Stone Terracing for Crop Cultivation in Gogela Settlement, the Transkei, South Africa

By

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Together in Excellence

A dissertation submitted in partial fulfillment of the requirements of the Master of Philosophy in Environmental Studies degree in the Department of Geography and Environmental Science at the University of Fort Hare

January 2010

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DECLARATION

I, Chenai Murata hereby declare that this dissertation entitled "Stone Terracing for Crop Cultivation in Gogela Settlement, the Transkei, South Africa" is the result of my own effort and investigation except where stated, and that it has not been submitted for a degree to any other University, other than the University of Fort Hare.

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Date of Submission 21 April 2010

Place of Submission: University of Fort Hare, Alice Campus

DEDICATED

To

my mother, Elina Murata, your unwavering support, love and sacrifice, and particularly your words of encouragement: "*zvichanaka, chazvo kunonoka*" (don't lose hope, things shall be alright),

my father, the late Philimon Murata, this work embodies the tears of joy that celebrate the times of your life; indeed you lived for a purpose.

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ACKNOWLEDGEMENTS

I thank my supervisor, Dr. L. Wotshela whose supervision, guidance and advice were very critical in building this work. Thanks to my siblings: Margaret, Judith, Rachel, Wilson, Daniel and Petros (as well as the late Febi, Violet and Philip), who collectively sponsored my long and winding study journey. It was never easy! To my beloved wife, Loveness, many thanks for your support; you are the pillar of my strength. To my son, Chenai, you always give me reason to work hard and look beyond the present. To my friends, Farai Mtero and Hlanganipai Ngirande, thank you for the support and encouragement. To my cousin brother, Dr. P. Muchaonerwa, many thanks for your support "*ramba uchiseva, pasipemuto panenyama*" (keep going you will get there). To the staff and fellow students in the department, I thank you for the constructive criticism and advice you offered at different stages of this work. To Mr. John Bwalya and Ms. Midea Mukabeta, thank you so much for all the time and effort you dedicated towards helping me in constructing this work. To the National Research Foundation (NRF), thank you for sponsoring my Masters studies. To Mr. Jonathan Denison, and all the Umhlaba Consulting Group, thank you for engaging me in the research assignment that inspired me to do this research theme. To the Water Research Commission, thank you for allowing me to participate in the research assignment. To residents of Gogela settlement, many thanks for participating in my interview discussions.

ABSTRACT

This dissertation provides a study on a soil and water conservation practice, known as stone terracing, in a rural settlement of Gogela in the Transkei area of South Africa. It explains the emergence and the continuity of stone terracing practice, as well as how it has impacted on crop cultivation. This is a qualitative study, theoretically informed by the notion of sustainable livelihoods. As a backdrop to the study area, the research offers a brief historical and geographical context of the Transkei, in which the Gogela settlement is located. This contextual exposition is preceded by an exploration of the varied literature on stone terracing in different communities of Africa. Overall, the literature survey establishes that stone terracing is a local innovation with uneven histories that pre-date colonial conquest in some cases in Zimbabwe and in Tanzania. Moreover, the literature illustrates a number of cases in which stone terracing still remains a contemporary practice of natural environment management. In providing its empirical findings, the study illustrates that Transkei, and Gogela in particular, receives enough rainfall to support dryland crop cultivation, but is steeply undulating. This renders soil and water highly susceptible to loss through runoff in this area, hence a challenge to dryland cultivation. Historically, some Gogela's households adapted to the challenge and initiated stone terracing technique to conserve soil and water. This historical local innovation, which relied on household labour force, modified overtime and adapted to different cultivation practices in the Gogela area. This study highlights the existence of scope for more research on other communities to rediscover and celebrate the importance of such local innovations, in dealing with natural environmental challenge.

