, says:

"The soil that you can see is never as productive as the soil you can't see. Our grandparents planted many different things together on the same piece of land. When they planted mealies, they also planted beans and pumpkins. The pumpkin vines spread out over the ground protecting it from the sun. The beans added nitrogen to the soil, making it richer. In the

vegetable garden there were different things planted in the same space and these would be ready at different times. There was always something growing, so the garden was never bare. They also planted more trees and hedges in and around their gardens than we do now.”

How can we involve young people in gardening?

Older people sometimes complain that younger people are not interested in gardening. Mrs Castina Gcilitshama of Skafu says her husband helps in the garden. When we asked if she passes on her gardening knowledge to her children she said: “Ja well, children, they refuse to help in any way, both in the garden and collecting water.”



Mrs Castina Gcilitshama of Skafu in her garden

The best way to address this is through creating awareness. Everyone needs to be aware that humans are not separate from nature, we are interdependent with the rest of nature. What is happening to the world around us is also happening to us. We also need awareness of what the modern diet of processed highly refined food is doing to our bodies.

Mr Plaatjies from Glenconnor feels that formal education is one of the reasons why children are no longer interested in learning about self-subsistence:

“People believe a person must be educated. There is nothing like that. God gave everyone a brain to think. I only did Matric but look at what I have achieved. I am growing and growing by the day.”

There are a lot of ways that schools can become the central place in a community to grow or learn how to grow food, and to learn how to look after our water and environment. A good movement to support is EcoSchools. This organisation explains its mission like this:

“The Eco-Schools water management and conservation programme supports schools and local communities across South Africa with food gardens and healthy living activities. With a focus on schools in low-income and rural areas, the project has installed water-saving irrigation schemes and trained schools on rain water

harvesting methods. The initiative, which promotes the efficient use of available resources to ensure food security, water conservation and management, is run in collaboration with the Department of Education, School Governing Bodies and a number of environmental development organisations, including the World Wildlife Fund and the Wildlife and Environment Society of Southern Africa (WESSA).”

We can encourage teachers in our local schools to become part of this programme and volunteer to help establish school gardens. Being part of Eco-Schools also means that we have access to lots of resources, training and expertise.

If children are aware of the benefits of working in the garden, they will not see it as punishment or a duty that has been forced on them. When young people have a positive experience of growing their own food, it makes gardening attractive for them. They will grow up understanding that gardening is a way of life, part of being a member of a family. Many people who are enthusiastic about gardening learnt to garden from their parents.

This can be seen in Mrs Bolekwa Ntusi’s family. Mrs Ntusi says:

“Everybody here works in some way in the garden, even the head of the household. The children help in both the field and in the garden. It is not up to children to say ‘I’m not interested

in the garden’. When I was a child I didn’t like working in the garden but my parents pushed me. It was part of being a member of the household. Now as a grownup I understand how this has helped me. I tell my children ‘I’m not asking you to help, I’m telling you that you go to the garden.’ Even if I’m not around they know they must go and water the garden.”

Mrs Nophakathi Njameni, a grandmother from Skafu, also involves the whole family in gardening. “I have a daughter. She has three children, one girl and two boys, and one grandchild who is seven years old. The one girl brings the water and the sons dig, their mother plants.”

How can we support each other to have water and food all the time?

If we are lucky enough to afford a tank, or if we have been given a tank, then we can support others by letting them use our water. A lot of people show their humanity to others (ubuntu) by doing this. Mrs Plaatjies from Glenconnor lets the people living on church land near her take water from her tanks.

By growing vegetables we can help our neighbours with food. Mrs Boniswa Tontsi is passionate about making sure that people get healthy food when they are sick. She takes vegetables from her garden to the people she visits. Others, such as Mrs Nothemba Languva, support their neighbours by giving them vegetables. Mrs Languva shares her vegetables with

the poorest families and also with households where a family member is HIV infected.

We can team up with a neighbour and share a vegetable garden. Two families do this in Cata. They water the vegetables from tanks in the garden, and then cook together in each other's house every night.

A good way to support each other is to start a small group. If we do this it is easier to get help from NGOs and it means we can share many things. For example, we can share tools, we can save together to buy seeds, and we can share our experiences and learn from each other. Many people in Cata started gardening after they saw their neighbours doing this. They learned from their neighbours and in turn taught others. A group keeps you motivated. When times are hard a group can give support, not only with knowledge but with sympathy and sharing.

Mrs Nothemba Languva describes how the Working for Food group helps her:

“We meet once a month to discuss problems. We share ideas and help each other. If you are no longer motivated, or seem to lose interest in your garden, a member will come and visit you and ask what is wrong. We also contribute R10 a month and at the end of the year we sit down and use that money to buy seeds which we share amongst ourselves. We also use these meetings

as a platform to bring forward our needs, such as the need for garden tools.”

A lot of groups split up because group members can't agree, particularly about money. The Working for Food group is still strong, but they have had to overcome difficulties. Mrs Bolekwa Ntusi explains:

“At first we agreed that when the Border Rural Committee pulled out, we would fund our own projects by contributing a certain amount of money to buy seeds and seedlings and share these amongst members. But when we made the call for this, some of our members wanted to withdraw. But those who withdrew were not entitled to seedlings. They felt excluded. But we can't afford to pay for other people.”

The Working for Food group has a monitoring committee to deal with problems. Mrs Ntusi told us:

“The monitoring committee monitors our gardens to see if we are still active and planting. For those who seem to be discouraged or drop out, it is the committee's responsibility to ask what the problems are. Then as a group we see how we can solve the problem and encourage that member to plant again. If we see that members are lazy we quickly address this. So our meetings are related to our own functions and how we support each other. It is also to ensure that our relationships with each other are healthy.”

HAS THIS BOOK BEEN USEFUL?

[Mediator, please refer to Mediator Note 9]

Let us briefly summarise what we have learnt in Sections 1,2 and 3 of this book.

In **Section 1** we shared information about our own water needs.

- Was it helpful for us to talk together about our water needs?
- If so, in what ways did it help?

In **Section 2** we learnt about different kinds of water tanks (how to choose a tank and how install and maintain our tanks). We also learnt about how to install a second tank that uses runoff water from our first tank.

- Did we learn new things about choosing a tank and looking after it? If so, how will this new information help us to choose and install a) a tank that uses water from the roof, and b) a tank that uses runoff water?
- What are some of the main things to remember about making a plastic tank last longer?
- What are some problems that we may have with tanks? How can we solve these?
- To help in the development of better learning resources please tell the Mediator if there were any parts of section 2 that were difficult to understand, or any sections that were not helpful for what you need to learn.

In **Section 3** we learnt about how to work with the soil to store water. This section is very important because it shows us that we must work carefully with the soil if we want to grow food now and in future.

- What methods for using the soil to store water did we learn about?
- For those of us who want to try one of these methods, what are the next steps to take?
- Please tell the Mediator if there were any parts of section 3 that were difficult to understand, or any sections that were not helpful for what you need to learn.
- How can the book or the facilitation process be improved?

Working together in future

When people work together, everyone adds knowledge and helps each other in practical ways. If we live on a slope we can work together with our neighbours to set up water systems down the slope. For instance if neighbours living higher up the slope have more water coming off their roof than can be stored in their tanks then instead of the water just overflowing onto the ground and making a mess you could install a pipe onto the tank overflow and lead it to a tank in your garden. By cooperating in this way everyone gains.

It can also be much easier to complete big projects, like digging planting circles, if we help each other. In

a few hours a group of people can complete a planting circle, so you take turns all going to one home and working together then on another day go to a different home. This is much easier and more fun than each person working on his or her own for a few days.

To keep our own water systems and tanks working we need to do maintenance, and we can help each other with this. As we heard from Mrs Nothemba Languva and others, people already working in a group can share their knowledge of how to set up and run a group.

Fieldworker Mr Monde Ntshudu believes that the success of the Cata projects comes from the strong leadership of the past:

“There was strong social cohesion in the community under the very decisive leadership of Mr Gcilitshana, who mainly united this community. If I can remember clearly, when this community received their land back, the compensation money that came with it was split in half. One half was to be used for development and the other half given to claimant communities.

A number of projects took off because of this, getting involved in such projects as building chalets, the museum, tarring the internal roads, the commercial pine plantation and the irrigation scheme. All these projects ran smoothly: there

was no infighting, which is often the case. Now that this strong leadership is no longer there I wonder about the sustainability of Cata projects. I can see that it is not as it used to be. The Working for Food members have been decreasing since the Border Rural Committee pulled out. I don't believe Cata will be able to attract tourism to sustain itself. I have not come across any visitors who were here because they saw Cata on the internet or on a flyer. It is word of mouth only. I worry that as soon as all the funding ends, that's the end of Cata.”

Leadership often depends on one strong person, but some organisations, like stokvels for example, keep going even without a strong individual as leader. This is because people need the stokvel so they keep meeting and if there are problems they talk together about how to overcome these. If we need water to live healthy lives then we too must keep talking to others to make sure we all have enough clean water and are looking after the soil.

Thank you very much for your participation!

APPENDIX: AWARENESS EXERCISE

Tim Wigley of Earth Harmony Innovators ran a Natural Farming workshop with people in Hombe village near Lusikisiki. He took the whole group to the nearby Mbotyi forest to learn about how a healthy ecosystem works. He explains how the exercise went:

Before leaving we worked out three main questions:

- How effectively does the forest use the rain that falls on it?
- How does the forest care for the soil?
- How effectively does the forest use sunlight?

At the time it had been raining heavily. All the paths and roads in Hombe village were wet and muddy, so it was difficult to even drive to the forest. Streams on the way were full of mud. But when we got to the forest we were surprised to see no more mud. The soil was completely covered with a thick layer of fallen leaves and we could walk easily without slipping. Our shoes stayed clean. When we reached the stream that flows through the forest the water was clear and clean.

By observing the forest, Tim says, it became easy for everybody to answer the three questions.

1. How effectively does the forest use the rain that falls on it? Very effectively. All the rain that fell in the forest fell first on the leaves of the trees, then it dripped down onto the thick covering over the soil, then it soaked gently through the covering and down into the soil. No water was seen flowing on the surface.

2. How does the forest care for the soil? The soil was well cared for, deep fertile and soft. When we scratched through the covering of dead leaves the soil was so soft we could push our fingers into it.

3. How effectively does the forest use sunlight? All the sunlight that fell on the forest was used by all the leaves it fell on, first on the high trees then on different levels of smaller trees and plants. No sunlight reached the ground.

Tim says everyone remarked on how peaceful and healthy the forest felt. "One old woman said it felt so good that she would like to bring her bed and sleep in the forest, as it felt like it was healing her."

After spending the morning in the forest the group went back to Hombe. In small workshop groups they walked around the village and compared conditions there with those of the forest. They asked the same three questions, but this time about conditions in the village. The answers were very different.

Then the group did an interesting exercise. Instead of thinking like human beings, they tried to imagine what it would be like to be the rain, and the soil and

the sun. Each person had a chance to speak as one of these elements. One man named Sipho said:

“I am the rain. Last week I was sent to the forest and it was a wonderful experience falling on all those leaves and soaking deep into the soft soil. It felt good to be able to make everything happy and the plants to grow. Then today, when God sent me to come and fall over this village, I felt excited, as I thought I would be bringing a blessing for the people who live here. Instead I found myself falling on bare ground without anything for me to hold onto. I started to flow faster and faster as I rushed down the hill carrying the soil with me into the river and down to the sea where the fishes complained that they could no longer see in the muddy water. Causing so much damage when I had come to bring blessing made me feel very unhappy.”

MEDIATOR NOTES

Mediator note 1: Section 1 is deliberately short to allow time for participants to discuss their own water storage experiences and concerns. In general it is best to get participants thinking about a topic *before* presenting the formal information in the book. For Section 1 this is easy as you can simply use the 3 questions in the notes to prompt responses. In answering the three questions, participants are likely to discover that they already know a lot about the topic.

When participants have completed Section 1 we hope they will feel that their particular needs are understood by the group and, just as importantly, that their insights can be useful to others. This approach is based on the idea the learning works best when we feel accepted and can construct knowledge from a personal basis: we then have a secure foundation onto which we can build more elaborate technical information.

Mediator note 2: Before going through the information in the notes ask participants what they know about the different kinds of tanks, for example cement tanks keep water cold but they are difficult to erect and maintain; zinc tanks tend to rust, etc.)

Note also that parts of Section 2 and Section 3 may be too technical for some participants. Explain in advance that this is not a problem and that learning

technical information from a book is not easy for anyone. The most important thing is active participation, and the aim is to come out of the workshop feeling motivated to tackle water-related challenges.

Mediator note 3: This is a good place to initiate a discussion about possible ways to pay for a tank and for people to make suggestions of how communities can lobby NGOs for support.

Mediator note 4: It should be made clear that this only works for land on a reasonably steep slope. The place where you have water flowing over the ground surface that you want to collect must be at a higher level than the catch pit, so that water can flow down the furrow you make and into the catch pit. The top of the catch pit must be higher than the top of the tank in which you want to store this water.

Mediator note 5: Before reading through this section draw participants out on why they might wish to work with nature.

Mediator note 6: Here is a simple way to demonstrate the concept of an average. Make a grid on a piece of paper, containing 10 squares. Find some small objects (e.g. seeds or torn-up pieces of paper). Take, for example, 30 'seeds' (enough so that you can put the same number into each square). Put 3 seeds into each square (better still get a participant to do this). Make it clear that the

total number of seeds is 30. Now get a participant to redistribute the 30 seeds so that some squares have more seeds and others fewer. Explain that the total number of seeds is still the same. This means there are still enough seeds for three in each square even if they have been distributed differently. The *average* is therefore three seeds per square.

Mediator note 7: Encourage a discussion in which participants offer ideas about 1) how organic matter breaks down in the soil and 2) how earthworms contribute to soil health/aeration. Organic matter (which is anything that was once living) is broken down by small creatures called micro organisms, either bacteria or fungi. Earthworms feed on the bacteria and produce waste that is very good food for plants. This interaction between many different things that live in soil makes conditions right for plants so they can be healthy and grow fast.

Mediator note 8: Demonstration models of swales in particular will help to get the concept across. If possible make a model of a swale in clay or any suitable material and also of vetiver grass planted at intervals along contours.

Mediator note 9: Give the main topic of each section, then allow participants a few minutes to consider what they have gained. Then invite people to briefly describe what they have learnt. Only once participants have spoken should the Mediator summarise the content covered. When you have dealt with Section 1, 2 & 3 ask the participants what

questions have arisen as a result of the information provided both in the book and in the workshop discussions. New questions are a sign that the information has been of value.

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Change Orientated Learning And Water Management Practices

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Appendix 2 Sample of primary research participant interview (Cata) and contextual interview (Glennconnor)

Primary research participant (Int.2Ca) Bolekwa Ntusi (Nyanga)

Bolekwa is a lively and friendly women. Besides tending a very fruitful garden she also works as a health/community worker, visiting people around Nyanga concerning health and social issues. She is part of WFF and became a member from 2006. Her daughter was originally the member of WFF and then once her daughter went back to school, Bolekwa took over. She had high school commitments so Bolekwa took over.

Me: So you are part of WFF. When did you join?

Bolekwa: My daughter joined before 2006 and then I took over in 2006 but because of her commitments to school, my daughter was not a member anymore. Ja I already

Me: How many people joined WFF when you joined?

Bolekwa: There were about 17 members.

Me: And did you have a garden before that?

Bolekwa: "I already had my own garden at the time. When I joined, I divided the garden in two, one side was mine and the other was for the purpose of the project".

Me: Why did you join?

Bolekwa: I joined because initially I was only planting meillies and sometimes potatoes... but I realised when you are a member of the project you can choose from various types of crops. And that when you planted that crop, people they do come and buy. So that's why I decided to be a member." And that is also why I've decided to separate my garden, my initial intention to plant the garden.

Me: So people come and by the vegetables from you and you get money from that?

Bolekwa: Ehe

Me: How many water tanks do you have?

Bolekwa: 4. No I have five Jojo tanks. But I bought one for myself. So the WFF tanks, when they come, I already had a tank.

Me: When did you buy that tank for yourself?

Bolekwa: So before 2006.

Me: And what were you using the water in the tank for?

Bolekwa: For both watering my garden and for domestic purposes

Me: And before you had the tank, where were you getting your water?

Bolekwa: The river. I would say a round trip is about an hour or more

Me: So that is why she decided to get a Jojo to have water right by her house. And do you use the taps sometimes?

Bolekwa: Ja well we have community taps around here in this village but its not easy even for us to have access to that water because it is not always available. There will be a call from one community member that the water in the taps is available and we all go line up for that water but some of us will not be able to get that water. The water will stop before all of us actually get into it. So in my case I don't really use tap water because now I have enough water on my property."

Me: Why did it just stop though?

Bolekwa: Well I'm not sure. We were never really told what exactly the problem is but the rumour is that the problem is the source from where they get the water. That whatever collects the water from the source is sometimes shifting or moving but I can't really confirm those stories, it's just a rumour".

Me: And did they come install them for you? Put the bases and gutters in?

Bolekwa: "You just be point where you would like your tank to be placed and then they will install it there. They are not going to prepare a cement base for you, that will be your responsibility and then they will also give you a small gutter that collects water from your roof to your tank. The other

gutters around your house is your responsibility. They will actually warn you that those gutters that they provide are plastic and then they break and you need to replace them. I also provided a cement base for the tanks myself. Two are cement bases and three are soil bases.

Me: Have you had any problems with the soil bases?

Bolekwa: No we haven't. We collect enough water, no leaking. I have not had problems with the tanks.

Me: And the gutters?

Bolekwa: I have not replaced them (gutters) but you need to always monitor them, they don't necessarily break but they bend so you need to monitor them and get someone to fix them

Me: What have you learnt from WfF? In terms of different techniques of gardening and what have you learnt?

Bolekwa: As a member of WfF I've learnt a lot in terms of how to manage my garden because before I would only plant at a certain time of the year. After the harvest I abandon the garden and wait for the next season for planting. But since I've been a member of the WfF we have learnt a lot of techniques such as digging furrows around where your garden will be and also before you plant your garden you dig a three meter hole and put your cans in there. And you dig those trenches and furrows in such a way that when the water comes those trenches will be able to distribute the water across all your beds. And still each bed will retain some amount of water. That way it allows you to always have a crop in the garden throughout the year so you don't wait now for a certain planting season so you always have food there because of such techniques.

Me: So you have that being part of WfF has given you food security, you don't have to worry and that you always have food?

Bolekwa: In terms of food security, for example, we planted potatoes and since last year since last December I have been harvesting potatoes from my garden. Not only harvesting but selling. Did you see that wheelbarrow that man was pushing-it had about 4 bags of potatoes. So what I'm trying to say is that I am selling these potatoes and even now, just before you arrived I was about to look for other potatoes in the garden. I am also planting new potatoes. I am foreseeing that I will probably only have to buy potatoes for one month. And then after that I am sure I will be able to harvest again the ones that I am planting now. " She has a large crop of potatoes.

Me: Do they all plant the same crop together as a group (WfF)?

Bolekwa: Ja well I wont say so. Well it is true that last year in October as a project we sat down and bought potato seeds and shared the money among ourselves and we planted. The potatoes I am harvesting now was these, they are nearly finished. But I have decided to buy my own potato seeds but this is not part of the project now-this is my own initiative and I'm not sure when they will meet again. We do meet and contribute some money for seedlings but we don't often do that-buy seeds and share it. For example now I am planting my own seeds at my own expenses.

Me: And I was wondering, who helps you in the garden?

Bolekwa: My children, my son. So everybody here works in some way in the garden, even the head of the house.

Me: Are you the head of the household?

Bolekwa: No, he does help, but not in this particular garden. We also have fields so the head of the house is responsible for these. Even now he is there working there.