TABLE OF CONTENTS

LIST OF FIGURES

Figure

CHAPTER I

BACKGROUND OF THE STUDY

Introduction

Historically, soil erosion, which leads to loss of organic topsoil, on the one hand, and water shortage resulting from low and irregular rainfall supply, on the other hand, have constituted major constraints to crop cultivation among small holder farmers in Africa. As a result, since pre-colonial times, many African countries have seen considerable efforts to conserve soil and water (Reij, 1991). In Southern Africa, externally innovated soil and water conservation practices have had a chequered history (Reij, Scoones & Toulmin, 1996). Such practices have seldom been sustainable among local farming communities for reasons that include technological complications, top-down land-use planning approach and capital intensity (Reij, 1991). This research therefore, focuses on the survival and continuity of a local soil and water conservation practice known as stone terracing, in a rural settlement of Gogela. In the study, conservation is defined as a means of preventing the loss of soil and water in croplands in order to maintain and enhance productivity.

This study is contextualised in the broader history of crop cultivation and conservation practices within the settlements of the Transkei, in the Eastern Cape Province. It is underpinned by the concept of sustainable livelihoods. The idea is to understand livelihood matters from the perspective of the ordinary smallholder farmers. The study reveals that stone terracing was innovated by local farmers to confront the challenging landscapes of arable zones within their respective homesteads. It has survived since the late 19th century till the present. Over this period, the practice has undergone several modifications, adapting to changing cultivation practices at different stages of the area's history. This research brings out and emphasises the role of local knowledge and practices, especially in the generation and sustenance of livelihoods in poor communities. Finally, the study findings also point out the weakness of stone terracing. Thus it provides brief suggestions on how local practices have to be complemented by scientific innovations.

Theoretical Framework

This study is predicated on the concept of sustainable livelihoods. "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets while not undermining the natural resource base"

(Scoones, 1998. p. 5). In its endeavour to comprehend how stone terracing has sustained crop cultivation among households in Gogela, the study focuses on the notions of 'capabilities' and 'assets' which underpin the sustainable livelihood framework.

The concept of sustainable livelihood is a means of apprehending the objectives, scope and priorities for development in order to enhance progress in alleviating poverty (Farrington, Carney, Ashley, & Turton, 2004). In doing so, it proceeds on several principles, of which two are critical for this study. First, it is people-centred. This informs the framework to begin with people's own views of their priorities, opportunities and needs. The aim is to learn from them about the various activities that they undertake to sustain their livelihoods, and thereby do away with pre-conceptions about what rural people want and how they have to achieve it (Camey, 1999). Second, it builds on people's strengths. In so doing, it seeks to tackle livelihood issues in ways that make the best of people's existing capabilities (Alliso & Horemans, 2006). These strengths may include local knowledge, technical expertise and environmental awareness among cultivators. These principles make it a suitable framework within which to study local soil and water conservation practices in rural communities.

The framework of sustainable livelihood places current events in their dynamic context, rather than assuming an ahistorical and snapshot analysis of phenomena. Sensitivity to dynamism and historical processes informs this study to make a systematic inquiry of stone terracing and crop cultivation from its past to the present state. This entails a historicised analysis that sees current situations as outcomes of past changes (Devereux & Maxwell, 2000). This analysis then captures the notion of adaptation and response crop cultivators undertake to address the environmental and socio-economic challenges to sustain crop farming.

African cultivators use a number of techniques that include crop rotation (Mabi, 2004), tied ridges (Nyagumbo, 1999, cited in Mabi, 2004), rainwater harvesting (Botha et al, 2003), grass strips (Osunade & Reij, 1996), and many more, to conserve soil and water. This study does not deal with agronomic practices, but it is interested in a specific ethno-engineering practice, called stone terracing. This is a soil and water conservation practice that involves the technique of stones' removal from cultivation lands and their placement in stacks of linear strips at intervals down the cropland to form barriers (Asrat, Adris & Semegn, 1996; Denison & Wotshela, 2008; Nyssen et al, 2007). The bunds act as an obstruction

to runoff flowing down the sloping cropland as shown in figure 1 below. The obstruction forces water to stay long enough to percolate down into the ground.