Me: Where are the fields?

Bolekwa: Close to the forest. There is a river that feeds to the Cata dam so there are fields there.

Me: What does he plant there?

Bolekwa: Millies, beans, pumpkin and a kind of melon.

Me: And then he sells these at a market?

Bolekwa: Its not for selling really, it's just for the house.

Me: Your knowledge about the gardening, did you learn that from your parents or grandparents?

Bolekwa: From home, from my parents and then when I got married I started this garden. It was my own idea, my own initiative, I did it. With that background that I come from.

Me: A lot of the people we are speaking to they say that the young people are not interested in gardening, do you think this is true?

Bolekwa: Ja well its not up to them to say I'm not interested in the garden. I push them." When I was a child I didn't like to work in the garden but my parents pushed us. It was difficult but as a grown up now I understands that they helped me. I'm not asking you to, I'm telling you that you go to the garden. Even if I'm not around they know that they must go and water the garden.

Me: Where there rules in the garden?

Bolekwa: So they said (WFF) ja well that they do not expect us that we do not have water to water our gardens. So these tanks are for us to be able to always have water for our gardens. And they went further and said in order to keep the water in the tank clean you must clean it yourself. They provided small ladders so you can go into the tank and clean it. I have lots of water off my roof so that is why my tanks are here. Those who where asked to put their tanks in the garden, those who have tanks in the garden, the water will be redirected by furrows to the tanks and they will provide a dish like thing that sifts all the dirty material that comes with water before it gets into the tank. And after they installed the tanks they came to see if they were working but then they never came again.

Me: So all your tanks are from the roof, not ground water?

Bolekwa: Hm (yes)

Me: Do you attend all the workshops that they have?

Bolekwa: As a project we no longer have workshops by BRC. We were told this last year and BRC said ja now we are going to let you stand on your feet and we are not going to support you anymore. And BRC came because they are having a similar project in another village (Nyameni) and actually asked us to train those people who are involved in the WFF project. Bos they don't have money to train them but asked us to use their skills and help the people. That happened late last year.

Me: And do you still have meetings to discuss problems?

Bolekwa: We haven't had any meetings this year.

Me: And what do you usually discuss in these meetings?

Bolekwa: During our meetings mainly we discuss issues about funding and funding our own seedlings. And that the possibility about getting outside support. There were visitors who came last year who promised to assist us financially. We already have our own bank account. And then maybe we don't know why the meeting was not called, the person who promised to give financial support. And then Agriculture, there were rumours that they could help. And then another issue we discussed is that initially is that when BRC pulled out we would fund our own project by contributing a certain amount of money and buy seeds and seedlings and share that, but when that call was made by us some of our members wanted to withdraw. But if you withdraw you wont be entitled to get seedlings bos you did not contribute. Those that did not contribute feel side-lined but we can't afford to pay for other people. And also the as a project we have members of a monitoring committee who monitor our gardens are we still active, are we still planting. Those who seem to be discouraged or seem to drop out, the committee's responsibility is to ask the problems and then as a group we see how we can solve the problem and encourage that particular individual to plant again. If we see that some members are lazy we quickly change them. So our meetings are really related to our own functions, how do we function and how do we support each other and also our relationships.

Me: So do you think that even though there are no workshops that people will keep meeting and supporting each other?

Bolekwa: Ja we will continue without BRC's help.

Me: And what do you do when you are not planting? Is this your main source of income or do you do other jobs?

Bolekwa: I am a community health care worker.

Me: How often do you do this?

Bolekwa: Monday to Friday. I am employed by the Dept of Health to work in the community.

Me: So do you do house visits?

Bolekwa: Yes exactly. And wherever there is a problem I can't handle I take it back to the clinic. If the nurses are needed urgently then I go.

Me: And what are the problems with people here when you do visits?

Bolekwa: A couple of problems and all the problems basically that I can't handle I take to my superiors. These problems range from drug related problems-especially the youth. And also domestic violence and diseases such as diabetes, hypertension, HIV. And also the youngsters who are suppose to be at school but who are at home. And also the households that get social grants from government but do not have a funeral policy. So all these problems I come across on a regular basis and then I deal with them. They don't only affect the households but also the community. For example, the question of the funeral policy. When someone dies, the whole village has to put together money so the person can be buried. So if I come across this problem then I act quickly so that person, even if they are getting a grant, I tell them to put money aside so the village doesn't have to do it. And also some households will complain that they don't have food, so I encourage them to have a garden. Even if you don't have money but you have land. It doesn't matter how big your garden but the thing is that you will be able to get some food there so you can't say that we don't have money but you have land. So I push people to have their own gardens when they have their own land.

Me: So you tell people about health and vegetables?

Bolekwa: We do encourage people to plant their gardens because these fresh vegetables assist a lot in terms of fighting diseases. And you do not have to pay for vegetables whereas you have land you can get the vegetables on your own land when you want it. And you don't have to pay for vegetables. You can get them at your own time whenever you want it. Because if you rely on getting vegetables from town you wont always have money. We even go further to encourage families to have even one or two chickens so you can have free eggs and whenever you feel you need protein you can slaughter your own chickens. Not everything in life that matters in life you need to buy, where you cannot buy try and get that for free by having your small livestock and having your own garden and then you will have access to those things whenever you want.

Me: That's such a great way to live, that's such a great value. Ah I think we are all tired now, maybe we can see your garden now.

Monde: Did you attend Tim's workshops?

Me: Oh so she went to the workshops with Tim wiggly?

Bolekwa: They used to plant one type of crop but Tim said let's just learn from nature and just look at the forest. In the forest you won't have just yellowwood and have other different, in the same place. So now Tim told them in one bed you can plant different type of crops. So that can also assist in terms of pests.

-In the garden now-she grows beetroot

(Int.2Cb) Bolekwa Ntusi-follow up

Me: I know you are a very busy lady. Bolekwa I was just wondering how work is going and how life is.

Bolekwa: The kind of work that I am doing is very challenging as you may understand...

Me: Health work?

Bolekwa: Hmmhm... cause you know I do home visits to see the households that are struggling, poverty and health wise are struggling as well. It's not easy but I am coping.

Me: And do you work everyday?

Bolekwa: Yes.

Nina: And how are your children?

Bolekwa: No they are good, I have five and other extended family children that are under my guidance and they are also well.

Me: How many people live in your home?

Bolekwa: 9

Me: And your husband's fields, is he still farming

Bolekwa: Yes

Me: Does he do any other work around here?

Bolekwa: Pension

Me: And your garden, have you been planting throughout the year and planting vegetables.

Bolekwa: Yes

Me: Ok, what, potatoes?

Bolekwa: Yes even now.

Me: And your children, they are helping cause I know you are very strict with them?

Bolekwa: Yes

Me: And you still have no tanks. No problems?

Monde: You have 5?

Bolekwa: Yes 5, no they are still working well. Ja the only problem is that I need to change gutters to direct water to the tank to maximise the water.

Me: Are they broken?

Bolekwa: Not really but they are just not in a good condition. I know exactly what to do to fix that problem.

Me: And then maybe if you can tell me how much money you think you get extra a month selling your vegetables.

Bolekwa: R220.

Me: And would you save money on food now that you have your own garden?

Bolekwa: Hmmhmm. Easy yes I do save.

Me: I was just wondering where you go buy your other groceries on a monthly basis and how much you spend?

Bolekwa: Ja I normally do my groceries in Kingwilliam's town and I go to a specific supermarkets to check prices, that is very important, and compare ok that one is cheaper here so ja I do go to Kingwilliam's town. So my groceries cost about R2000.00 because of the number of people in my house.

Me: And I was just wondering what has been the biggest challenge in your life last year?

Bolekwa: Actually a family problem. Maybe it's the age of the children, they are not rebellious but judging to experience, bad health like smoking. When they start smoking they get into zols, so that has been my challenge and worrying about my child.

Me: And on the opposite side of that I just wanted to know what your future plans or dreams for your household or family is.

Bolekwa: Ja I just wish my family unites and works together so that we live in peace and harmony and every member of the family to play his or her role in making my family better.

Me: Ok great, I really hope that happens. Is there anything that you wanted to add Bolekwa in terms of anything I haven't asked in terms of food or water security?

Bolekwa: No

Me: Well thank you so much for your time.

Contextual interview

(Int.10G) Khynisa NGO (PE) Interview

Gerald Mkele

July 2012

Nina: What is the meaning of Khynisa?

Mr Mkele: Ma'am the name Khynisa means Enlighten. Khynisa was established in the early 1990s and it was established because you know I'm not sure if I'll say it right, because of this Trust for Community Outreach-the head office is in CT. It is housing many different NGOs. Different offices, It's an umbrella foundation. These offices we call them regions, so this office in PE is called a region, the office in Grahamstown called Masifundo. And then there is other one in King Williamstown called and in Northern Province which is called Deteriga. Ok I wanted to give you a brief background. So all the affiliates were born in different times and different years but what is similar to them is why do they gave them, it was during the time of apartheid. Apartheid is usually accompanied by poverty. So all these offices were trying to address the question of education. So the children needed to pay uniform, to pay school fees, the children needed a good study environment in term so f the life and food and what what. So all of us were trying to address the education problems, then fortunately or unfortunately we were the last one to be established in this family, we were established in the early 1990s...

Ok let me start somewhere, you see the way we are addressing this education problem is using certain programmes like for instance for one the OBET (Other Basic Education and Training). So we were responsible in terms of training the tutors, the teachers and also they in return were suppose to establish the classes in their various areas and also do support training and support them in terms of stationary and what what.

Nina: Is this primary school up to high school?

Mr Mkele: No we are talking about adult basic education. Those are our mothers and fathers who have never been to school or went to school and were early drop outs. So we were doing that training at elementary and intermediate level and advanced level and then in the end of our session they were encouraged to join the OBET classes which were run by the government. But unfortunately there was a contradiction in terms of methodology because we were using a learner centred which starts from where the learners know to where they don't know. But when they joined the government ones they were bombarded with all the information on the board so they drop out.

So that is one of the programmes. Then secondly we have the education programmes which have three levels. Ok so we offer bursaries from the primary level to the high school level. We also have tutorials. Then there is bursaries to cover that poverty thing and due to the lack of stationary or teaching aids at high school level makes the failure rate very high so we are responding to that so we are organising teachers to teach them in their spare time like Saturdays, linked to that during the June holidays we usually have winter school and we organise the good teachers, and organise a place which is a centre where they come. We pay a lot because we paying the teachers and paying for also the stationary and for the food to eat and also for the van and accommodation.

The third one was based on, called cooperatives. This one was responding to the rate of unemployment which the oppressed and it was encouraged in them to have their own project like sowing so they can sell something. But unfortunately the two of them collapsed, well actually what happened we're depending on funding from the European countries. So these people were questioning what are the students doing after we have assisted and helped them? And then that was the difficult part because the students come to us after and in terms of their careers but then they are responsible to respond to their family affairs, and that was a problem in terms of the funder. And

also we find out that all these programmes were chowing a huge amount of money which we do not have because we were depending on the funder. Now after some time 1993/94, the funder gave us the funding to do the remachining exercise. To dash all these people we are saving and to check the relevancy of what we were doing.

And the other approach PPPA (People's Participatory Planning and Action) ok let me tease it. Ok people who are the people for us, we are using this philosophy in terms of organising the community, we don't say every people are "the people". To us we are refereeing to the oppressed, those who were oppressed and are still oppressed and referring to those who are still disadvantaged. We are responding to the voiceless. So participation to us means active involvement of the people in decision making up to the culmination to the policy. So after the people have gone through some of these things, identify the problems in their communities they must also suggest how is this problem. So active involvement in solving the problem, so after they plan together we expect them to take action in terms of implementing.

Nina: So that comes from the TCOE?

Mr Mkele: We are very straight in terms of the approach in regarding this philosophy. We encourage critical thinking from the staff to the level of the community. So ma'am during the time of this education, there were areas like SRV like Glenconnor, Paterson all those areas. So there was no NGO like us. And there was also Kouga which involves Humansdorp, Hankey. So there was no TCOE involvement. So you find out most people do find out information about us or about TCOE. So they were applying to other offices like Grahamstown, Masifunde...and also the head office in CT called Masifunda. So when that was analysed it was decided that we need to establish an office here in PE.

Nina: Did the people seek you out first or did you seek them out first?

Mr Mkele: I'm getting there. So the TCOE analysed all this and said we need to set an office to accommodate all these people. There was a lady which was a partner, due to her experience she was asked to undergo needs assessment. To interview people to check where there is a need, all those things. And via her consultation, it was agreed in all these municipalities, we need to operate. So we started to implement all these education programmes. Khynisa was established during the time of 1990, neh, and then around 94/95 there came this philosophy. We also do remissioning training workshops with communities. Out of that remissioning exercise we came up with the programmes we have presently. This is the Land Programme which has two legs-Land Access and Land Use. Secondly we have local government programme, also it is specific in terms of these things are very new-the developmental local government is very new to our local communities. Both are done by applying the policies. So there is the land reform policy and local government policy in terms of participation so how are people going to know these things-so they won't participate, not participating what does that mean? It means they won't get a good delivery. So ours is to capacitate them on these things. And thirdly although it is not a stand alone thing, integrated, the women or gender thing. It's women empowerment and equality. So out of this change there were in all the areas, SRV, Kouga there were people who were hungry for land. Land for what? Land for crop, land for stock. So as you know the government divided this thing to three or two so there was land distribution and development and restitution and there was also to security on the farm of the farmers. But we are not taking that third leg. Ours are to capacitate to make people understand this land reform policy and after they have understood it they can apply. So now we have this group of people called black emerging farmers, mostly in Kouga and Hankey. But you know the government, there are many problems around this because firstly the government first wanted to group them as 15 or 20 and so on so they can access this grant and buy the farm for them.

Nina: Like a co-op?

Mr Mkele: No like a shit trick. You see most of the people their minds are not in the farms or owning the land, but they were roped in because government wanted the grant to be enough. Because government doesn't have their own farms, they buy it from the white commercial farmer.

And in doing that they are using willing buyer willing seller which is a problem. Yes they managed to assist them to have land access but the problem is that not all of them were keen to work the land, others were just roped in to make the numbers. So it's difficult to work the land profitably like that. So they end up being divided and lots of disputes and so on. So that makes it difficult for them to do the land and moreover there was lack of support from the government. This is agriculture and they use highly industrialised machinery that they are not getting. And they are not training these people and they must be trained in business skills. And since they are interested and keen to work the land, they end up fundraising somewhere and they end up lending money from the land bank. Well the land bank is like any other bank, if you don't pay the bank then they take your land away. So that's happening to the farmers. So you don't produce enough cause you're not trained because you are not getting supported. So you end up being unable to pay the bank so the bank takes over the land and you go straight to square one of being landless.

So what we are doing is all those people who have acquired the land we organise them, we run capacity building activities so that they can stand on their own and challenge this thing on their own. So we end up in all those areas, they end up establishing their own vehicle called Makukhanye Rural Movement. So all our capacity what we doing, we doing it to these leaders so they can go back and share to their perspective communities. And they can also use this information to in order to lobby the diff government department for resources, but the government, his neck is very stiff so they are struggling in that regard. Let me talk about Glenconnor now.

Nina: Yes ok I just wanted to know why Glenconnor was chosen as opposed to Kleinpoort for example and how many years Khynisa has been working there.

Mr Mkele: During the years we were organising all these people, well let me talk about myself before that. I was working at Masifunde , originally I am from Grahamstown, as an OBET coordinator but in during 1990 when Khynisa was established there was a shortage of staff so they requested me to come down and assist, since then I ended up working here.

So we met the Glenconnor people in 1998/99 it was them who touched us and invited us to come and work with them. Roughly they were experiencing problems at that time. You know how Glenconnor came into being. Glenconnor was a station of the railway called Spoornet. And it had its own workers like in Kleinpoort, Volvontein and Glenconnor. They were working there, then I'm not sure if they were experiencing problems but Spoornet ended up closing and gave workers its package. So it was no more use that station. It had its own houses for the workers. Meanwhile there were nearby farm dwellers experiencing unfair treatment by the white commercial farmers so they saw that as a space so they jumped and occupied those houses. Since those houses were owned by Spoornet so they expected them to pay rent to Spoornet. But they stayed there but services were not good and Spoornet told them that they were not responsible. Then the government, Cacadu wanted to take over the service of Spoornet and to take over by evicting all those people and drive them to the nearest town which is Kirkwood. So the people didn't want to do that. They had many years staying there from those farms and they calculated the rent they had been paying and find out that they are suppose to be owning those houses. So they met us to assist in facilitation of those struggles. They told us that they do not want to move, instead they want to respond but they want to be united to understand the policies and their rights. So that is what we did. We established the Glenconnor Development Committee which was responsible in terms of uniting all the communities and all those people have certain skills, like organising skills and understanding the organisation of the government.

Nina: So that is like Mr Plaatjes? He is a CDW.

Mr Mkele: Ja he gets that training.

Nina: Is that under Makukhanye? So that Glenconnor Development group falls under Makukhanye?

Mr Mkele: Yes it does, those areas that we are working in. You see when we facilitate the development we don't work with individuals, we rather establish community development vehicle.

So in all those areas there are those vehicles, which are affiliates of Makukhanye, yes we are responding to their needs in their local but more and more we organise them under one roof under here at Makukhanye. so we have training programmes for the leadership that we expect them to plough over to their community committees. So Glen was one. And due to our own trainings and also referring them, they managed to, it was a difficult struggle, they managed to win their struggle. They are not going anywhere but instead the government must pour in the services to them. There was no water, no electricity, no ownership of the houses, so when Cacadu wanted to take over they said no you can do that but you must provide services for the people and you must buy those houses for the people so they can own them.

Nina: So they got the title deeds for the houses?

Mr Mkele: Yes

Nina: And what year was that?

Mr Mkele: You see it wasn't so long ago, maybe two years back.

Nina: And the water issue?

Mr Mkele: Ah the water issue is a very difficult one along the SRV. What they did, the Cacadu District Municipality, they managed to negotiate with the white commercial farmer which is staying adjacent to Glenconnor and they negotiated and then were able to get water from him. But the water had problems, it was dirty and what what. So they also engaged in the struggle to make that water clean and it was very long, but ultimately the water was cleaned.

Nina: And then they got a water tank?

Mr Mkele: Yes they did. And also the ownership and access to that.

Nina: And now it's the problem of electricity

Mr Mkele: Yes, I think since last year SRVM took over from Cacadu. SR is the affiliate of Cacadu but not directly now. Glenconnor is under SRV now. So all those services...but the problem is that since they were all along fighting g they were able to secure some funding from Cacadu. Now they want the SRVM add on that amounts and give them services which is a struggle.

Nina: So Cacadu is the District Municipality and SRV is the local Municipal?

Mr Mkele: Yes

Nina: Ok so Glenconnor residents approached you. I just wanted to know, what are the goals of Khynisa in Glenconnor specifically?

Mr Mkele: This is a difficult one. We do not serve just one area. Although we respond to the needs for a specific area in terms of owning houses and getting services. In all the areas we work in our overall goal is to assist them to live better lives. Better lives to us means, own certain natural resources, example-land. Also better life to us means better basic services, and better life to us means participation in terms of shaping their future with the government. And also it means the shaping of the policies to be in favour of them. So in all the areas that's what we are struggling for. So we are doing a huge task. There are specific objectives but the overall objectives are like these in the TCOE areas. You also find out that the TCOE assists also in capacity building activities. So they call leaders from all those different offices and assist in training and sharing information in terms of where policies are concerned. And we use that advantage in making them share their experiences, each one learns from each other. and we start that from the local, The Makukhanye Movement we facilitate monthly action research meetings, leaders from Addo, Hankey, Paterson meet under one roof and give progress in what was expected of them so they give the problems, attempted solution and the progress. So they are assisted in terms of advice and that's where Makukhanye comes in, if they are unable to solve the problem so that is where Makukhanye comes in and tries to assist. As you know its difficult policies. You cannot influence policy change as a single NGO so that is why it is NB to work together as communities. So now they are busy to establish the National Rural Movement which Makukhanye and other movements have assisted. And some of the activities that they are looking at are 1913 Land Act. Its anniversary is next year so these people are going to respond they will say you cannot have that anniversary because this thing damaged many communities up to the present-difficult for government to redress so we come with that. Your questions are leading me to speak about other things too...

Nina: No that great, that's how I've structured the interview so you can just speak. I wanted to know, I just wanted to know what you understand by sustainable rural development. I'm looking at gardening and RWH so I just wanted to know what you understand by that.

Mr Mkele: Ok I'll be starting from the premise where these communities want land for them to produce, just small pieces to produce as women and men. The government is responding to that they are calling it Green Revolution. These groups established ...let me start here rather. You know the problem with the policies with what I'm saying is that they are neo-liberal you see. Like for instance, they are being told to apply the way they are told which is a problem to sustainability for instance neh, in order for rural development to be sustainable there must be land access and support and the people must be trained in terms of concept building. They must be aware of the position they are in and the response thereof. Its neo-liberal in a sense because they are forced to use the highly skilled machinery that they do not have. And also the natural way of ploughing that they are told to apply are neo-liberal. Like for instance the use of GMOs. So this is encouraging and building towards capitalism. As such the use of GMOs make these programmes unsustainable because you can use GMOs for a certain time but after a certain time of using GMOs the land is no longer productive. And secondly when you talk about producer groups we are talking about people retrenched in big firms in Utinhage and PE. And also in terms of unemployment camps, and these GMOs need money, so you have to buy them which makes it unsustainable. So to us sustainable rural development means away with GMOs. So in terms of TCOE funders, we have funders that support organic farming. Organic farming is coming with the use of other alternatives if we take out GMOs. So that's Sustainable Rural Development to us.

Nina: And anything you do around water?

Mr Mkele: That is where we are struggling. When we talk about land reform and rural development there is also to be included water reform. That's why you find our black emerging farmers, because there are water boards, I mentioned the case of Kouga, the white commercial farmers are using all the water boards which makes it difficult for these black emerging farmers cause they have to sometimes pay a large amount and most of the time the water is closed. So how are they going to produce? And also you have producer groups like mostly women that are working that do not have land but they manage to negotiate with churches or schools and since they are unemployed these are the people that we train in organic farming. In fact I don't know about that but we do have facilitators we are using given by TCOE and some we organise by ourselves. Like there is an organisation in Grahamstown,

Nina: Umthathi?

Mr Mkele: Yes Umthathi we work closely with Umthathi and we send our people there or they send people to train for this organic farming so that also adds on what we understand for sustainable development.

Nina: Ok so they were trained in food gardens, did Umthathi go to Glenconnor and do the training there?

Mr Mkele: No since we have these isolated areas, its difficult for the trainers to just do one area so we usually identify a training ground for one of the areas and then so Umthathi can come and train everyone. And also when they are having these trainings in Grahamstown we take them there and subsidise their accommodation and transport. So in terms of giving support.

Nina: But you worked with Umthathi though?

Mr Mkele: Yes yes we have working relations with them.

Nina: Because when I spoke to Jimmy and Mieta Plaatjes she said she was part of that training in Kirkwood. Did Umthathi go to Kirkwood then?

Mr Mkele: No that was a different one. That was a specialist, because during that time we needed training fast and Umthathi was busy and people were thirsty in terms of getting that training session. So we hired a private somebody not sure who but it's an org based in Hummansdorp which specialised in organic gardening.

Nina: Could I get that name from you later maybe?

Mr Mkele: Sure

Nina: Ok so they are in Hummansdorp. I know they (Glenconnor residents) did a training programme in February of this year.

Mr Mkele: But also last year that lady was there from Hummansdorp training them twice. They were using that place called Bashiba which is near Kleinpoort which is a middle ground.

Nina: Ok and I just wanted to know, that food garden training, was it mostly women who attended?

Mr Mkele: Yes mostly women and a few men.

Nina: And the selection process. Who decides who goes?

Mr Mkele: We are not always there. They decide themselves. We just encourage in their criteria that it must be the person who is willing to share with the others and translate that information to others. So it must be a person..in his her own area.

Nina: Ok so maybe these other questions will be more specific to the people who did the actual training. Do you perhaps know what the challenges are working with these communities with training or development in general?

Mr Mkele: You see one, it the whole question of competition. If you have listened to me carefully, ours is training aimed at capacitation and self reliance so people at the end of the day must stand up and respond themselves. so the other organisations are coming with something so the government lack of housing, they come with RDP houses. so people sometimes they are confused don't want to join because they say you are coming with nothing. So that is one.

Secondly you know it's difficult to change policy of the government so it takes time and it is difficult so the people end up being tired without achieving.

Thirdly, the Makukhanye in terms of its leaders, neh they are not employed and all the time in order for you to have a place in the family or the house you must work. Unfortunately for now Makukhanye is not employing because they lack that funding. Especially during the citrus season people get employment there so who is going to perform the duties of the Makukhanye. You cannot say you can't go there. So during that citrus season, there are problems. even those people that I said have no land, they work in churches or schools they need that employment, most of them work there.

Another challenge is that it is difficult to come with alternatives, if we are talking about unfair policies. It takes time to come with alternatives,

Then there is the dependency thing. By establishing those movements, rural movements, we want to decentralise power. We thought that at some time the NGO will die naturally and then the movements will take over. Because some of the funders are not willing to fund the NGO. They want to give to the communities directly so at the end of the day and during that time the people are not really keen to be self-reliant. In fact they do not have that alternative of being self-reliant. Seemingly we'll support them forever. But there are plans in that regard from here at Khynisa. We have a three year strategic plan . We are in the second year. By the third year we have a clear exit plan.

Nina: Ok so you slowly pull out?

Mr Mkele: Yes

Nina: So obviously the first phase you come in and you help and then Ok so what does the second phase look like?

Mr Mkele: The second phase is seeing those people do those things. Like presently these people are organising their own activities with or without us. They have managed to have the fundraising activities. they have organise their own-like the women tell us that they managed to fund raise themselves, so it is them that are making and doing that.

Nina: That is so exciting when people make their own initiative and I have not thought of it like that that you want the NGO to fade away.

Mr Mkele: And it encourages us..

Nina: Yes most definitely, and maybe its probably encouraging finding leaders, its difficult with the seasonal work and having constant leadership and having that moment taken away but to have leaders that are consistent, like Mr Plaatjes.

Mr Mkele: Yes but now we are trying to identify new levels of leadership.

And one thing I forgot in those capacity building activities. we also have TCOE we have Catership Development Programme which is granted by TCOE. It's a training for two years which is divided into modules. So you have modules 3 times a year. So each and every movement like in Makukhanye is training people to be there. so about 6 leaders from Makukhanye and other movements. so at the end of the day if they are expected to go and translate that information or transfer to other movements members or to their respective areas. And there we are talking things like economic literacy, things like food and security stuff, gender and so on.

Nina: Ok

Mr Mkele: So we do have two people from Glenconnor that are undergoing this programme.

Nina: Ok that just reminds me of something, in terms of good gardens, did Khynisa suggest that to the community or did the communities say they wanted to learn about this?

Mr Mkele: Yes we use triple, that thing for facilitation so they come with their own responses

Nina: Ok and I know there is a community crime watch, do you know about that? Was that their own initiative?

Mr Mkele: No that is government, because it is attached to community policing.

Nina: Ok and I was just wondering, politics is obviously a huge thing and where alliances lie. Do you ever have problems trying to negotiate between diff political parties or people who support a certain party?

Mr Mkele: Thank you for reminding me cause one of the challenges is that, the other thing that makes it difficult to go forward for this movement is loyalty to political parties and unfortunately in all these areas the ANC is dominated and it is difficult for people to challenge their own party. And that derails the development strategy. Otherwise we do not have a problem working with anyone because we are non-aligned. We do not work with people using their caps. We use that thing of community. Without any political cap. Although sometimes we do experience problems in terms of division in communities. The DA is emerging as strong which makes it difficult. And it makes it difficult for us to work in that kind of environment.

Nina: Yes I know the DA has won that area.

Mr Mkele: Hhmmm

Nina: Ok , one of the things I want to know is that you have people that design monthly programmes of action. Can you speak a bit to that. What is that for?

Mr Mkele: It is for them. To monitor their progress in terms of their plans. So the agenda is for them. Its just there as facilitators. So that is where the executive reports the account and the general member comes with certain programme.

Nina: Does Khynisa have any responsibilities that you expect from communities when you work from them. Any rules of engagement? Kind of like accountability?

Mr Mkele: Yes that is there. But we make them understand that they are not accountable to us but to their communities. But there are specific programmes that we work together. But they must be accountable to us and the community. I forgot to tell you about SRD-we have a funder, called OD I'm not sure, but the funders from overseas and they have mixed with other movements from other African countries and they have agreed that they must secure funding for food recovery which is countering the use of GMOs. And food recovery starts from communities where communities should identify land which can be used as a training ground. Whereby communities should also establish nurseries for them to inject funding because it is not enough for them to discourage GMOs. They must come with alternatives. In this seed recovery funding there is also funding for a one woman who is responsible servicing all the areas of operation. Making sure the nurseries are working, the money for selling of the seeds is used by all that are there in terms of responding to their own problem. Everyone that is there.

Nina: So that seed recovery programme, would the people in Humans or Umthathi, would they be able to speak more specifically to that.

Mr Mkele: No it's a TCOE initiative. It is better known by us inside. So we invited them as facilitators to assist us in that, how is the nursery established. So they come and run training for that, how to establish a nursery.

Nina: So the food gardens, they teach them to do food garden for their households but then the ultimate goal is to establish a community nursery that will generate money so they can sell seeds and vegetables?

Mr Mkele: Yes.

Nina: And will the report speak to this?

Mr Mkele: Yes I'll get Simphiwe to send that to you.

Nina: And do you want to add anything or ask anything?

Mr Mkele: Yes I talk a lot I want you also to talk. What are you aiming at in undergoing this research and why do you do this research like the way you are doing it. the reason I ask is because I have in mind since you are talking to communities I have in mind that communities lack research skills so if it was designed in people's action research whereby they were actively involved so they can understand and even if you are not there they can do it.

Nina: Well my specific research is linked to years of research linked to the WRC. They are a research body based in Pretoria and do lots of research around water and their website isif you want to look it up. I'm working with a lady on this stuff and basically they are saying that there is so much research done about what we can teach people but all this research is not used because it's not coming directly from the people so it doesn't address their specific needs. So what I am doing, I'm actually an anthropologist, so I listen to people's stories. So I sit with people and then I ask them about their experiences of living in Glen and doing food gardening and the problems they have and then we take that and make a resource, a simple to use resource on RWH and that is development from the questions that people have, and then I will pilot that resource. But what you are asking is what these people are going to get out of it. I think as researchers we have to be really careful of going into communities and promising the world.

Mr Mkele: Yes and not coming back again.

Nina: Exactly so the ethics around that are problematic so we need to be sensitive. So I'm only a year into my research, I've only been to Glenconnor once and I have to go back...

Mr Mkele: So you'll be finished when?

Nina: At the end of July next year.

Mr Mkele: No thanks for your response, why I was asking is because you are involved in this water thing and presently we are struggling around that and linking this thing around water reform which is linked to land reform. So we are struggling with this as TCOE and Khynisa. So we have a challenge of the community structures at Kouga and Hankey where our black emerging farmers are and producer groups are. So presently there they want to influence or change these water boards and they are working with the local government and that but the white wards do not want to open up. And as such we are, they have managed to fight back our people there. And as such it is said that the constitutions must change in order to suit the groups that are getting water. And there are things such as water rights so they need to get capacitated. So I thought when you finish your thing we'll come back to you and ask you to help us. Constitutions. And run workshops around water rights and all that stuff we don't know.

Nina: You know Mr Mkele there is an amazing institute called the IWR and they do immense amounts of research around water...I can put you in touch with them, because water rights and research is such a huge thing now. And they have booklets on water rights

Mr Mkele: Ok

Nina: And I'm not if they do training and workshops as such but they would know a lot and I would be more than happy to try put you in contact with as many people as possible. And if you are talking about land rights, me myself I don't have the technical knowledge with water policies. But I would love to have that knowledge, that is why I am getting into this research.

Mr Mkele: Ok sorry for interrupting. I'm interested in this IWR. Could you...as a person who is working here I come with my recommendations I think you could assist us and the facilitation of the meeting with us and those people based on what they want and we want.

Nina: Ok, I'm part of two projects-the WRC and then I am on the SANPAD project in SRV. And they are doing a huge study in the SRV which is linked to the IWR. And the SANPAD people, its transdisciplinary,

Mr Mkele: Besides funding in these educational studies, what are they funding?

Nina: I think they just do research, I'm not sure if they fund projects

Mr Mkele: Ok cause then maybe they can also assist us because one of our problems is a shortage of staff so we will need to do research but we do not have funds. Maybe they can assist us and send someone...

Nina: Ok yes well I don't want to make any promises, I'm just a small fish so I can find out who would be most helpful to you and then I'll put them in touch with you.

Mr Mkele: Ok and I also want to say feel free to ask our help....

Nina: OK thank you so much yes. I'll just be in touch then.

Appendix 3 Excerpt from field journal of sample observations

Field Journal-Cata

Tuesday, March 20, 2012

(What is the contribution of an anthropological lens for understanding rural peoples' use of water?)

Why are people engaging in water practices this way?

Traditional ways people are scaffolded in their understanding and learning of water practices- compare that to how people learn about water now

What are the prior knowledges of using water?

What are the informal ways of learning about water (oral tradition)?

Monde and I arrived around 11 am on Tuesday morning. We went straight to the Cata Museum/Community Hall. We met Boniswa Tontsi, the head of the tourism office in Cata and the BRC Support Officer. At first she didn't remember me but then I reminded her of my last visit with Ashley Westeway.

Monde is so wonderful as a person to open up this field site for me. He knows many different people in the community and is really well liked and respected. This is the first time he has been back in Cata since 2009. He also did lots of work with Boniswa so she is very willing to help us.

Ethics and research-Monde really challenged me on how I conduct myself in the field. He has observed many a MA and PhD student in the field and argues that Rhodes really should put structures in place where students are required to give back to the community in some significant way. He does not think it is right that we come in and take from communities and give nothing back. I agree whole heartedly with him.

So we chatted to Boniswa and asked her to organise us a few translators to choose from tomorrow for me to work with. He is so helpful. He said that a translator is so important and that I really need to interview a few before I just work with one as my research is so dependent on a translator. Very good advice. So tomorrow morning at 8 we will interview a few female translators.

*** Research participant (Int.1C) Nothemba Languva in Skafu**

After we settled down at Amanda Palmer's house we headed off to a lady that works for Water For Food. I think Monde knew her from working here previously. Her name is **Nothemba Languva** and she is an elderly lady who has gardened for a number of years (interview 6/6, 7/7, 8/8). She was so accommodating, the interview went on for quite a while. Her little grandson came in and out of the living room where we sat, playing with the grumpy dog on the floor and carrying a scruffy little back pack around. It's warm and there is a strong manure smell. She has been part of the project since 2004 the WFF started. She was already a member of a developmental committee (restitution fund) so she knew about the WFF programme. She liked it so in 2005 she joined the programme. She has been a member ever since.

She has four Jojo tanks and one cement reservoir built by the WFF people or BRC. She was chosen by the WFF programme to have this reservoir built in her garden. Out of 21 families, four were chosen to have a reservoir built in their gardens- One in Skafu, 2 in Nyanga, and one in Ndele. She was chosen because she was already a successful gardener. Later they were given tanks as well,

both the reservoirs and tanks were funded. Other people who did not get reservoirs, got four Jojo tanks on the criteria that they were either poor, struggling, had elderly people or did not receive compensation from the restitution process. Fifty families were given tanks and they mostly use them for domestic use.

She digs small furrows that lead to the reservoir-this is how the rain is collected. She had a garden for the need for food and planted meillies, potatoes and beans in order to feed her family. Before a garden she used to beg and ask around the community for food. Then she started planting and “things were much better”. Now she grows green peppers, spinach and other vegetables. She was and is the main food provider.

Before she had a reservoir “she relied on rain entirely”. She knew when the rain was coming so they would plant just before that, December/January. There was lots of drought around 2006/7 so then she joined WFF and got tanks and now she can manage her water much better. During drought the alternative is to get water from the taps because it does get dry. Even if the water goes down, **its very difficult to get the water out of the reservoir because she has to scoop it out and its deep (problems)**. She uses two litre bottles to fill drums around her garden. If she could change anything about her reservoir-“if I could get a pump, anything that would assist me to get the water easily”.

Gardening techniques she was taught by Mama Tspepho (this lady is a really good example of what the WFF programme ethos stands for-helping yourself and helping others)-dig your garden, take out tops soil, take old Coke cans, old blankets and burry them underground, cover it with soil and top soil and then plant seedlings. The Coke cans retain the moisture because they collect the water underneath the soil. So they retain the water that you water the garden with and it retains the rain as well. So now she plants throughout the year.

An outside contractor built her reservoir but used local labour in order to build it. division of labour-her husband helps her in the garden. She is the head of the house, but he assists her in the garden. She has had no problems with the reservoir except that it is difficult to scoop out because its very hard work to get the water (problem)-sometimes when it is low she just goes to the community taps for water. She has had no problems with the Jojos. They are still quite new and they have been helping her.

Rules-there were some conditions given in terms of the use of the reservoir. It was only to be used to water gardens. Not to mix mud to plaster house or anything like that. She uses the water from the Jojos for domestic use and puts a drum under the Jojos to collect water that spills over. Then she uses these drums of water to water her garden. She drinks the water in the Jojos and does not treat it. “the quality is good”.

Other techniques-she just does the cans and blankets and then she uses natural persticides. Aloe and other indigenous plants which she learnt from the WFF programme. She also places old cow bones at the base of trees which retain water very well (**indigenous knowledge**).

Community-the WFF group used to meet once a month to **discuss problems**. “We share ideas and help each other”. “if you are no longer motivated or seem to lose interest in your garden, one member will visit you and ask what is wrong. We also, each member contributes R10 a month to some kind of trust or bank, where at the end of the year, we sit down and use that money to buy potato seeds. Share these among members and then plant these”. Other problems, if they no longer have seedlings to plant they will take money from their bank and then buy seedlings to plant. They use these meetings as a platform to bring their needs to the fore-“such as the need for garden tools. These are really lacking amongst the people and this really demotivates people”. The WFF

programme does not provide money for tools. So she bought her own tools with money from selling vegetables-people come to her to buy veggies, she doesn't have to go and sell them. At first they had communal tools and then they had to return them to the hall. When she took them back that was the last time she saw them. She sometimes shares her vegetables with the poorest families and also with households that are HIV infected. Even if they do not cry out for help she can see and she shares what she has. "her own garden does not only help her to get money but it also contributes to her own health because she is diabetic but because she eats fresh vegetables her diabetes is always controllable".

Of late they have not been meeting that regularly. She thinks this has to do with all the other CWP (community works programme) activities that keep others busy. She herself is very busy, for example, she cuts grass at the school and plants a garden there. She also works to paint or renovate the school-so she gets paid for these activities. Others plant pine seedlings for commercial forests. This CWP is diverse in terms of what is happening. So this is another way of diversifying income essentially. People are busy then and don't necessarily have time to meet and discuss gardening matters.