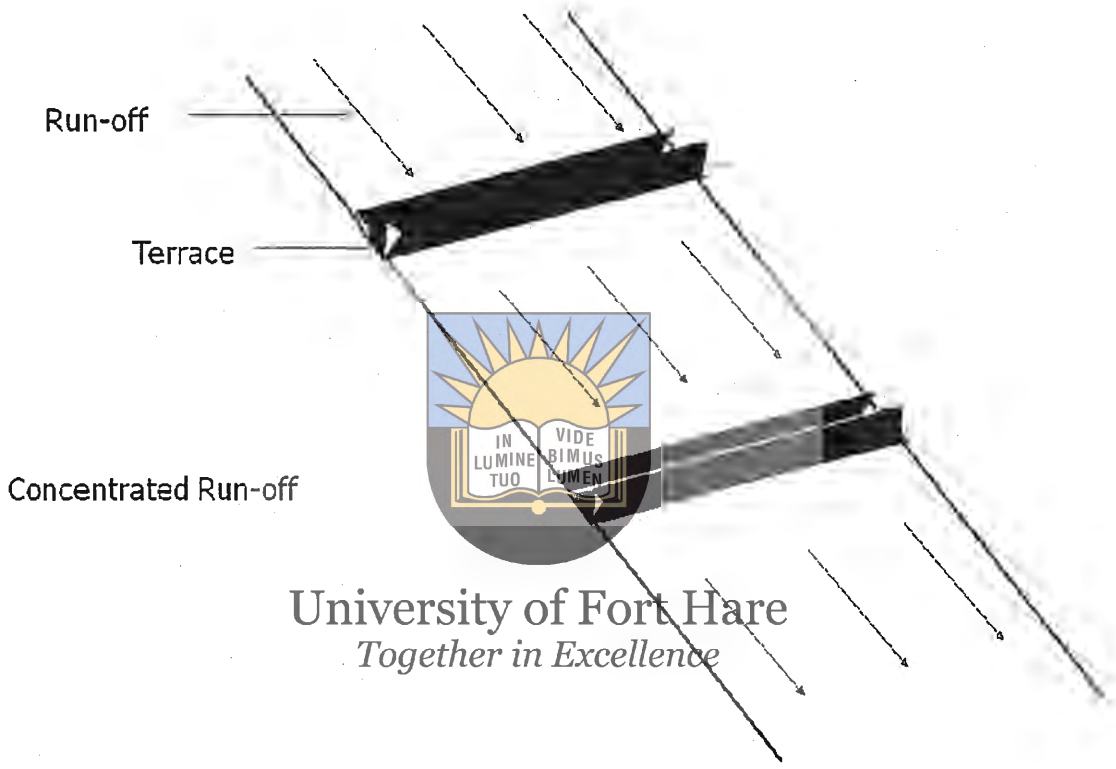


Figure 1. An image of stone terraces and runoff

Nevertheless, excessive water filters through because the stone walls are permeable. The following summarises research that has already been conducted on stone terracing.

A study done by Asrat et al (1996) investigated the flexibility of stone terracing in the Harerge Highlands of Ethiopia. This is a hilly terrain, interspaced with sloping valleys. Its rugged topography combined with erosive tropical storms, makes crop cultivation difficult to practise. As a result local farmers initiated construction of stone terraces. Asrat's research established that stone terraces had been used in the area for generations. Technically, construction of terraces is a long-term process. It starts by a line of stones only a few metres long. This line is gradually extended over time until the whole field is treated. The size of spacing between terraces is determined by the farmer as he or she sees the pattern of runoff. The study also found that farmers construct stone terraces for different reasons. In stony areas, the predominant reason was to create cultivable land. In some other areas the purpose was purely to conserve soil and water.

Another study was conducted in the Tigray region of Ethiopia, by Nyssen et al (2007). It assessed the effectiveness, efficiency, social acceptability and side effects of stone terraces in that particular area of Ethiopia. The study was conducted on 202 field parcels and generally found that stone terraces increase sedimentation. It further revealed that the accumulation of sediment increased with field gradient and spacing between the terraces. In fields using stone terraces, there was an increase in grain yield of 53% on the lower part of the plot as compared to the central and upper parts. The study found a great

enhancement of moisture storage on both sides of the terraces. Overall, 75% of farmers in Tigray were noted to be using stone terraces.

Critchley, Reij and Seznec (1992) studied stone terracing in the Yatenga region of Burkina Faso. Yatenga has a very high population density of about 100 people per km^2. Stone terracing was introduced in the area in the 1980s by Agro-Forestry Project (PAF). It was meant mainly as a water conservation practice. By 1983 only about 150 hectares were terraced. The hectarage increased to 5000 by 1988. In some cases the practice was extended onto fields already under cultivation. On such fields, it increased grain yield by about 40%. Stone terraces were also used in combination with planting pits (*zai*) to rehabilitate crusted soil. The study found that on rehabilitated land, grain yields could be as high as 1200kg per hectare. Originally, the Yatenga people were not interested in growing trees. However, this changed with the introduction of stone terraces. The terraces keep moisture along their edges for long enough to support trees. This helped diversify households' livelihood base.

A study conducted by Kassogue', Komota, Sagara and Schutgens (1996) on the Dogon Plateau in Mali classically demonstrates how farmers adapt to local physical environments in order to carve out a living. The Dogon Plateau is a sandstone massif with a highly eroded landscape. The Dogon group got to the

plateau seeking refuge from warring tribes. "In order to survive on the plateau they had to make the most of scarce soil and erratic rainfall" (Kassogue' et al, 1996, p. 69). Therefore, they initiated several soil and water conservation practices including stone terracing. The study found that the Dogon group applied different conservation techniques according to their knowledge of soil types and characteristics. Stone terraces were applied on gravelly and clay soils because of their high susceptibility to erosion. Sandy soils were treated with trash lines because they have high infiltration capacity which makes them less susceptible to erosion.

Related to this particular case, Chacker, Abbasi and Laouina (1996) studied persistence of indigenous soil and water harvesting practices and how they influence crop cultivation in Morocco. This study found an extensive complimentary application of stone terraces, earth bunds and agronomic practices to be instrumental in combating soil erosion. The practices were initiated by the Chorfa people, who after arriving late in the region, were forced to occupy the hilly terrain since all gentle lands had already been occupied. After harvesting season, farmers consistently removed stones on their croplands. In some cases the farmers planted trees on the constructed stone walls in order to reinforce them.

In Sierra Leone, where government is not actively involved in matters of conservation, it is locally innovated practices that are predominant (Millington, 1984). Among these local practices is stone terracing. The practice is used on very steep slopes, of about 17º, to combat soil erosion. The study found that fields treated with stone terraces suffered only 29% soil loss of unterraced fields. Nonetheless, the study found that although the technique is effective in combating soil erosion, it is not indiscriminately applicable to all lands. The major constraint is soil type. It works well on course-textured soils that have high infiltration rates as opposed to fine-textured soils.

In Manadra Mountains, Morocco, stone terracing, earth bunds and an array of biological and agronomic practices are used to sustain crop production. Hiol, Mbeyo and Abina (1996) have termed this comprehensive conservation matrix "mountain civilization". Farmers put weed removed from the fields on stone terraces. Some of these weeds begin to grow on the stones, their roots spread down the space-pockets of terraces. This helps reinforce the terraces.

Stone terracing is also used in Kenya by small holder crop cultivators to rehabilitate degraded croplands. Land degradation through wind and water erosion is a dominant constraint to crop cultivation in the country. In a study on conservation practices in Kenya, Wakindi (1999) observed that stone terracing is

the most common indigenous approach, especially in the eastern dry-lands. Farmers lay stones in parallel lines on compacted and denuded land to enhance infiltration and capture soil blown by wind. In eastern Kenya, the Embu region, Wakindi (1999) found a sophisticated stone terracing system, where cultivation on inter-terrace portions, gradually led to the formation of natural ridges.

Stone terracing has been used in Adre Doutchi Maggia in the Niger for centuries, but little research has been done on the subject (Reij, 1991). A study on soil and water conservation in the area done later by Hassan (1996) does not focus on stone terracing, although it mentions the practice. The focus of the study is how the International Fund for Agricultural Development (IFAD) ran projects to promote low-cost conservation practices including stone terracing. The project targeted to cover 2300 hectares of crop land by stone terraces in four years. The study does not deal with matters of origins and development of the practice in the area.