Who is the main leader of WFF in Cata and are they still getting assistance? There is one person who is the chairperson for WFF-Phumzela. This WFF was funded by BRC but now there is no longer financial support from them. They wanted this programme to run by itself and be sustainable and going with its own momentum. She thinks that it has the same momentum. They started as 21 members and now they are still 21. The membership does not grow because in the beginning the project budgeted for only those who were interested and stuck with the programme. There were only 21 families interested so they were helped. Now there is no money left or assistance or tanks to be donated so people have no incentive to join.

Other people just plant what they want to and buy their own Jojos.

Community-People do come to her for advice. I do tell them. Knowledge is not that difficult anymore. People are taught to dig furrows even if they do not have a Jojo tank. So **other methods** used when there are no tanks.

If her tank breaks she says she will fix it-"she cant look any further for help".

Appendix 4 Sample letter of informed consent

To Counsellor Blou,

This letter serves as an introduction to myself, Miss Nina Rivers (student number g06r4063), a full-time student within the MED Environmental Education programme at the Environmental Learning Research Centre (ELRC), Rhodes University, Grahamstown. I am currently undertaking research in the SRVM on the learning around food and water security practices. The title of my study is 'The Mediating Processes within Social Learning: Women's Food and Water Security Practices in the Rural Eastern Cape'. The research is a case study on communities in Glenconnor and Kleinpoort in the SRVM.

Through my research in the SRVM, I am also affiliated with a broader research programme being carried out in the SRVM by the Institute for Water Research (IWR) based at Rhodes University, the Water Research Commission (WRC) based in Pretoria and the Southern African Netherlands Project for Alternative Development (SANPAD). I began my research in May (9-11) 2012. Seeking permission to carry out research in the area, I was directed to Karen Smith who gave me Mr Stef Delpoort's contact information. I was unable to contact Mr Delpoort so Karen Smith gave me the go ahead to begin my preliminary research. I later interviewed Mrs Smith and Isabella Wagenaar, the new ward counsellor for the towns of Glenconnor and Kleinpoort, to find out what the socio-economic issues were that people in the area were struggling with.

As my research is focused around the learning of food and water security practices I chose to work with the residents of Glenconnor and Kleinpoort as many of them have rainwater tanks as well as grow food gardens. I conducted another field trip in January 2013 (25-30). I have been working with several residents from Glenconnor and Kleinpoort, interviewing and running focus group discussions around the subject of rainwater harvesting and growing food for household needs. I am currently not sure if I will need to return to the SRVM for further data collection.

The results of my research will feed into a broader WRC research project looking at how people learn about their water practices.

Should you require any further information please do not hesitate to contact me.

Yours sincerely,

Nina Rivers
MED (EE)
Environmental Learning Research Centre
Rhodes University
Grahamstown
nina.rivers@gmail.com
0466038390

Appendix 5 SANPAD workshop meeting minutes

SANPAD WORKSHOP: SHARING GIS RESOURCES IN THE LSRV

16 May 2012

Venue: Interpretation Centre, Main Camp, Addo Elephant National Park

Objective

The main objective of the workshop is to explore ways in which the different institutions using GIS as a tool for planning within the Lower Sunday's River Valley can collaborate, learn from each other and share the available data in order to ensure sustainable and equitable distribution of domestic and livestock water. The workshop will endeavour to use the principles of co-learning to improve the use of data that are already available to inform decision making. By exploring different data sharing options (e.g. ArcGIS Online), we will create a platform for different interest groups to access and make use of the knowledge embedded in the databases. There will also be an opportunity for agencies active in the Lower Sundays River to present a summary of the types of data they have, what they use it for and the protocols of access to and restrictions on the use of these data. It is envisaged that the workshop will be able to demonstrate how the different types of data can be used together to create a better picture of the current situation around water allocation and security for the communities within Lower Sunday's River Valley.

Programme

9:00 – 9.15 Welcome and presentation of the aims

Tony Palmer (ARC)

9.15 – 10.00 The Eastern Cape GIS Clearing House for Water Infra-structure

Ms Vatiswa Dyanti (Dept of Water Affairs)

10:00 – 10:15 Discussion and questions.

10.15 – 10:45 Tea

10:45 – 11.45 ArcGIS Online

Julian Inskip (ESRI)

11:45 – 12:45 Short (5-10 min) presentations by the various local agencies on the nature of the data in the local GIS. Here the representatives of the following agencies will have an opportunity to present information on the water-related data that are available.

WUA

Cacadu District Municipality

SRVM or SETPLAN

ARC

CSS

Amatola Water

12:25 – 13:45 Lunch

13:45 - 15:30 Plenary session.

Short presentation on the regional challenges to effective water resource management.

How best can we integrate the existing GIS capacity to improve water resource management within the SRVM?

What gaps can be identified in the data available for more effective water resource management?

Contribution to general education on water issues.

15:30 – 15:45 Summing up and closing

15:45 – 16:00 Workshop evaluation

Attendees:

Dr. Tony Palmer – ARC (palmert@arc.agric.za)

Ms. Andiswa Finca – ARC Research Assistant (finca@arc.agrric.za)

Dr. Georgina Cundill – Rhodes University, ELRC (georgina.cundill@gmail.com)
Jane Burt – Rhodes University, Transdisciplinary PhD (j.burt@ru.ac.za)
Lara Molony – Rhodes University, Water security issues (molonylara@gmail.com)
Matthew Muller – Rhodes University, MSc student (matjmaula@gmail.com)
Dr. Sukhmani Mantel – Rhodes University, IWR (s.mantel@ru.ac.za)
Nina Rivers – Rhodes University, MSc student, ELRC (nina.rivers@gmail.com)
Jai Clifford-Holmes – Rhodes University, MSc student (jai.clifford.holmes@gmail.com)
Helen Fox – Rhodes University, PhD student, change agents (helenthefox@gmail.com)
Julian Inskip – ESRI (jinskip@esri-southafrica.com)
Suritha Kampman – LWUA GIS person (suritha.01@gmail.com)
Rudi Haroldt – SRVM Manager Technical, GIS for town planning purposes (ruidih@srvm.gov.za)
Sidwell Mpondo – SRVM IST officer, social participation (sidwellm@srvm.gov.za)
Vuyani Mata - SRVM (vuyanim@srvm.gov.za)
Angelique Attenborough – Amatola Water, Water Resources Department, GIS (aatenborough@amatolawater.co.za)
Vatiswa Dyantyi – DWA KWT office (GIS), Acting GIS Manager, DWA Eastern Cape (dyantyi@dwa.gov.za)
Thando Dhulane – DWA KWT office, Monitoring, technical, engineering (dlulant@dwaf.gov.za)
Kasonde Mulenga – DBSA SRV technical support (KasondeM@dbsa.org)

Start Time: 9 am

Tony Palmer – welcome, introduction of himself, and introduction to project's transdisciplinary approach to issues. Aim of workshop is to get GIS experts together to build better understanding, assist with project development and opportunities in Sunday's River Valley.

Georgina – asked everyone to fill a pre-questionnaire.

Introductions of each participant.

VATISWA DYANTYI PRESENTATION on EC Clearinghouse

DWA Eastern Cape GIS Clearinghouse

Focus area 1: Implement project governance mechanisms

Focus area 2: Design database and water services data capture

Loaded in GPS to capture data in the field. Devices with lookup tables to input data on e.g. reservoirs.

Water Infrastructure data capture projects for EC WSAs – using digital data forms, high accuracy GPS receivers, etc.

Collected data from 2003-2010 e.g. abstraction points, boreholes, devices, pump stations, reservoirs, meters, standpipes, valves, water treatment works, windmills, sewer treatment works, etc. for Alfred Nzo, Amathole, Chris Hani, Joe Gqabi, OR Tambo, Cacadu/Ndlambe.

Project data collected by consultants or DWA in-house.

Focus area 3: GIS System implementation at DWA – various GIS hardware and software equipment acquired and input (<http://dwafecgis1.dwaf.gov.za>).

EC Water Service Authorities e.g. for Amathole and Buffalo City in East London. CHALLENGE - Difficulties in receiving new data from some district municipalities since 2010.

Focus Area 5: Application of GIS technology

a. DM Backlog quantification – quantity accurate water service level backlogs for EC. SPOT5 satellite imagery. 1,433,648 households captured for EC from satellite imagery. Buffering potable water sources by 200m, 500m, and 1 km to determine backlogs and hardships. RDP standard - acceptable that a person walks up to 200m to get water and so houses outside that distance are identified as backlogs. Level of Hardship defined by this distance from potable water source and shown on maps by colors (green – within 200m, yellow – 200 to 500m, orange – 500 to 1km, red - >1km).

Non-functional standpipes are also identified in red for operation and management issues.

Kasonde Question – on measures being taken to update water information.

Thando - Challenge of data not being submitted.

Tony – how can one contribute to the Clearinghouse?

Vatiswa – capture picture/GIS coordinates in the field and can be submitted. Can be submitted to Vatiswa.

Project on linking water quality data on DWA database to this clearinghouse.

Tony - Stock water points – not collected as part of this database. Only human consumption points.

Tony - How can this information be used to develop opportunities for new proposals?

Rudi – SRV starting to go towards rural areas – boreholes and their yields could be used to determine how many houses can be built in that area or how many families could be supplied.

There can be an opportunity to develop borehole plan by DWA.

Researchers working with people not being serviced by water sector – *Nina* Glenconnor – local livelihood strategies, what people do when they don't have access to water.

Tony - How are people dealing with water points that are not being serviced – DWA response - go to natural local sources.

Tony - Is there any opportunity to expand the database e.g. use of rainwater tanks? DWA is providing rainwater tanks in some areas. *Thando* – ISSUE - Information from sister departments like which projects will be happening is not available.

Georgina – envisioned process to get data in an efficient

Thando – submit info in GIS compatible format.

Kasonde - Need for information from DWA to get SRV information into database.

DWA – Specifications have been forwarded to Vuyani Mata.

Mata – project of informal settlements politically driven – people want to see houses, and so water issues are seen only after people move in. Very hard to follow backlog numbers. Challenge of physical verification on ground different from numbers on paper.

Tony – Port Alfred also similar problem of houses built and no water and minister stepped in to provide water tanks. Need for understanding of role played by households installed and people's strategies to deal with water issues.

Nina – found that municipality donated tanks to people and those people sold those tanks to farmers.

Jai – WUA has data on farmers – any link with local community.

Suritha – in future gather more data for local communities. GIS data only 2 years old.

Tony – recognize that water necessary for human consumption much less than agricultural use.

Abstraction a problem according to WUA.

Suritha – communication between people is the biggest problem.

Tony – role of GIS for communication to broader public – e.g. allocation from Gariep, where used, so people can understand the nature of the relationship. Possibly a DVD or CD on information to community.

Rudi – Everyone with own GIS system – not compatible and so information can be passed on. Consultant needs to be paid to make system work.

Tony – not insurmountable problem. Protocols need to be agreed upon for exchange of information.

JULIAN INSKIP PRESENTATION on ArcGIS Online
Publishing data online – geared towards GIS community.

- a. ArcGIS Online – create free user account to get on system. Caters to wide variety of data formats. Shapefiles cannot be viewed online but can be downloaded for your own software.
- b. Mobile solution – ESRI has free downloadable solutions for creating maps and gathering data on incidents in the field e.g. light out at a lamppost or stormwater.

Tony – need to decide on requirements for uploading and sharing data.

Julian – Municipality would need to establish a connectivity protocol and schema for sharing GIS data.

Jai – capturing community needs data. Service disruptions in community are recorded by satellite offices. How to capture and collate the data in the Technical division in Kirkwood is an issue.

With such a system can register incidents. Wondering is this a couple of steps too advanced? Should it be recorded in Excel first before geospatial environment?

Tony – easy learning environment to upload data. Could be used to record for example a village without services.

Rudi – gap in mapping newer houses and municipality services provided. In field, people not capacitated to obtain lat/long data.

Tony – marking and entering point is quite simple – a press of a button.

Thando – capturing data in the field –

Angelique – operator with limited capacity – accuracy of data might be an issue. Data sharing and management important to consider – members of a group can work on same file even though working in a far off areas.

- c. Offline editing – also possible with ArcGIS mobile option.
- d. GeoCom extension for water – tool for routine maintenance – CAD drawing as background as an example. GeoCom – Swiss company – extension for buying.
Rudi - Paterson data – burnt down and no data available.
Julian – Analysis tools – e.g. of an application for maintenance e.g. can choose all house connections, enter a leak and can see what house connections need to be turned off. E.g. can be used to send letters to people whose water would be shut off.
- e. Example of a Hardship study e.g. – health facility and household locations. Using road network to determine access to facility. Straight line but can be brought into 3D to show actual route that needs to be travelled. Software available in ArcGIS desktop. 3D through network analyst option.

JAI PRESENTATION on Challenges in SRV:

Mismatch between available water in municipality naturally and demand for water for agriculture and domestic side. Resulted in IBT scheme and role of WUA of providing water from Darlington over water network. A farmer that *Jai* met talked about how in the past he would get water brought by horsecart for citrus trees vs. now exported fruit. Now 34-50% employment through this industry. Actors – SRVM, WUA, AW + Nelson Mandela Metropole being provided water. 2011 blue drop report – Sundays River achieved 35%. Local challenges of a small municipality meeting demands on a low revenue base e.g. 40% of population in SRV has a household income of < R800 per month. Plus additional problems of meters not being read, etc. resulting in municipal functioning becomes an issue. New areas have also been added to SRVM jurisdiction from the District Municipality. Lots of possibility and uncertainty. SAM workshops conducted last year resulted in development of system view of knots in the system. The four knots that were raised are integrated. They were – bulk distribution (happy orange trees versus sick community members), WTW process (management, finances, housing developments without infrastructural planning by the Housing Department which becomes an issue for Technical Services Department), Community water supply issues (including unserved communities), WWTW (discharge, health of river, potential problems with farming, tourism, etc.).

WUA PRESENTATION (Suritha Kampman)

Updating new channels and offsets. Realised issues in channels that haven't been picked up by limited capacity. Room for improvement with community interaction. *Suritha's* work would be to bridge that gap with local community. Monitoring role in maintaining the channels.

Tony – would like to develop information for community e.g. about history of the system, water use, bulk water supply with low quality, etc. Opportunity to share information with wider community.

Suritha – agreed that there is communication problem about water distribution which leads to discomfort.

Tony – proprietary information and how can this information be shared?

Suritha – needs necessary channels to be followed but it can be done.

Jai – question about what format to use to distribute information to wider community – possibly role of Sidwell since the information would be very useful to local community. Challenges on channels – would these effect municipal bulk water supply and the communication of that with SRVM.

Suritha – Limited time (3 months) to manage canals. Local community does not respect the infrastructure and developing understanding of those canals would be useful.

Angelique – water conservation education important for children. The more water you have, the more one uses without thinking. System is water limited and that message needs to get out there.

Tony – citrus farmers concerned about European economic condition and sustainability of the industry. High risk environment. Job creation opportunities need to be considered - Twenty packing sheds.

CACADU DISTRICT MUNICIPALITY (Given by Tony Palmer in their absence)

Their role diminished with transfer of responsibility to LSRV. Water tank issue and their distribution was mentioned – possible role GIS for distribution, management, people's independence of water infrastructure. Distribution of tanks to Paterson etc. – auditing, monitoring and management of this system.

Sidwell – involved in rainwater tanks in Paterson with water crisis situation. Areas with high risk with not enough water. 1100 water units have been identified by Cacadu. SRVM there to provide support in project implementation and giving community a sense of involvement. Project implementation – 60%. Intended to be rolled out in Kirkwood. Water management committee – DWA person Ms. Titus - Water demand management issue. Last week workshop on this – developed a communication plan. Social awareness communication plan ready for water conservation and demand management. SRVM just providing support to CDM who is the implementing agent. Not sure how GIS can be of assistance with this network.

Nina – Glenconnor and Kleinport have these water tanks – questioned about how to fix and maintained. No information on how to do this. Since new no problems so far. Schools with tanks – previously a lady who came every 3 months to ensure water tanks working but she has stopped coming. Use of tanks for drinking instead of domestic or gardening in Glenconnor. Kleinport do not drink water out of taps because of salinity. Not much information on safety, keeping screens closed. Versus in other areas Nina has worked in Xata (Water for Food Programme installed), there is information provided on management. In some areas in SRV, some people received a tank from the Game Farm people they worked with and they have received a second tank as part of the CDM programme.

Tony – role that GIS can play is where tanks distributed. CDM interested in recording coordinates of these tanks. Needs for maintenance, water quality of water in raintanks. Opportunity to put a proposal to monitor and maintain water tanks. Work on this proposal after lunch.

SRVM PRESENTATION

Rudi and Mata out of the room.

ARC PRESENTATION (Tony Palmer)

Perspective of catchment. Contribution to regional catchment and not farmers or water infrastructure. Opportunity to provide data on degradation in SRVM area. Rehabilitation of thicket and planning for suitable places. Working for Woodlands framework – to build carbon credits. Keen to consider for that potential market.

Secondly, stock watering and new farmers with their need for water. Perspective on planning framework for that.

Thirdly, satellite remote sensing use for measuring evapotranspiration (ET) from grasslands in Makana area to compare land use activities effect on ET. Places with high biomass, there is high ET rate, but grass cover can act as a sponge to allow water to infiltrate to guarantee more water in areas with low biomass. Compared scenarios with improved grasscover in small areas and the effect.

Also, remote sensing use for identifying sites without direct provision of water. Can be offered as part of ArcGIS Online or Clearinghouse.

AMATOLA WATER PRESENTATION (Angelique Attenborough)

AW – bulk water services provider. Primary and secondary business in past couple of years to support WSAs with managing infrastructure.

GIS data for maintain AW infrastructure for planning maintenance. Work with Office of Premier and Clearinghouse to get base data. WTW, pumpstations, WWTW – would like to update the data with good accuracy. Recent project – helped Ndlambe municipality to gather new data to assist in their planning including CAD files, individual GPS units in the field.

Expertise in water quality monitoring, compliance, O&M.

SRV – no spatial data to contribute but received data from SRK but recommendation that better to get data from the custodian of data who can advise on how to use the data.

PLENARY (Tony Palmer)

This afternoon will discuss route to take (ArcGIS Online, Clearinghouse) and where to gather data from, champions for any projects identified.

How best to integrate the existing GIS capacity to improve water resources management within the SRVM

Challenges identified:

- a. Lack of public knowledge about system. *This group can contribute with describing resource – developing documents – contributing pictures infrastructure using the spatial framework.*
- b. Awareness raising programmes – e.g. maintaining water flush system, potable water and usage, conservation issues. Water conservation programme being designed (*Sidwell*) – DWA woman Ms. Titus of Rapid Response Unit. (*Nina*) Conservation has not filtered through and on health and sanitation knowledge is not being linked to. *This group can contribute with describing resource – developing documents.*
- c. Recognising independence of water infrastructure – diversity and widespread.
- d. Maintaining infrastructure –
- e. (*Nina*) Kleinport – no servicing and knowledge gap of people on what the issues are and lack of technical skills to support infrastructure.
- f. Strategy on public participation and implementation process.
- g. Guaranteed supply of water –
- h. Assured allocation from IBT.
- i. Weak knowledge base of infrastructure – *GIS can contribute with knowledge of infrastructure.*

Actions - should support SRVM decision-making (Georgina)

- a. Contribute to clearinghouse. Whole system or specific area? *Rudi* – some hardcopy, some digital but maybe not compatible or downloadable. Is there a DWA strategy or budget? *Vatiswa* - WSAs can submit proposal for funding – need warm bodies. *Rudi* – GIS project should include GIS on other areas besides water, e.g. other GIS users including property ownership, etc. WUA can also benefit because have records of property ownership.
- b. Rainwater tanks – policies related to DWA and how can this contribute to roll out and implementation. Can model amount that can be available, plus uncertainty factor (*Denis*' program). *Thando* – not a long-term solution + challenges of funding. Bulk water implementation timing is 18-20 months and so water harvesting is short-term solution. *Kasonde* – rainwater as a standard backup option. *Mata* – agrees on backup option. *Jai* – as personal off site storage, plus sustainability of bulk water schemes – system over-allocated already. *Rudi* – sewage flow into water – important to maintain issues at source instead of paying for chemicals to treat sewage. Training needed so problem does not occur – raintank maintenance.

- c. Cooperatives – have not submitted what they have found at sites after 3 months. Training needed on infrastructure.
- d. Knowledge base improvement of public – Many schools without electricity, so consider pamphlets, etc instead of CD. Targeting kids who can read is a good idea compared to other members in the community who might not be able to read; maps are visual and might be more accessible. But consider map literacy as an issue. Rob O’ Donaghue sustainability and knowledge practices resource books including people’s stories and link to curriculum. *Georgina* – SAM workshop and issues brought up on how many people die and kids breaking pumps etc. *Jane* – Knowledge dissemination doesn’t work, knowledge source has to be linked to on the ground practices – make it important to their lives and something they are doing already – pamphlets get thrown away. *Sidwell* – how to disseminate it important. NOTE - *Thando* - KWT – Special programmes – school promotional material – DWA providing educational material as part of Water Week.

Need to decide priority on concept note/proposal:

1. Motivation to Clearinghouse
2. Rainwater and RDP houses - monitoring, policy issues
3. Training programme to identify and maintain infrastructure at household level; rainwater tank infrastructure
4. Narrative about practice and how they deal with water issues and how to disseminate that knowledge more widely.

Narrative number 1 – champion Nina / Jane

Rainwater number 2 – champion?

Both can get information from Jane’s WRC project proposal.

Meeting ended at 4:00pm.

Appendix 6 Sample of semi-structured interview schedule (Cata)

Semi-structured interviews:

Group A) People with rainwater tanks:

The things we are looking for in these questions:

- Stories of actual practice
- Problems/challenges faced
- Solutions to tank use

1. How long have you lived in Cata? (added in field)
2. Where did the water you used come from in the past?
3. How did you collect and store water in the past?
4. Tell me your story about your garden. When and why did you start it? Who helps you? (added in field)
5. How long have you had this/these tanks?
6. How did you get it/them? (buy it yourself/donated)?
7. Did you install it yourself? If yes, what labour did you use?
8. What do you use the water/tank for?
9. What sort of problems have you had with your tank?
10. How do you maintain your water tank?
11. If it breaks, do you fix it?
12. Where do you get the money to fix it?
13. How did you learn to fix it/them? (did you ask neighbours or outside help?)
14. How do you manage the water in your tank? (have you ever used less than you have needed? When you run out what do you do?)
15. Do you use other rainwater harvesting methods as well, or did you used to?
16. If yes, who taught you or where did you learn this? (added in field)
17. How do they compare with the tanks?
18. Are people generally concerned about water in Cata? If yes, why and what are they doing about it? If no, why not? (added in field)
19. Eventually this project wants to produce a resource that is helpful to people wanting to learn about rainwater harvesting. What would you put in there or would be helpful to you? (added in field)
20. What else do you do when you are not gardening? (added in field)
21. What is the most important thing you have learnt about water? (added in field)

Group B) Other methods of rainwater harvesting

The things we are looking for in these questions:

- Are people aware of alternative , self-help methods for harvesting water (swales, trenches, ponds, planting circles)
 - If yes, where did they discover these?
 - If yes, are they practicing these?
 - If not, why not
1. Have you seen other methods being used? Ponds, trenches etc?
 2. If yes, where and why are you not trying these out?
 3. If you are trying other methods out, why did you select a certain method?

4. Is it working well?
5. What problems are you having?
6. What opportunities does this method of rainwater harvesting offer?
7. Why do you not have a rainwater tank?
8. Do you want one?
9. What would you use it for?
10. Do you have other ideas of collecting and storing water if the municipality does not provide you with tanks? [again leave out the above leading questions, or ask them at the end. If they raise the tank issue spontaneously, as these questions at the point that they raise it]

Group C) People who used to have rainwater tanks:

The things we are looking for in these questions:

- Where did they get the tanks
- Why do they not have them anymore/ why are they dysfunctional? They are probably still there, but broken or leaking

Why were they not replaced/repared? This is a good place to ask about costs, ie. Both what a new tank costs and how much it costs to repair theirs. Also, who will do the repair? Can they learn this themselves?

- What are they doing in terms of water provision at present

1. How long did you have a water tank for?
2. Where did it come from?
3. What happened to it?
4. Why did you not replace it?
5. Are you are waiting for outside intervention?
6. If it doesn't come, what will you do?
7. Do you have other ideas of collecting and storing water if the municipality does not provide you with tanks?
8. Have you seen other methods being used? Ponds, trenches etc?
9. If yes, where and why are you not trying these out?
10. If you are trying other methods out, why did you select a certain method?
11. Is it working well?
12. What problems are you having?
13. What opportunities does this method of rainwater harvesting offer?

Appendix 7 Sample follow-up interview schedule (Cata)

Interview Schedule D: In-depth semi-structured interviews with primary research participants

1. Bolekwa
2. Nothemba
3. Sisiwe
4. Castina

This time around I want to get more in-depth information about who they are and why they garden.

NB: try not repeat questions from last time, and therefore exasperating these ladies and waste their time.

Life history

- How long have you lived in Cata?
- How long have you lived in this house?
- Where your parents from here?
- Have you ever lived somewhere else?
- Are you married? (if yes is your husband still around?)
- What does he do?
- Who is the main breadwinner in this household?
- How many children do you have? Grandchildren?
- Do they live here with you in this house?
- Have you had a job before?
- If you have a job, do you enjoy it?
- Do you belong to a church or other religious or social group?
- Are most of your friends in Cata neighbours or from church?

Water security

- How are you doing for water this winter?
- Are/is your tank(s) full?
- Now that it is winter, are you using less water each day from your tank? Or are you having to use the taps?
- Are you still planting and watering your garden with the tank water or do you use this water only for drinking now?
- Have you had any problems with your tanks (recently)?
- Have you learnt anything new about how to save your water throughout the year?
- Where did you learn this?

Food security

- Are you still selling vegetables this winter?
- Where do you buy your groceries?
- How often do you buy groceries?
- Do you ever buy vegetables?
- If yes, why when you have a garden?
- If no, why not?

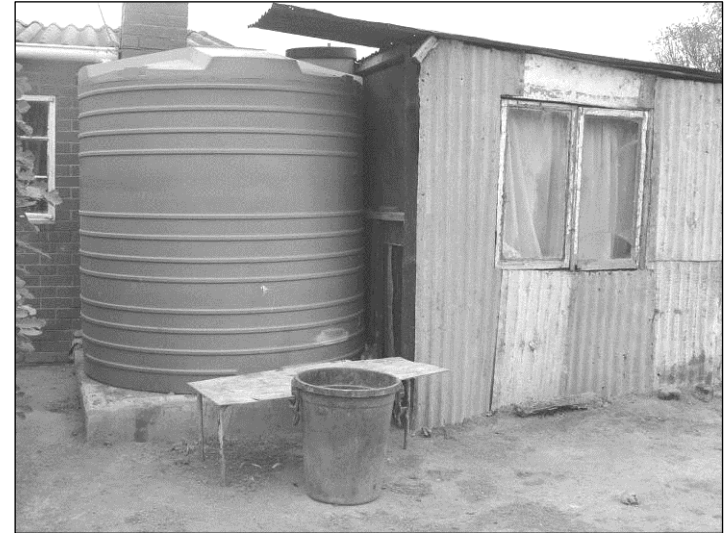
- Where does the money come from to buy food?
- Do you ever ask for food from neighbours or family?
- Do you ever offer food and other help to neighbours, friends or family? If yes why do you do this? Can you give an example of a time you did this please.
- What have you learnt about growing food?

WFF programme

- What worked well for the programme?
- What do you think should be done differently next time?
- If you have to go teach other people in another village how to plant or harvest water, what would you teach them?
- What did you find difficult about the training? (lack of support? Lack of technical assistance? Lack of tools?) Please explain.
- Has the WFF programme been good for the Cata community?
- Do quite a lot of people in Cata have food gardens? If yes or no, why do think this is?
- Do you see a lot of the other women who belong to this programme and discuss ideas and problems?
- When you did workshops with WFF how did they teach you? Did you just plant and garden or did you first work through books or posters?
- Where did they demonstrate things to you?
- Did they come back and check to see if you vegetables were growing and give you feedback?
- Is there anything else you would like to add?

Rain Water Harvesting for Homes and Home Food Gardens

**DRAFT –
NOT FOR
DISTRIBUTION**



Tim Wigley & Robert Berold

Draft resource document for WRC project K5/2074/1

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Change Orientated Learning And Water Management Practices

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APPENDIX: An awareness exercise from Earth
Harmony Innovators

What is the purpose of this booklet?

This booklet provides basic information about how to catch and store rain water. Wherever there is flowing water there is an opportunity to harvest water.

Section 1 is about how to collect and store runoff rain water in tanks and how to purchase, manage and maintain tanks.

Section 2 discusses methods of water storage using the soil itself. Good quality soil stores water naturally, so this section also discusses ways to improve the quality of the soil. It also talks about how good soil leads to food security.

This booklet is designed to be used by mediators who are communicating directly with rural communities about rainwater harvesting.

The research was done in the Eastern Cape, in villages the Cata area near Keiskammahoek and in the Glenconnor area near Sundays River. Residents told the stories of their experiences, and the researchers drew questions out of these stories.

SECTION 1: Harvesting rain water

If you want to harvest rain water you should begin by answering three basic questions:

1. What do I need the water for?
2. Where is the water flowing?
3. What is the best method to catch (harvest) rain water for my needs?

Question 1 you can answer for yourself. If the water is for drinking, this will influence the collection and storage method you chose. If it is for watering plants, the water does not need to be of drinking quality.

To answer Question 2, you just need to look at what happens around your house when it rains.

- If your roof does not have gutters there will be water running off the edges. If you have gutters you'll see water flowing out of the downpipes.
- If the water from the roof is not being caught in a tank, you will see how the water flows off the roof and over the ground. Observe where it is flowing.
- You will also see water flowing over hard surfaces like paths or bare patches of ground around your home.

To answer Question 3, concerning the best method to harvest and store rainwater, you can consider the following methods:

- Tanks
- Ponds
- Dams
- Reservoirs
- Furrows

To help the water to soak into the ground, you can use swales, deep trench beds and planting circles (these are discussed in Section 2).

People in Cata collect rain water from their roofs in tanks. They use this water for household drinking, cooking, washing and cleaning because it is clean water. To water their gardens they usually use a separate tank that is filled from ground runoff water.

Why are rain water tanks so important?

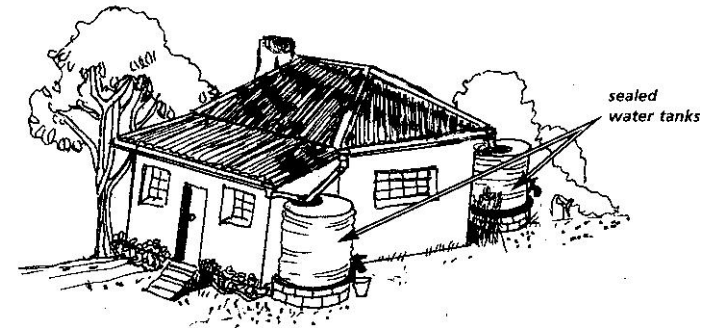
Household rainwater tanks give extra water security. People in the Cata area feel this is important as they cannot rely on the municipal water supply. At times the municipal supply fails and sometimes local taps break. Glenconnor resident, Mr Elliot, says that having his tank is very helpful as the water from the municipal taps is sometimes dirty.

Mrs Bolekwa Ntusi describes how people in Nyanga near Cata cannot rely on tap water:

There will be a call from one community member that the water in the taps is available. We all go and line up for that

water but the water usually runs out before all of us actually get to it.

People also buy rain water tanks to ensure they have enough water for their gardens during dry periods and drought. Before Mrs Ntusi had tanks she relied entirely on rain to water her garden. She suffered during the drought in 2006/7. Now she can manage her water a lot better and she can plant vegetables all year around.



What kind of rain water tank should I buy?

There are three choices:

- Corrugated iron tanks
- Plastic tanks such as JoJo tanks
- Ferrocement tanks

Corrugated iron tanks have a limited lifespan, because after a few years they begin to rust and start leaking.

However, it is possible to extend the life of a corrugated iron tank.



An elderly man in Nyanga (see photo) managed to make his tank last 40 years. The tank developed many leaks during that time but he was able to patch it with various products that filled metal cracks. “The tank is very old now,” he

said, “I can’t fix it anymore.” This man eventually bought a plastic tank.

Ferrocement tanks are made by plastering cement over wire mesh. They are cheaper than other tanks and last longer, but they need to be constructed on site. This needs someone with the knowledge and skill to build them. You will have to pay someone to do this for you, which could make the tank expensive.

Plastic tanks are the most popular. JoJo is the most common brand, but there are others too. If you have been lucky enough to get assistance from an NGO or government plan, then you will probably get a JoJo tank. These tanks will last for many years if you protect them from the sun.

Is it worth spending money on a rain water tank?

Yes, according to all the residents we spoke to, buying a rain water tank is nearly always worthwhile. Having water available right at your home saves much of the time and effort needed to fetch it from communal taps, or from the river.

Collecting water at home has health benefits. With a convenient water supply, it is more likely that people will wash their hands before preparing food, eating, and caring for children or sick people. Having water right at your home makes it easier for you to grow your own fresh vegetables and fruit in your garden.

Having water at home has changed how we relate to each other. In the old days women would go down to the river together, so fetching water was a social activity. In places where there are household water tanks, this communal activity has fallen away. In many households people still need to fetch water manually, but some people, especially the younger generation, don’t like this. An elderly man from Nyanga says that he bought his tank for the household partly because of his children’s attitude:

My youngest children, especially the girl, didn’t want to go to the community tap. Traditionally when they go and fetch water they put the bucket on their head, but this

generation no longer want to do this. They worry about their hairstyles. For them, fetching water is old-fashioned. This is why I decided to buy a tank.

How much does a tank cost?

A new ten-thousand litre tank costs over R7 000. This is expensive, but it is a good investment because in the long term it can save you a lot of money.

Mrs Castina Gcilitshama bought her own tank for household cooking, cleaning and washing:

Where I used to fetch water, it was very far. I used to take the washing to the stream, carry it on my head, and it is so far. So I thought, if I could buy a tank it means that I would have water here and don't need to go down there. So as soon as I got money – it was pension money – I decided to buy this tank.

What if I can't afford a rain water tank?

It is very difficult for poor people to find so much money, but some people manage this by starting a savings club or stokvel. When everyone is saving together and encouraging each other, it feels like less of a burden. Mr Joseph Njameni from Ndela says a rainwater tank is unaffordable for him:

I just have to depend on the rain for my garden because the municipal taps are often not working. I would like to have a rain tank but I'm not working so I don't have money, that's the problem.



Joseph Njameni is unable to afford a rain tank for his garden

A few years ago in Cata many people were given rain water tanks by the Department of Water Affairs, distributed by the Border Rural Committee, an NGO working in the Eastern Cape. The Working for Food project invited community members who were already gardening, or were interested in starting gardens, to come together and support each other. Each member household was given three or four JoJo tanks, to be used for home food gardening. The project also donated tanks to elderly people and to those who were

struggling financially. A total of fifty families received rain water tanks.

NGOs are more likely to support you if you can get a group together. However this is not always simple, as the support may be subject to particular conditions. Mrs Platjies from Glenconnor expresses her frustration:

There is an NGO group who wants to give us tanks but you must be registered as a group. We might have to work and work for maybe three or four years before the group gets money from growing vegetables. People don't like that. People want money now. They don't want to volunteer.

How do I install a rain water tank?

It is easy to install a tank. You will find many people who have done this successfully so you should be able to get advice from neighbours.

Two things are most important in tank installation:

- The top of the tank must be lower than your roof gutters so water can flow off the roof into the tank.
- The tank must stand on a firm and level base.

The base can either be made of cement or soil. If you use a soil base it is best to make the base slightly higher than the surrounding ground. It is

not difficult to do this. You place the tank where you want it to be, and make a circle of stones around it. Then you remove the tank, fill the inside of the circle with soil, and stamp down the soil very well.

Check that the base is level by using a spirit level. The base should be even and smooth, with no stones or anything sharp that will cause your tank to leak.

If the bottom of the tank is too low to get a bucket under the tap, don't worry. You can dig a hole below the tap for your bucket. Another way to deal with this is to fit a pipe to the tank and put your tap further down this pipe.



Tim Wigley placing a circle of stones round a tank to begin making a base

Where is the best place to put a rain water tank to catch water from a roof?

The best place is directly under your roof gutter, where you normally attach the downpipe. If this is not possible you can put the tank anywhere downhill from your house, as long as the top of the tank is lower than the gutter. You can then run a pipe from your gutter to the tank. This pipe should be buried underground to the bottom of your tank base, and then come up to the top of the tank.

Installing a pipe like this is more expensive than putting the tank at the corner of your house, because the pipe has to be wide enough to carry water from a heavy rain. If the pipe is not wide enough, water will overflow from your gutter and be lost.

What size tank do I need?

To decide on your tank size, you first work out how much water your family uses in a day.

If your home is connected to municipal water, and has a water meter, find out from your municipal water bill how much water you are using per month. Divide by 30 to get the water use per day.

If you don't have a water meter, measure your water usage by working out how many buckets of water you use per day. It is best to measure this

over a week to get a more accurate figure. To work it out even more accurately, you can use the Water Audit booklet (see the catalogue that goes with this resource book). The Water Audit booklet shows you how to make accurate water measures using 2-litre plastic bottles.

The next step is to think about how many days your area usually goes without rain. Here you should consider the average number of days without rain in normal weather conditions, rather than considering the long droughts. Discuss this figure with your neighbours and with anyone you know who is knowledgeable about the weather.

Now multiply these two figures: *Daily household use x Average number of days without rain =* How many litres water storage you need.

Let us say, for example, that your normal household use is a hundred litres per day and you want to have water for 90 days (three months). This means you will need to store 9 000 litres. You should then buy either a ten-thousand-litre tank or two five-thousand-litre tanks.

But before you do this, there is one thing you must check, which is how much water your roof can catch. It is no use getting a ten-thousand-litre tank if your roof is too small to collect enough water to fill a tank of this size.

How do you work out how much rain you can collect from your roof? You first need to measure

the *area of your roof* in square metres (sq m). To measure how much water this area can collect, work out the rainfall over a month. Every millimetre (mm) of rain produces 1 litre of water for every 1 square metre of roof.

For example, if you have 100 sq m of roof and you get 100 mm of rain (this is about average for Cata for a month of the rainy season) you will get 10 000 litres of water. This means that during one rainy season month, you can expect to fill up your 10 000-litre tank. If some time during the rainy season, it rains more than 100 mm per month, your tank could overflow. If it rains less than that, then it will take more than a month to fill up your tank.

Mr Plaatjies of Glenconnor in the Sundays River Valley told us that rain is not so plentiful in the valley. He said that even when his tank is full he uses it only for drinking and cooking. This way he conserves as much water as possible because he doesn't know when it will rain again.

Measuring and recording rainfall: To measure rainfall you need a rain gauge. Not everyone needs to have a rain gauge, but it is helpful if at least one person in the village is willing to keep a gauge. It is not too difficult to make your own rain gauge (see the catalogue that goes with this resource book).

Each morning after there has been rain, read the rain gauge to see how many millimetres of rain fell the previous day. Then record the amount in a book, and empty the rain gauge.

How do I know how much water I have in my tank?

That's easy. You just knock on your tank as if you were knocking on someone's door. The sound where there is water is very different to the sound where there is no water. Start tapping at the bottom of the tank and move up steadily until the sound changes. That tells you where the water level is.

Some tanks have a scale on the outside marked 500 litres, 1 000 litres, 1 500 litres, 2 000 litres etc. If your tank is not calibrated in this way, you can mark it yourself with a permanent marker or paint. Measure the height of your tank. If it is a 5 000-litre tank make a mark exactly half way to the top. Mark this "2 500 litres". Then divide the distance between the bottom and the half-way mark by five. Make five marks and write 500, 1 000, 1 500, 2 000. Then do the same for the top half of the tank and mark these from 2 500 up to the top which is 5 000. Now it will be easy to check how much water is in the tank.



What do I do about overflow from my tank?

Overflow water has to be led away from the tank and the house, otherwise it can cause damage. An elderly man from Nyanga said: “This tank has overflowed many times. This is why I’m planning to dig a trench like this one beneath the fence. It’s a long trench, so as soon as the tank floods the water will come out far away from the house, over there.”

How can I harvest ground water?

The water from a roof is very useful to a family because it is clean and it can be used in the home. But it is just as important to harvest the runoff water that falls on the ground. This water can be used to make the area around your

homestead more productive and healthier. Another good reason to harvest it is to prevent it causing damage such as flooding and soil erosion both to your own plot and to the property of people who live down the hill from you.

We spoke to one man from Nyanga, who has decided to harvest groundwater for his garden. He has also seen that the runoff water causes flooding of his neighbours below him. He plans to use trenches to prevent this:

What I am using is especially for us people on the top, because the water starts here. It helps the down people, because this water is actually destructive when it rains a lot. It destroys people’s houses and property and so on. If people dig trenches at least they will slow down the water.

Can I use a tank to harvest ground water?

Definitely yes. But harvesting ground water into a tank can be done only if the site is right. The ground must be steeply sloped. This is because you can collect water in a tank only if the top of the tank is lower than the area where the water is flowing.

Besides the tank, you must have a *catch pit* (also called a *silt trap*) to stop soil and sand getting into the tank. [add illustration]. This is usually a 200-litre plastic drum buried in the ground. A furrow

leads the runoff water into the drum, and the soil and sand carried in this runoff water sinks to the bottom.

Just below the top of the drum there is a pipe which leads water from the drum to the storage tank. This works only if the drum is lower than the runoff furrow, and the top of the drum is higher than the top of the tank. Again, this shows that you need a steep slope.

Collecting ground water works well if a group of homes are built on a slope. The downhill neighbours can harvest runoff from the uphill plots. This can happen for all the homes as you go down the hill. If all the homesteads on the slope harvested the runoff from their uphill neighbours, it would reduce soil erosion and flooding.

How do I build a catch pit?

Rain water running along the ground carries silt and gravel with it. The purpose of the catch pit is to collect silt and sand from ground water runoff so that the silt doesn't get into your tank. With a pond it is not difficult to remove the silt – you just dig the silt out whenever the pond is empty. But if you are storing the runoff water in a tank or reservoir, it is difficult to remove silt that collects in the bottom of the tank. It is better to stop the silt from getting into the tank in the first place.

This is why, when you want to store runoff ground water, you have to build a catch pit.

The first step is to dig a trench to catch the water that flows over the ground. The trench should lead the water down the slope. At the end of this trench you must dig a hole big enough fit a 200-litre plastic drum. Near the top of the drum cut a hole for a pipe fitting, which you can get from a plumber or hardware shop. Clamp a pipe on this fitting to lead water from the drum to the top of your tank.

After this is done, dig another trench from the drum to your tank. The pipe from the drum to the tank can be buried in this trench. It should be buried at least 60 cm underground so that it will not get damaged later by someone digging in the garden. The pipe itself must be at least 50 mm wide, otherwise the water will flow too slowly into the tank. Bury the pipe all the way to the tank. Run the pipe up the tank using an elbow fitting, and with a second elbow fitting lead it into the hole at the top of the tank.

Using ponds to harvest water: advantages and disadvantages

If you don't have a tank, or can't afford one, you can harvest water through ponds (or small dams).

Two Cata residents who have experience with ponds are Dumisani and Sisiwe Khiba. They

believe that the best way to water your garden if you do not have a tank is to dig furrows between plots in your garden and make a pond inside the garden. “This is how we watered our gardens long before the tanks arrived,” they said.

Ponds and small dams are a cheap and effective way to store water that runs over the ground. If your soil is mostly clay, then the soil itself will hold water. However if the soil is sandy, the water will drain away and be lost. To make a pond work in sandy soil, you have to line it with a waterproof lining. There are different ways of doing this. The easiest is to line the pond with chicken wire and then plaster it with cement.

One disadvantage of ponds is that they can be dangerous to children and livestock. Ponds must therefore be properly fenced with good gates.

Another disadvantage of a pond is that water can be lost through evaporation. You can reduce water loss by covering the pond with shade cloth, and also by growing trees around the pond to shade the water and block the wind.

Reservoirs: advantage and disadvantages

An underground reservoir is a safer and less wasteful way of storing water than a pond, but is much more expensive.

Reservoirs are usually built with bricks that are plastered to make them waterproof. Poorly built

reservoirs can leak and they are not easy to fix because the whole structure is underground. For this reason you need to use an experienced builder.

Several Cata residents have had problems with leaking reservoirs. Phumzela from Nyanga said: “My reservoir is leaking slowly, and making my garden so wet that I can’t plough. I will try and use silicon to fix it when it dries out.”

Dumisani and Sisiwe Khiba from Nyanga said: “Since the reservoir was built it has been leaking. We tried to fix it with silicon but that did not help, and it leaked again. We can admit that we do not have a reservoir in reality.”

Nothemba Languva of Skafu has a reservoir. She says it works well for her, but she does have one problem with it. Being underground, the water level is sometimes very low in the ground, making it difficult for her to scoop water out. As a result, she says, “it’s very hard work to get the water” and it hurts her back. She has been using 2-litre plastic bottles to draw the water from the reservoir to fill the drums around her garden. When the water level gets too low, she goes to the community taps for her water. She says she needs a pump or “anything that would help me to get the water out easily”.



Nothemba Languva of Skafu demonstrates the difficulty of drawing water from her underground reservoir

What are the most important things about managing my tank?

Keep the tank clean

It is important to make sure that the water going into the tank is clean. If you are harvesting rain water from your roof, this means making sure your roof and gutters are kept clean.

Bolekwa Ntusi says: “When we were given our tanks we were told they were now our responsibility. They provided us with small ladders so we can go inside the tank and clean it. You need to always monitor the gutters, they are plastic, they don’t break, but they bend.”

It is also worth making a strainer with fine chicken wire to cover the hole where the gutter

goes into the down pipe. This stops leaves from falling into your tank, also birds and mice.

Keep light and sun off the tank

Make sure the lid of the tank is on properly so that no light gets into the tank. We do this because when sunlight gets in, algae start to grow in the water – this makes the water green and undrinkable. You can plant trees or vines to make shade.

It is best to keep the sun off the whole tank, not just the lid. A fully shaded tank keeps the water fresh, and a shaded tank lasts longer because sunlight slowly destroys plastic. You can see this with old tanks that have been standing in the sun, they turn a whitish colour.



Granadilla plants protect these water tanks from direct sunlight

Reduce the acidity of rain water

Rain water is slightly acid, so it helps to put a piece of limestone in the tank. This will neutralise the acidity of the water, keeping it fresh and healthy.

What can go wrong with my tank?

Most things that go wrong happen because the tank was not installed properly in the beginning. If the base of the tank was not built firm and level, it will sink or move when the ground gets wet. If there are sharp stones in the base, the weight of water pressing down on them can make a hole in the bottom of the tank. If the fittings for the tap are not screwed in tightly and sealed well, the tap will leak. It is therefore a good idea to spend time making sure the water tank is installed properly from the start and to check the fittings regularly.

The main problem that people in Cata had with their tanks was leaking taps. Many people we spoke to had this problem. Castina Gcilitshama commented: "The only problem I've had with my tank is that it leaks where the tap joins the tank. I think this was because it was not installed properly. I asked someone to fix it and since then it has been fine."

How do I maintain my catch pit?

Every time it rains, silt will collect at the bottom of the catch pit drum. It is best to clean the drum out after every rain. If you don't remove the silt, your drum will soon be full, and the silt will begin to flow into your storage tank. Cleaning the catch pit after every rain also helps to prevent mosquitoes breeding.

It is good to leave a plank or pole standing in your catch pit so that frogs and toads that fall in can climb out. If there is no place for them to climb out, you will find dead frogs and toads in the catch pit, and this will affect the water quality. Frogs and toads are very useful for your garden. In fact these amphibians are a sign of a healthy eco-system, and should be protected. They feed on insects that would like to eat your plants.

Many people in South Africa have strong beliefs about frogs. Some traditional leaders advise people not to drink water where frogs live. In KwaZulu-Natal this has led to traditional leaders advising people not to have rain water tanks at all, because frogs sometimes fall into the tanks and die. It is possible, however, to prevent frogs from falling into rain water tanks with a simple sieve made of chicken wire.

How do I maintain my reservoir?

Once silt gets into an underground reservoir it is very difficult to remove. So the best way to maintain your reservoir is to prevent silt from getting in by looking after your catch pit.

Keep sunlight out of your reservoir. If sunlight reaches the water, green algae will grow in the water, which will make it more difficult to use the water. So always keep the reservoir well covered.

SECTION 2: Food security and rain water harvesting



Bolekwa Ntusi in her garden

Food security is one of the main reasons for harvesting rain water. Here Bolekwa Ntusi of Nyanga explains how harvesting rain water has made a big difference to the food security of her family:

Before I got these tanks I would only plant at a certain time of the year. After the harvest I used to have to abandon the garden and wait for the next season for planting. But since I've been a member of the Working for Food, a gardeners' support group, we have learnt a lot of techniques.

Before we planted our garden we dug a 3-meter hole and put tin cans in there. Then we

dug trenches and furrows in such a way that when the water comes, the trenches can distribute the water across all our vegetable beds, and each bed will retain some amount of water. This way allows us to always have a crop in the garden throughout the year, so now we don't wait for a certain planting season. We always have food.

For Thandiwa Ngxafana from Nyanga village, her part time job at the pine plantation is not enough. She says, "That is why I go back to my garden. I can't rely on the job, it's not enough to feed my family."

Nothemba Languva, who has diabetes, helps to maintain her health by keeping a garden: "By eating fresh vegetables I keep my diabetes under control." The garden also helps her financially because she sells some vegetables.

Being able to grow our own food is not only useful for ourselves. It allows us to help others, and therefore restores our sense of community. Before Nothemba Languva had a garden she used to beg and ask around the community for food. Now she plants mealies, potatoes and beans to feed her family and "things are much better." An elderly lady in Ndele started growing food when she retired because she could no longer afford to buy vegetables. She says: "It is nice to have a garden because I am able to feed lots of people, as I did when my father-in-law died."

How can I use the soil in my garden to collect and store water?

If you look at nature, you will see that soil holds water well if it is rich in *humus* (decomposed organic matter). Also, rain can penetrate better into the soil if the surface is covered with vegetation and decomposing plant matter. So, if we want our soil to soak up rain water, we have to ensure that it is always covered with vegetation. And if we want our soil to hold onto this rain water we make sure it is full of humus. Humus becomes even richer if we dig in lots of kraal manure and compost.

There are different ways of harvesting water directly in the soil. Best are the ways that follow natural water harvesting patterns as closely as possible. Common methods are making *swales*, planting *vetiver grass*, making *planting circles*, digging deep *trench beds*, and *using furrows* to distribute water.

Wandiswa Ndlazulwala from Nyanga says the best technique she has been taught is digging furrows. She has seen that by distributing water in furrows, she can grow food in her garden throughout the year.

What happens when rain falls on the land?

Tim Wigley, of Earth Harmony Innovators, says we should imagine two different environments:

one with the soil covered with vegetation and one with very little vegetation.

When the soil is completely covered with vegetation – plants and trees – you will find that underneath the vegetation there is a layer of decomposing plant matter. You will also find that the soil itself is rich in humus. This is made of decaying vegetable or animal matter, which provides nutrients to plants and increases the ability of soil to retain water.

When there is little vegetation you will find a lot of bare ground baked hard by the sun. There will be hardly any humus in the soil, so it is unable to absorb water.

Now, Tim says, we should think about what happens after a period of drought, when both these areas receive a good soaking rain. In the place where the soil is well covered and healthy, the rain falls first on the leaves of the plants, then drips down gently onto the covering of decomposing plant matter, then soaks deep into the soil. But in the place where the soil is mainly bare and baked hard, the rain falls directly into the hard bare soil. Very little water can penetrate into the soil, so most of the rain runs off. It gathers speed as it flows down the slope and takes some of the topsoil with it.

Next, Tim says, we should picture what happens in these two landscapes after two or three weeks

without any rain. In the place where the soil is well covered, the plants will use some of the moisture that is in the soil. Because the soil is well covered, it will be protected from the drying effect of the sun and the wind, so there will be no water loss through evaporation, and any remaining water will still be available. On the other side where the soil is bare, the small amount of water that managed to soak into the bare soil will be completely dried out, and the soil will be back to what it was in the drought.

In many places you will hear older people say that in the old days there were springs that used to flow strongly throughout the year, which have now dried up. People say we no longer have as much rain as there was before. However, Tim says, this is not true: “The rainfall records for your area will probably show that the rainfall is much the same. What has changed is that rain is no longer absorbed the way it used to be. The land is much drier even though we have had the same amount of rain.”

Tim explains that if you take a small piece of soil from the floor of a healthy forest and examine it under a microscope you will find it contains millions of tiny living creatures. “A piece of healthy soil just the size of the end of your small finger will contain more than six million living organisms. A piece of soil the same size, taken from a field that has been ploughed and treated

with chemicals, will have between zero and three living organisms in it!”

Most of these soil *micro-organisms* have a beneficial relationship with plants. They break down organic matter and turn it into humus, which acts like a sponge and holds water in the soil. Forty years ago our agricultural lands had an average of 20 per cent organic matter. Now they have only 1 per cent.

Our grazing areas too have become degraded and less able to hold water than before. Tim says the reasons for this are complicated. “Often the damage is blamed on overgrazing, but this is not an adequate explanation. Before human settlement huge herds of wild grazing animals were able to keep the grasslands in a healthy condition. Today’s herds of domestic livestock are much smaller. We cannot merely blame the damage on overgrazing.”

What methods can I use to harvest water in the soil?

As we mentioned earlier, there are different ways of harvesting water in the way nature does it: making swales, planting vetiver grass, making planting circles, or digging deep trench beds. The following information giving details of these methods was supplied by Tim Wigley:

SWALES

A swale is a ditch built on the contour of a hill which has a raised earth wall on its lower side. Swales are an excellent way of harvesting water down a slope, they work even on a very gentle slope.



When digging the furrow for a swale the soil that is removed is placed on the lower side of the furrow. This low wall made by the removed soil holds

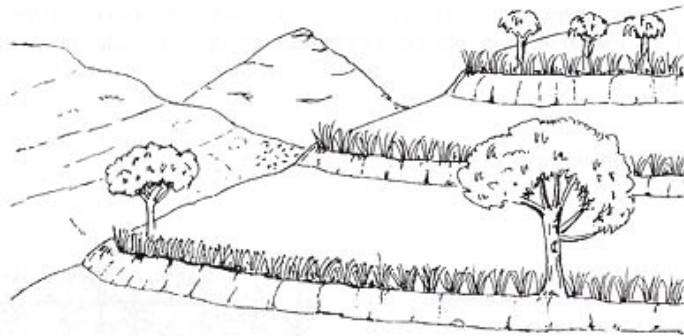
back the water coming down the slope even if the trench is full. Because the swale is level all along the contour line, the water cannot flow sideways. It stays in the swale and soaks into the soil. The slope just below the swale (on the left in the diagram) [add drawing] becomes much more productive because of the extra water that has soaked into the ground. It is an ideal place for planting fruit trees.

Swales are useful even when runoff from very heavy rain overflows out of the swale. The overflow runs evenly over the low soil wall along the full length of the contour, so the flow is gentle and does not cause any damage.

A contour is a line on a map showing all places at the same level or altitude. .

Swales work only if they are dug exactly along contour line, so you have to mark the contour very accurately before you dig. Fortunately there is a tool called an A-Frame that you can make yourself. It is easy to make, easy to use and very accurate. [see the catalogue that goes with this resource].

VETIVER GRASS



Instead of digging a swale along the contour you can do something almost as good without having to dig, which is to plant a type of grass called vetiver along the contour.

Vetiver grass has deep, strong roots that hold back water and release it slowly down the slope. The thick leaves of this grass trap silt so that soil builds up over time. After a few years the soil built up by the line of vetiver will be higher than the soil below. It will look as if someone has built

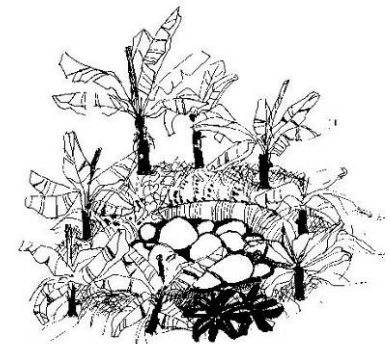
a step in the slope. Plants will grow well in this deep moist soil.

If you plant a half circle of vetiver below a tree growing on a steep slope it will trap water and silt. Vetiver does not spread – it only grows where you plant it – and its strong roots keep out the kinds of grass that spread and interfere with the growth of fruit trees.

PLANTING CIRCLES

A planting circle is a round pit which can be made in places where you can see rain water flowing in a natural furrow.

Dig the pit 60 cm deep (deep enough so that you can stand in it up to your knees) and 2 metres across. Pile the soil that comes out of the hole to make a low wall around the edge, with a gap in this for the furrow that leads the water into the circle. [needs better picture]



When you've finished the digging, fill the hole with anything you can find that will decompose and make compost. This can be mealie stalks, branches, weeds, bones, cardboard and paper, or tin cans – but not plastic or glass. Do not use cold

drink cans or beer cans because they have aluminium in them which is bad for our health.

Fill the hole right up to the top of the wall of soil around the edge, and then cover everything with dry grass. You can now plant beans, sweet potatoes, and pumpkins on the circle of soil. You can also plant trees a little distance (about 3 metres) away from the circle. The roots of the trees will grow into the hole and enjoy the rich moist compost that forms there. As the material in the hole decomposes and makes compost, the level will drop, so you need to keep adding material to keep it level.

You will be amazed when you see how productive the small planting circle will become. It is because it is holding and using all the water that was previously flowing away and being lost.

DEEP TRENCH BEDS

Deep trenches work in the same way as planting circles. Dig a pit where you want to make a garden bed. At the bottom throw mealie stalks, branches, weeds, bones, cardboard and paper, and tin cans – even worn-out blankets and clothes. Cover this up with the soil you dug out of the pit. Then plant your vegetables on top.

A deep trench catches the water that soaks down and stores it there. The plant roots will go down and grow because of the extra water and compost.

Trenches and swales should be made wherever there is water flowing down a slope. The size of the trenches depends on how much water flows when it rains. The trenches should be big enough to catch all the water even in a heavy rain.

If you want to collect the water and store it for irrigation in the dry season then you must dig your trench across the slope at a slight angle so one end is higher than the other. When it rains, the trench will channel the water to the lower end, where you can collect it.

How do I keep the soil in my garden healthy?

If you regularly feed your soil with manure or compost and keep it covered, the soil's micro-organisms and earthworms will maintain your soil for you. You will find that it keeps on getting better, more fertile and better able to absorb rainfall.

Adding bones raises the fertility of the soil. The soils in the Eastern Cape are very short of phosphorus, and plants need this mineral to develop good roots. Bones decompose slowly, releasing phosphorus into the soil. Tins decompose slowly too, releasing iron into the soil. And before they decompose, when they are buried underground, bones and tins store water in the soil.

As we learnt earlier (see “What happens when rain falls on the land?”) covering the soil keeps it healthy in two important ways. Firstly it prevents the sun and wind from drying out the soil. Secondly it protects the micro-organisms that build soil because sunlight kills these organisms.

Tim Wigley, who has run many workshops for Working for Food, says:

Soil that you can see is never as productive as the soil you can't see. Our grandparents planted many different things together on the same piece of land. When they planted mealies, they also planted beans and pumpkins. The pumpkin vines spread out over the ground protecting it from the sun. The beans added nitrogen to the soil making it richer. In the vegetable garden there were different things planted in the same space and these would be ready at different times; there was always something growing. The whole garden was never bare. They also planted more trees and hedges in and around their garden than we do now. We should not be surprised that our grandparents were healthier and lived longer than we do today.

Nothemba Languva looks after her soil by putting old cans and old blankets in her trenches. She uses natural pesticides, such as aloe and other

indigenous plants, to keep her vegetables free of insects.

An elderly lady in Ndela uses natural compost such as cow dung for her garden: “I use natural things to grow my garden. In order to chase away moles, take chicken bones and then put them under the ground – the moles won’t come and eat your potatoes.” This lady learnt all her skills from her father. “He is 92, as old as Mandela, but much stronger. He can walk by himself and even comes up here to see me.”

Bolekwa Ntusi is another person who has seen how productive a garden can be:

Some households complain that they don't have food. I encourage them to have a garden. Even if you don't have money, if you have land you can grow something. As the Working for Food group we do try and encourage people to plant gardens because fresh vegetables assist a lot in fighting diseases. We go further and encourage families to have chickens, even one or two, so you can have eggs and meat. Not everything in life that matters has to be bought. If you have your own garden and small livestock, you will have access to food whenever you need it.

How can we involve the younger generation in gardening?

Often it is the older people in the village who have the experience and interest to maintain a garden. They often complain that younger people are not interested.

Castina Gcilitshama of Skafu told us that her husband helps her in the garden but that her children do not help her. When we asked if she passes her gardening knowledge on to her children she said: “Ja well, children, they refuse to help in any way, both in the garden and collecting water.”



Castina Gcilitshama of Skafu with her garden

The best way to address this is through awareness. Everyone needs to be aware that humans are not separate from nature but

interdependent with the rest of nature. What is happening to the world around us is also happening to us. We also need awareness of what the modern diet of processed highly refined food is doing to our bodies.

Mr Plaatjies from Glenconnor feels that formal education is one of the reasons why children are no longer interested in learning self-subsistence:

People believe a person must be educated. There is nothing like that. God gave everyone a brain to think. I only did Matric but look at what I have achieved. I am growing and growing by the day.

There are a lot of ways that schools can become the central place in a community to grow and learn how to grow food, to learn how to look after our water and environment. A good movement to support is EcoSchools. This organisation explains its mission like this:

The Eco-Schools water management and conservation programme supports schools and local communities across South Africa with food gardens and healthy living activities. With a focus on schools in low-income and rural areas, the project has installed water-saving irrigation schemes and trained schools on rain water harvesting methods. The initiative, which promotes the efficient use of available resources to ensure

food security, water conservation and management, is run in collaboration with the Department of Education, School Governing Bodies (SGBs) and a number of environmental development organisations, including the World Wildlife Fund (WWF) and the Wildlife and Environment Society of Southern Africa (WESSA).

You can encourage teachers in your local schools to become part of this programme and volunteer to help establish school gardens. Being part of Eco-Schools also means that you have access to lots of resources, training and expertise.

If children are aware of the benefits of working in the garden, they will not see it as some form of punishment or a duty that has been forced on them. When young people have a positive experience of growing their own food, it makes gardening attractive for them. They will grow up understanding that gardening is a way of life, part of being a member of a family. Many people who are enthusiastic about gardening learnt to garden from their parents.

This can be seen in Bolekwa Ntusi's family. According to Bolekwa:

Everybody here works in some way in the garden, even the head of the household. The children help in both the field and in the garden. It is not up to children to say "I'm not

interested in the garden". When I was a child I didn't like working in the garden but my parents pushed me. It was part of being a member of the household. Now as a grownup I understand how this has helped me. I tell my children "I'm not asking you to help, I'm telling you that you go to the garden." Even if I'm not around they know they must go and water the garden.

Nophakathi Njamani, an elderly grandmother from Skafu, also involves the whole family in gardening. "I have a daughter. She has three children, one girl and two boys, and one grandchild who is seven years old. The one girl brings the water and the sons dig, their mother plants."

How can we support each other to have water and food all the time?

If we are lucky enough to be able to afford a tank, or if we have been given a tank, then we can support others by letting them use our water. A lot of people do this. Mrs Plaatjies from Glenconnor lets the people living on church land near her take water from her tanks.

By growing vegetables we can help our neighbours with food. Boniswa Tontsi is very passionate about ensuring that people who are sick get healthy food. She takes vegetables from

her garden to the people she visits. Others, such as Nothemba Languva, support their neighbours by giving them vegetables. Nothemba shares her vegetables with the poorest families and also with households that are HIV infected.

You could team up with your neighbour and share a vegetable garden. Two families do this in Cata. They water the vegetables from tanks in the garden, and then cook together in each other's house every night.

A good way to support each other is to start a small group. Not only are you more likely to get help from NGOs, but you can share many things. You can share tools; you can save together to buy seeds; and you can share your experience and learn from each other. Many people in Cata started gardening after they saw their neighbours gardening. They learned from their neighbours and in turn taught others. A group keeps you motivated. When times are hard a group can be very supportive, not only with knowledge but with sympathy and sharing.

Nothemba describes how the Working for Food group helps her:

We meet once a month to discuss problems. We share ideas and help each other. If you are no longer motivated, or seem to lose interest in your garden, a member will come and visit you and ask what is wrong. We also

contribute R10 a month and at the end of the year we sit down and use that money to buy seeds which we share amongst ourselves. We also use these meetings as a platform to bring forward our needs such as the need for garden tools.

A lot of groups split up because group members can't agree, particularly about money. The Working for Food group is still strong, but they have had to overcome difficulties. Bolekwa Ntusi explains:

At first we agreed that when the Border Rural Committee pulled out, we would fund our own projects by contributing a certain amount of money to buy seeds and seedlings and share these amongst members. But when we made the call for this, some of our members wanted to withdraw. But those who withdrew were not entitled to seedlings. They felt excluded. But we can't afford to pay for other people.

The Working for Food group has a monitoring committee to deal with problems. Bolekwa explains:

The monitoring committee monitors our gardens to see if we are still active and planting. For those who seem to be discouraged or drop out, it is the committee's responsibility to ask what the problems are.

Then as a group we see how we can solve the problem and encourage that member to plant again. If we see that members are lazy we quickly address this. So our meetings are related to our own functions and how we support each other. It is also to ensure that our relationships with each other are healthy.

Fieldworker Monde Ntshudu believes that the success of the Cata projects comes from the strong leadership of the past:

There was strong social cohesion in the community under the very decisive leadership of Mr Gcilitshana, who mainly united this community. If I can remember clearly, when this community received their land back the compensation money that came with it was split into half. One half was to be used for development and the other half given to claimant communities.

A number of projects took off because of this, getting involved in such projects as building chalets, the museum, tarring the internal roads, the commercial pine plantation and the irrigation scheme. All these projects ran smoothly: there was no infighting, which is often the case. Now that this strong leadership is no longer there I wonder about the sustainability of Cata projects. I can see that it is not as it used to be. The Working for

Food members have been decreasing since the Border Rural Committee pulled out. I don't believe Cata will be able to attract tourism to sustain itself. I have not come across any visitors who were here because they saw Cata on the internet or on a flyer. It is word of mouth only. I worry that as soon as all the funding ends, that's the end of Cata.

This is an ongoing question in communities worldwide, not only in South Africa: How do we sustain our projects, how do we keep motivated to work together once the funding has gone?

APPENDIX: An awareness exercise from Earth Harmony Innovators

Tim Wigley ran a Natural Farming workshop with people in Hombe village near Lusikisiki. He took the whole group to the Mbotyi forest nearby to learn about how a healthy ecosystem works. He explains how the exercise went:

Before leaving we worked out three main questions:

- *How effectively does the forest use the rain that falls on it?*
- *How does the forest care for the soil?*
- *How effectively does the forest use sunlight?*

At the time it had been raining heavily. All the paths and roads in Hombe village were wet and muddy, so it was difficult to even drive to the forest. Streams on the way were full of mud. But when we got to the forest we were surprised to see no more mud. The soil was completely covered with a thick layer of fallen leaves and we could walk easily without slipping.. Our shoes stayed clean. When we reached the stream that flows through the forest the water was clear and clean.

By observing the forest, Tim says it became easy to answer the three questions.

How effectively does the forest use the rain that falls on it? All the rain that fell in the forest fell first on the leaves of the trees and then dripped down onto the thick covering over the soil, then it soaked gently through the covering and down into the soil. No water was flowing on the surface.

How does the forest care for the soil? The soil was well cared for, deep fertile and soft. When we scratched through the covering of dead leaves the soil was so soft we could push our fingers into it.

How effectively does the forest use sunlight? All the sunlight that fell on the forest was used by all the leaves it fell on, first on the high trees then on different levels of smaller trees and plants. No sunlight reached the ground.

Tim says everyone remarked on how peaceful and healthy the forest felt. "One old woman said it felt so good that she would like to bring her bed and sleep in the forest, as it felt like it was healing her!"

After spending the morning in the forest the group went back to Hombe, and in small workshop groups they walked around the village and compared condition there with those of the forest. They asked the same three questions, but this time about conditions in the village. The answers were very different.

Then the group did an interesting exercise. Instead of thinking like human beings they tried to imagine what it would be like to be the rain, and the soil and the sun. Each person had a chance to speak as one of these. One man named Siphso said:

I am the rain. Last week I was sent to the forest and it was a wonderful experience falling on all those leaves and soaking deep into the soft soil. It felt good to be able to make everything happy and the plants to grow. Then today, when God sent me to come and fall over this village, I felt excited, as I thought I would be bringing a blessing for the people who live here. Instead I found myself falling on bare ground without anything for me to hold onto. I started to flow faster and faster as I rushed down the hill carrying the soil with me into the river and down to the sea where the fishes complained that they could no longer see in the muddy water. Causing so much damage when I had come to bring blessing made me feel very unhappy.

Appendix 9 Sample socio-demographic information form (focus groups- Glennconnor)

Focus Group Discussions (Glennconnor)

“Rain Water Harvesting for Homes and Home Food Gardens”

Socio-demographic information form
Focus Group Discussions: Glennconnor

Focus group:

Name and Surname:

Age:

Gender:

Occupation:

Level of education/grade:

First language:

How many live in your household?

Are you the main bread winner?

Do you have a tank? If yes, how many?

What do you use it/them for?

Appendix 10 Sample Kouga Urban Harvest workshop programme

Introduction to Food Gardening Workshop

2 – 3 November 2013

The topics that are covered on the course include:

What you need to consider when choosing a site for your food garden

Optimal design of your food system

Soil preparation and mulching

How to plant: spacing, depth, timing of the year

Crop Rotation and Companion Planting

Watering, Harvesting

Making your own organic liquid fertilizer

Making your own compost

Farming with earthworms

Saving your own seed

Fighting pests without the use of artificial poisons

Dates and Times: 02 November and 03 November, from 09h00 to 15h00 every day

Venue: 3 Dandelion Close, Jeffreys Bay

Directions: Coming into Jeffreys Bay from the highway, drive past Fountains mall on your right hand side and continue towards the sea. Turn left at the third circle (Bethel's Cove development will be on your left) and right at the first stop. Continue down the road to Dandelion Close on your right hand side.

Bring: Hat, Sunblock, Water Bottle, Comfortable clothing, Pen

Language: Classes will be offered in Afrikaans and English

Cost: R600 per person

Healthy lunches will be served each day and you receive a manual and planting guide to help you on your future food growing endeavors!

Facilitators: Jakkie and Susan Botha are both qualified in permaculture design and have experience in setting up and maintaining food production systems in a diverse array of settings. They believe that with the right tools, growing vegetables is achievable for anyone, anywhere. To book your place please contact Jakkie (jakki.botha@gmail.com or [079 934 0689](tel:0799340689)) or Susan (susan.botha@gmail.com or [082 601 3559](tel:0826013559))

Appendix 11 Sample of Border Rural Committee Annual report

Cata

Co-ordination

On 13 September, BRC had a meeting with John Allwood of the Department of Agriculture. The Department's working relations with BRC were discussed, as were plans to involve the Department in BRC projects broadly, and specifically at Cata. The meeting was fruitful especially in that there is a linkage between the provincial government's Growth and Development Plan (PGDP)'s planned Siyazondla programme (which has yet not taken off) and BRC's Water for Food programme at Cata. Allwood suggested that BRC meet with the Regional Director and Head of Agriculture at Amahlati Municipality to explore funding for infrastructure and inputs. We did manage to follow-up with the Amahlati office; this resulted in its visiting the 'water for food' gardens during the December open day (see below). It should be noted that our relations with this office have been considerably strengthened as a result of this engagement.

BRC held technical task team meetings with ADM on 21 July, 8 September and 12 November. These meetings are held so that so that project progress can be fast-tracked and monitored, and related problems addressed timeously.

Two project steering committee (PSC) meetings were held during the period under review, ie on 6 August and on 14 October. Community representatives are in the majority on the PSC. BRC (as project manager), ADM and other government departments involved in the project also attend these meetings. These meetings were held to follow up on progress of the development plan implementation and to look at problems and to take important decisions.

Considerable time was spent during the past six months following up on and driving various aspects of the implementation of the Cata development plan. In this regard, we can report the following:

Furniture for the classrooms. The Department of Education indicated that it would supply furniture for the classrooms. Attempts to follow-up in this regard have been futile, however, as it has proved impossible to contact the relevant officials.

Roads. The preliminary investigation indicated that the cost of the upgrading of internal roads would be R2 986 000, where the development plan provides R1 444 000 for this work. This is because the plan based its costs on roads that were deemed by ADM to be too narrow. This matter was discussed at a PSC meeting, where community members indicated that they were willing to contribute to the increased cost (out of the interest accrued to their account), but pointed out that the provision of roads is a government responsibility and that they therefore expect the municipality to contribute towards the cost. It was agreed that the contractor should continue with the designs and tender documents for the roads whilst negotiations with the Department of Public Works and ADM are underway. However, there was serious disagreement within the technical team about exactly which roads should be included within the tender. This caused further delays to this so-called short-term project. ADM's Engineering Department ultimately unilaterally excluded the two main artery roads into Nyanga and Skafu on the basis that they fall under the authority of the Department of Public Works. A further disappointment is that ADM indicated that it would be unable to provide any supplementary funds for the upgrading of roads at Cata. The tender for internal roads closed on 2 December. The appointment of a service provider is expected shortly.

Wattle. The development plan makes provision for the thinning and management of the existing wattle forest, as well as the planting of a new wattle forest. At the end of the first stage

(thinning), attention was drawn to the fact that there is another wattle forest nearby, which is at the right stage for thinning. The forestry consultant advising the project recommended to the project manager that it would be cost effective to thin the existing forest rather than plant a new wattle forest. The PSC meeting accepted the recommendation and signed a contract with Fractal Forest in this regard. The wattle project now covers 75 hectares, whereas it was previously 57 hectares in extent. The wattle group undertook a tour from 8 to 12 November to KwaZulu-Natal to observe various established wattle businesses there. The group returned very encouraged. The project is progressing very well; it is anticipated that the plantation will be established by the end of the first quarter in 2005.

Heritage project. This project has been slow to get off the ground, but we are happy to report that there seems, at last, to be some progress. BRC met with FHISER on 14 September. The Institute indicated that it would commit a staff member to working full time with teachers and scholars at Geju High School from beginning of the last school term (4 October). Further, on 18 September, BRC participated in a FHISER planning session related to fundraising for the heritage project. From 18 October to 5 November, Swedish students from Farnebo Folk High School stayed in Cata. They were attached to the heritage project. The assignment was to identify a relevant area where people lived before betterment and choose two homestead sites for intensive investigation (including measuring and mapping those sites, and interviewing people who previously lived there). FHISER committed a staff to be at Cata two days a week during that period. The Swedes did satisfactory work, which needs to be taken up by FHISER.

Local economic development (tourism). ADM appointed Tshani Consulting Engineers to conduct the feasibility study and to develop a business plan for the building of chalets at the waterfall forest. Tshani was introduced to BRC on 2 September. We, in turn, introduced Tshani to the CPA committee on 7 September. The consultants were at Cata on 28 and 30 September to meet and talk to the community and to walk to the site with community members. On 13 October Tshani presented a draft feasibility report to BRC. This report was finalised 3 November. Tshani has started with the business planning. On 24 November, Tshani conducted a briefing meeting for Cata people on tourism. One of the main issues that we have been engaging with Tshani on is the selection of an appropriate site. From early on in the process, Tshani explained that it would not be feasible to utilise a site above Waterfall Forest. Instead we have looked at options in the vicinity of the wattle area. Tshani has sub-contracted an engineer and architect to provide input in this regard, and to take the planning process forward.

Local economic development (spring water bottling). GSM has been appointed to conduct a feasibility study on the viability of spring water bottling at Cata. BRC met with GSM on 30 September in this regard. On 14 October, GSM was introduced to the CPA. According to GSM schedule, a first report should have been presented by 12 November but GSM had problems and could not present the report. We are still awaiting the report. GSM amended the action plan. It was due to finish the feasibility report on 24 December. The report will be presented to the team in January 2005.

Agriculture. ADM wrote to the Department of Agriculture (DoA) on 5 July, confirming that funds are available for the upgrading of irrigation infrastructure (c/f previous report). The DoA presented the prepared tender documents to its Tender Committee on 6 July. The Tender Committee refused, however, to take responsibility for the process. The DoA's position is that the Municipality should take responsibility for this. Owing to the 'stalemate', the irrigation upgrading project stalled until ADM agreed to take total responsibility for the project. Thereafter, it advertised the tender for a contractor to undertake the work. The

tender closed on 16 September. Unfortunately one contractor qualified in terms of the tender but did not meet standards for the work. A call for proposals was then made to specifically-targetted contractors. Further delays followed. However, a contractor was finally appointed in December. Work should commence in early 2005.

Layout plan. Setplan is still awaiting comments from a couple of government departments. Thereafter, the plan will be submitted for approval in terms of Act 113.

Legal process to prevent further disruption of the development process. Smith Tabata, the attorneys representing the Cata CPA, BRC and ADM, have secured a court date for the hearing relating to securing a final interdict against Mr Jama, preventing him from obstructing development at Cata. Despite this, Mr Jama continued in his attempts to harass the parties involved. On 19 July, the Human Rights Centre (a private firm) sent ADM a letter, making various demands and threats. Smith Tabata responded on 7 September. On 13 September, the Human Rights Centre targeted ADM, once again demanding that the development monies be paid over to the community (via the Human Rights Centre, which, it should be noted, will charge a handling fee of 10%). We referred the correspondence that we received to Smith Tabata. Mr Jama's case was finally staged in High Court on 3 December. Unfortunately, the case was postponed until March 2005 because Mr Jama's team had not prepared for the defence. A costs' order was granted against Mr Jama. We will decide in January whether to pursue the costs' order or not.

Facilitation

Water for Food programme

BRC met with families involved in the Water for Food programme on 15 July in order to check on progress with regard to planting seeds brought from Pretoria and the digging of trenches and furrows. There had been some progress: all members had planted seedlings. The new members had started digging trenches, but had not yet redirected water to the trenches. Progress has been hampered by the fact that soil is very hard and dry during winter.

BRC trained eight more people from 16 to 18 August. The new group is comprised mostly of young men, which is very encouraging (traditionally, gardening is considered 'women's work'). There is one woman in the group. The total number of households involved in the project is fourteen. BRC visited the project on 1 September, and again on 7 September, to monitor trench digging process and to deliver seedlings and orange trees (one tree per member). The members are doing very well and the new team is very energetic and working very well. Each member had three trenches, and one of the members had more trenches, as well as some seedbeds. This particular member transplants his own seedlings and he was given three fruit trees (orange, peach and apricot).

BRC visited project members on 6 October and 11 November to issue out seeds, seedlings and fruit trees. On 20 October, BRC met with the group to discuss and iron out problems. The group gave a report on the status of their gardens, problems encountered and how those could be resolved. This was done because there were new members who have just joined the project without having undergone any training. Also discussed in this meeting was scheduling of a field day to invite DoA, Fort Cox College, the CPA and Gasela community. The group accepted the idea of a field day. On 29 November, BRC and the whole group visited each garden in preparation for the field day on 2 December. The field day took place as scheduled and was very successful. The Department of Agriculture from both Stutterheim and Keiskammahoek, the Fort Cox College, and Gasela community representatives visited Cata. Project members and visitors met at the hall and then moved from garden to garden, covering six in total. DoA and Fort Cox were very impressed and both committed themselves to assisting the project in terms of inputs and may be establishing a nursery at Cata. A follow up has to be made on these early next year.



Mrs Peteni (DALA, Keiskammahoek), project members and visitors from Gasela inspect Phumzile Mboso's garden at the field day on 2 December.

Appendix 12 Monde Ntshudu and Ewald Kruger focus group discussion reports

Monde Ntshudu (Cata):

WATER HARVESTING RESOURCE / HANDBOOK REFLECTIONS

(Detailed group discussions will be transcribed)

Focus groups

Our members of the first group included people who can read and those who can't. So I therefore decided to ask them to discuss questions that interest them from the resource. Then I would read out the information in that question and ask them whether the question was addressed to their satisfaction or not and then discuss the information further.

Firstly, I must say the weather was a big challenge for us in that we did not have a choice in arranging our groups (those who can or can't read*) and therefore broader contributions and views on how the resource is perceived by individuals was limited. Sometimes in the group all members can't read this makes the process very difficult to the point where people want to fall asleep. Our observations therefore are based on very few individuals who were able to read and understand what the resource was trying to achieve.

One can decide if the resource has been understood through comments made by individuals. For example, one member of the group felt that the comments (pages 42 & 43 of the Xhosa resource) I made about Cata's future being bleak after their strong leader has passed on are not true reflection of what is currently happening in Cata, these comments represent the opposite of the present situation and such comments must be taken out completely from the resource as Cata is progressing very well. She said there are more visitors especially this year than before and such statements are not instrumental in encouraging people to work harder for their community. Furthermore, the group said the resource is not only informative but also elicit technical support that can be very useful to community members and can assist in saving them a lot of money.

When the members of the group chose to discuss the question that deals with 'tank installation' after discussions everyone in the group agreed that from now on they will never ask someone (these people charge money to install tanks) else to install the tanks but will do it themselves, the resource is so explicit on how to install the tank.

Largely it is people who can read that stimulates discussions in the group, however when the discussions are on everybody contributes (even those who can't read). This may be because the information discussed in the resource is more relevant to them in that it is related to water harvesting and gardens.

The following are my personal observations of the groups:

- Group members were very comfortable to contribute in discussions and said they feel relaxed in smaller groups
- It is easy to learn in smaller groups
- Maximum members of 4 people is enough to ensure participation
- At least 1 member of the group must be able to read to stimulate discussions
- Illiterate groups do not work

In conclusion I can say the focus groups went very well

*People who can't read are not necessarily illiterate but its eyesight failure

Working with the resource

On the content page, the page number of the question discussed must be shown to make it easy for the readers to find that question. In addition, it will be very much easy to work with resource if we can divide each section into sub-section by grouping all the questions that deals with a particular item (e.g. all the questions that are related to tank are grouped in one sub-section and pages are consistent with those questions).

I think for the Xhosa resource we need to list some words on the first pages of the resource will give synonyms of the words used in the resource.

It felt good to me to see that people understood very well what was written in the resource and that language used is familiar except few (that is why we need to have this list on our first pages). I have noted all these word that need to be given synonyms.

It seems to me that everybody was very happy to see themselves and what they said on the resource.

Struggles observed

May be it could be useful to give some information on how to use this book at home. I feel questions and explanation are straight forward and easy to understand even when someone reads out to you. Other questions such as the ones that deal with the volume of a tank one need and the one that deals with water falling on the ground. When the resources started talking about square meters and humus I could see people were bit lost.

This is also important information we would not like the illiterate and those who can't read to miss. I tried to pose this question to group and they felt that school children should be used if one can't read.

Attitudes toward working with the booklet

They commended the booklet saying it is gold, it is better than money, it is something that belongs to you forever and something you can share but still have it. They said the knowledge one gets from the booklets can keep forever and can assist in elevating poverty for ones` family, the book is better than money in that if you give money to someone today tomorrow that money is finished and the person you money to even forgot about you but the knowledge in the booklet is forever yours and can change your life for the best.

Ewald Kruger (Glennconner):

Growing circles of learning: Facilitation Report on Rainwater Harvesting Focus Groups Sundays River Valley 25–30 January 2013

A. Introduction: I was asked to facilitate the Sundays River Valley focus groups as most of the community members were Afrikaans and not Xhosa speaking. Having translated the learning resource from English into Afrikaans some time earlier was beneficial as I was familiar with the contents and the aims of the booklet prior to commencing with the focus groups.

Three focus groups were run over a period of 5 days, of which the first two groups were more successful in terms of establishing rapport and participant motivation.

It seemed that most participants in the third group attended only because they had nothing else to do and may have been disappointed with the subject of water harvesting.

While most participants in the first two groups were government grantees many of them had some form of part-time employment as well. This drive to self-sufficiency may explain the difference in commitment and perseverance between the groups.

B. Facilitation techniques employed: In order to optimise the learning opportunity a variety of collaborative methods were used, taking into consideration the low level of formal education most of the participants had.

- **Self-reflection:** Participants were asked to reflect on their childhood experiences of water, what did they do with water, what did they learn about water and from whom? The reason for using self-reflection was two-fold:
 - to anchor participants in their own experience of the subject and hence create curiosity in the process;
 - to get a sense of participants' experience of mediated learning.

Observations:

1. None of the participants learnt about the role and importance of water in any meaningful way. They could only recall being shouted at or receiving a beating when they played or wasted water. No reasons were given by the adults as to the *why* of needing to use water sparingly. The effect of adult modelling – *prohibitive* instead of *instructive* learning – was clearly illustrated by a participant who while looking at her water tank and commenting on the slack in the anchor wires said it was the children who used to hang on to it when they fetched water, but that she 'loves beating' and they have now learnt not to do that. It was evident that she didn't explain to the children the function of the wires.
2. There was a marked *gender role separation* among participants, as few male participants learnt about water as children while all the females learnt from their mothers or grandmothers as part of fetching water for washing and cooking.
3. Females learnt that adding ash to a bucket of dirty water will collect the dirt at the bottom and leave clean water to be thrown off.

4. Few participants recalled using water for home food gardening.
5. None learnt about water harvesting, only about water preservation.

- **Small group discussions:** Participants were divided in two groups (each group had an equal share of participants who could not read) and tasked with reading a particular section decided upon by the group, and to feedback in plenary their understanding of the issue covered in the section. This served two purposes:
 - To see how well the resource would be understood if accessed unaided by a mediator
 - To motivate in-group participation as each group would want to demonstrate to the other group its ability to read and understand the text.

Observations:

1. Participation, especially with Group A and B, was animated and created active discussion.
2. Participants who were good at reading read aloud, and those who could not read appeared as involved as those who could.
3. Few question for clarification were addressed to the facilitator and the resource text appeared accessible to the groups.

- **Plenary discussions:** Were used to clarify information in the booklet and to share experiences.

Observations:

1. Group members shared their thoughts and opinions without the fear of being judged or that they would say something considered ‘wrong’ by either the facilitator or a group member. They clearly were ‘in it together’ and this was especially true for Group A and B.
2. Shared experiences sparked memories of prior learning and participants were surprised by how much could be learned from one another, for example one participant used to repair concrete water tanks with her late husband and she could identify the possible reasons for the water leak at a tank at one of the venues.

- **Read-to-Do (text-to-practice):** The facilitator noticed the presence of water tanks in the vicinity of the training venues and decided to enhance the learning process by practical application of the information in the resource. Participants were taken to inspect the tanks and to corroborate the information in the text with their observations in the field. For this purpose they were asked to take the booklet with and on occasion of uncertainty they were referred back to the resource to either clarify misconceptions or to verify factual information.

Observations:

1. Despite the searing heat participants were very enthusiastic to compare their knowledge with their observations and to demonstrate what they have learned. For example, they were keen to point out where gutters were either leaking or not connected to the tanks and identified tanks wrongly placed exposed to the sun. One participant asked about the function of the ridges on the tanks as it is not explained in the resource, and another explained that it provides reinforcement to prevent an empty tank from losing shape.

2. When dealing with plant circles the facilitator used a spade to give participants the opportunity to discover themselves how impenetrable the soil surrounding their homes was. Participants noticed that water was not absorbed by the soil compared to vegetable patches where the soil contained some amount of humus.

3. These outdoor excursions affirmed that learning was not only successful but also enjoyable and rewarding and hence stimulated participants' interest to return to the text.

C. Feedback on Resource:

- The language used in the booklet was simple and easily understood.
- The section on swales and vetiver grass was difficult especially if read without assistance.
- The booklet is very useful as it contains new information which is presented clearly.
- Some of the pictures and drawings were either not clear or confusing.
- They would want to share the information with family and members of the community who could not attend the focus groups.
- Application of harvesting water in the soil as described in the resource mostly applies to gradient terrain whereas both training sites were level and whenever it rains the water merely dams up or flood their houses. Participants suggested that the resource should include methods of harvesting water on level terrain.

Observations:

1. Participants had an immediate connection with the *APPENDIX: An awareness exercise from Earth Harmony Innovators* which sparked their imagination and enabled them to identify themselves with rain that either falls on hard soil or on the forest. Undoubtedly imaginative thinking is independent of the level of education.

2. They all wanted to keep their booklets, and some of the booklets we managed to retrieve had the participants' names on them which indicated the extent to which they had appropriated the learning process.

3. For learning and discussion purposes most participants selected *Section 1*, focusing on the use of water tanks, and under *Section 2* how to improve soil quality with the aim of food gardening and how to make a plant circle.

D. Feedback on Process:

Participants were asked – reflecting on their experience of the sessions – what for them the purpose of learning was. They replied, without contemplating much, that it is to use and share knowledge with others.

One participant qualified his answer by saying that one can only share knowledge if one knows *how to use it* so one can *show the other*. He added that the sessions empowered him to be able to assess the work of service providers, for example he will be able to ensure that the erection of new water tanks be done correctly.

Another participant added that the sessions built her confidence to change her circumstances without having to wait for government to do that, while another said that the sessions alerted her to detail, for example she for the first time noticed tiny holes in her gutters that need fixing.

Feedback indicated that participants benefited from the learner-centred approach and felt free to express themselves and enjoyed the interactive nature of the sessions. In response to how the learning process was different to what they experienced as children they said that the sessions allowed them to make *sense* of the information and created *understanding* of the importance of water harvesting.

E. Recommendations

1. Resource:

- Introductory activities reflecting on participants' history of water knowledge may help draw participants into the learning process.
- Information on how to harvest water on level terrain.
- Humorous cartoons will reinforce key concepts, for example a cartoon of a tank sweating in the sun or a tank crying tears because of its leaking tap. (see pictures at end of report).
- Pictures and drawings need to be re-visited.
- The use of the annexure will be optimised if its contents become part of Section 2 on water harvesting and soil quality.

2. Facilitation:

- Future mediators would benefit from being trained in learner-centred participative techniques and how to create a climate conducive to learning.
- Mediators need to be aware of the motivational needs of *adult learners* which are different from those of juvenile learners, and in particular the needs of adult learners with low levels of formal education.
- The psychological needs of learners (for example the need for mastery) – which underpin the success of a learning activity – must be built into the planning of learning activities. As Plato said “All learning has an emotional base”.

Report compiled by Ewald Kruger, 13 February 2013



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STATEMENT OF RESPONSIBILITY AND MAINTENANCE GUIDELINES**

Agreement and Disclaimer:

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1. Safety of the tank installation.

I will ensure that the lids to the tanks are adequately protected at all times to prevent accidental entry and drowning. I further guarantee that all children in the homestead and children visiting the homestead will be instructed that they may not play with the tanks, or on the tanks and are regularly made aware of the danger of drowning.

2. Maintenance of the tank installation.

I undertake to maintain the tank installation and guttering from this date onwards, at my own cost, as set out in the maintenance sheet which forms part of this agreement.


3. Re-sale of tanks.

I undertake that I will not remove or re-sell the tanks and that these are specifically provided by the Department of Water Affairs for the purpose of storing water and growing food in my homestead. I agree that the Government may claim back all tanks and costs should I not comply with this condition.

4. Water quality not for drinking

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name: Nophakata njameni
 ID Number: ~~##~~ 3904040788 085
 Village: Cato
 Umhlaba Household Reference Number: KKJ
 Date: 15-9-2009


LORNA ANNE ANDREW
COMMISSIONER OF OATHS
 Admin.
 318 Oxford Street, Belgravia
 East London, 5201, RSA
 Ref: 9/1/8/2 East London of 17 August 2006

**CERTIFIED A TRUE AND CORRECT
COPY OF THE ORIGINAL**



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Name:

Nontosi Gcilitshane

ID Number:

5604210734080

Village:

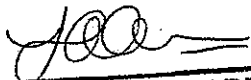
Cata

Umhlaba Household Reference Number:

KK2

Date:

15-09-2009


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Name:

MZWAMADODA PAMA

ID Number:

6305015957084

Village:


CATA

Umhlaba Household Reference Number:

K.K3

Date:

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Name:

T. Ngxafane

ID Number:

8904070184081

Village:

Cata

Umhlaba Household Reference Number:

k.k. 4

Date:

15th September 2009

LA

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Name:

Mzwandile MGBANU

ID Number:

37 0105 5387087

Village:

CATA

Umhlaba Household Reference Number:

~~415~~ KK5

Date:

15/09/09


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Name:

NTSHUTSHA NTOMBABANTU

ID Number:

67 03 04 09 62 089

Village:

CATA

Umhlaba Household Reference Number:

KK 6

Date:

15-09-09


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Name:

Zohani Eric Luthi

ID Number:

811 21715730089

Village:

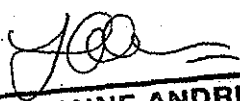
CATA

Umhlaba Household Reference Number:

KK7

Date:

15th September 2009


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4. **Water quality not for drinking**

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

Bojana Sampanje

ID Number:

5806010789084

Village:


Cata

Umhlaba Household Reference Number:

kk9

Date:

15 September 2009


LORNA ANNE ANDREW
COMMISSIONER OF OATHS
Admin.
318 Oxford Street, Belgravia
East London, 5201, RSA
Ref: 9/1/8/2 East London of 17 August 2006

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**RAINWATER HARVESTING TANK INSTALLATION
STATEMENT OF RESPONSIBILITY AND MAINTENANCE GUIDELINES**

Agreement and Disclaimer:

I, the de-facto homestead owner, hereby take full and unconditional ownership of this rainwater harvesting installation on my homestead. I confirm that I fully understand the following:

1. **Safety of the tank installation.**
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Name: Zwelanidile Mbaso

ID Number: 630609 5972 084

Village: Cato

Umhlaba Household Reference Number: KK10

Date: 10 September 2009


LORNA ANNE ANDREW
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4. **Water quality not for drinking**

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

MASIBONGE Mbaso

ID Number:

8607275612 087

Village:


CATA

Umhlaba Household Reference Number:

KK12

Date:

15-09-2009


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East London, 5201, RSA
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4. **Water quality not for drinking**

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

Ndhlazulwana Masibonge

ID Number:

8007245434086

Village:

CATA

Umhlaba Household Reference Number:

K.K.12

Date:

15-09-2009


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4. **Water quality not for drinking**

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

LINDIWE GLADYS NOPAKELA. T.S.A.

ID Number:

6507040720086

Village:

CATA LOCATION

Umhlaba Household Reference Number:

KK13

Date:

15-09-2009

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4. **Water quality not for drinking**
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Name:

ZWELANDIKE GQINTSHANA

ID Number:

801001 0805 0844

Village:

LATA

Umhlabha Household Reference Number:

KK14

Date:

15 SEPTEMBER 2009

LORNA ANNE ANDREW
COMMISSIONER OF OATHS
Admin.
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East London, 6001, RSA
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4. Water quality not for drinking

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

Bolekwa: G. Ntusi B.G. Ntusi

ID Number:

590724 0707084

Village:


Cala

Umhlaba Household Reference Number:

K.K. 15

Date:

15-09-2009


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318 Oxford Street, Belgravia
East London, 5201, RSA
Tel: 9/1/8/2 East London of 17 August 2006

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4. **Water quality not for drinking**

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

GRIFFITHS/LILAMBA MBOSO. G.L MBOSO

ID Number:

580202 6277 081

Village:


CATA LOCATION

Umhlaba Household Reference Number:

KK16

Date:

15-09-2009


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4. Water quality not for drinking

I confirm that I understand clearly that the water collected in the tanks which collect rainfall runoff from the ground is not safe for drinking.

Name:

Boniswa Tontsi

ID Number:

7005 18 0535 082

Village:

Cata

Umhlaba Household Reference Number:

Kk 43

Date:

15 September 2009

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Appendix 14 Earth Harmony Innovators trainers' list of indicators for garden success

INDICATORS

1. Throughout the year the soil is kept covered and healthy.
Lonke ixesha kufuneka umhlaba uhlale ugqunyiwe ube semphilweni.
2. A variety of crops and trees are growing in gardens and fields.
Xube lintlobo zonke zezityalo nemithi zikhule kunye ezigadeni nasemasimi
3. Rainwater is being harvested and utilised.
Qokelela amanzi emvula khona ukuze uwasebenzise.
4. Trees are planted and cared for.
Tyala imithi uyikhusele.
5. Natural methods of pest control are being used.
Sebenzisa amayeza endalo ukukhusela izityalo kwizinambuzane
6. The soil is enriched with organic fertiliser.
Umhlaba mawuchunyiswe ngezinto zendalo.
7. What is taken from the soil is returned to the soil.
Into oyifumana emhlabeni mayiphinde ibuyele kwasemhlabeni.
8. The family is self sufficient in vegetables and fruit.
Kusaxhhomekekiwe kwinthengo yemifuno neziqhamo
9. Seed is being saved and seedlings produced from them.
Imbewu iyagciniwa ukuze kuveliswe izithole.

Appendix 15- Focus group semi structured interview schedule

Questions for focus group discussions (Cata)

1. What questions are you interested in? Why?
2. Which question would you like to discuss first?
3. What do you remember from the section we just read/sticks in your mind? Why?
4. What section was helpful to you? Why?
5. What section did you not understand or had trouble with? Why?
6. What have you read in here that you didn't know before?
7. Did you know some of these things in here and where did you learn or hear about them?
8. Can you do this at home? Replicate it?
9. How would you improve this resource to be more helpful?
10. Would it make any difference having this resource when you want to get or use a tank?