Sutton (1984) also discusses stone terracing at Engaruka, Tanzania. His study depended on archaeological evidence providing a historical analysis of what was already a disserted area. Engaruka is a dry-land strewn with stones. For this reason, the study found that terracing was meant more to create cultivable land than to conserve soil and water. The stones had to be disposed of efficiently if enough cropland was to be had. Indeed farmers treated stones in multiple ways

in order to sustain crop cultivation. Some stones were neatly piled on the corners of each field, while others were arranged into terraces. All this was testimony to continuous efforts of the cultivators to contend with an insoluble and accentuating problem. Nonetheless, one negative finding of the study is that the stone structures were later abandoned, and the Engaruka people got assimilated into other stronger groups (Sutton, 1984).

Growing research on this subject has also been illustrated by Sutton (1984) and Tempelhoff (2008), who have both studied the history of stone terracing at Inyanga, eastern Zimbabwe. Both studies probe the origins of the practice. A hectarage of 6000-8000km² was terraced mainly for cultivation of *tsenza* (plectranthus esculentus). Using archaeological evidence, the studies found that the practice got into disuse around late 18th to early 19th century. Both studies emphasise the on-going debate over the specific identity of the people that started stone terracing in the area. Some claim that it was Arabs that extended their influence southwards from Abyssinia to Inyanga, posing challenge to the notion of 'indigenous'. Others attribute the practice to people of Indonesian origins because of extensive evidence of beadwork recovered on the place. David Beach, a renowned scholar of Zimbabwean history argues that it was an innovation of the local Shona people. This debate is critical in that it points to a process of cultural hybridization (Tempelhoff, 2008).

In a study of the history of pre-colonial irrigation in South Africa, Tempelhoff (1998) identifies several cases in which cultivators have historically manipulated stones to enhance cultivation. The study documents the use of stone terraces along the Soutpansberg mountain range and along the Drakensberg escarpment into Mpumalanga Lowveld, the Free State and Transkei over historical times.

Importantly, Critchley and Netshikovhela (1998) found that smallholder cultivators in the former Venda homeland of South Africa predominantly use stone terraces (*mitsheto).* Terraces were constructed using stones from the croplands. For this reason, low walls would result, or that the construction was still at an infant stage. The largest stones were used as anchors, and were set out first.

The research found that the Venda possess a rich conservation awareness. When asked by the research team why they terraced their fields, farmers mentioned the need to conserve soil as the major reason. Stone terraces in this area particularly, were used on steep slopes (above 12º) (Critchley & Netshikovhela, 1998).

Stone terracing in Venda was used since the early 20th century. The Venda have been using stones to build homesteads for a long historical period. The Dzata ruins at Venda, that dates back to the 18th century testifies to the antiquity of the tradition (Chritchley & Netshikovhela, 1998).

Recently, the Water Research Council commissioned a study on historical water harvesting practices in South Africa incorporating briefly the stone terracing practice and cultivation in Gogela (Denison & Wotshela, 2008). Abiding by an overall mandate and set of objectives to document different existing or even modified historical rainwater harvesting practices in the country, the study enunciated four different historical practices that have been in practice in various parts of the country. These practices are; *pitsi* in the Tyume river valley of Eastern Cape, stone terracing and *gelesha* in Gogela on the Umzimvubu river valley, *saaidamme* in Clanwilliam in the Northern Cape, and *klipplaate en vanggate* in Stilbaai in the Western Cape. These practices were investigated and highlighted without use of intensive case study examination and with no intention to study respective households who practice them. Although the study shows that the remnants of oral sources regarding stone terracing in Gogela seem to refer to the 19th century, it has not carried detailed physical and ethnographical research to give a comprehensive discussion of the origins and development of the practice.

Research Problem

The literature survey has summarised some of the studies done on the use of stone terraces for crop cultivation in various communities of Africa. The antiquity of the practice is underscored by various studies that date it to pre-colonial times. However empirical research that documents the existence of the practice in South Africa is located within various texts that deal with African environments, social histories as well as ecological studies. These do not necessarily deal conventionally with literature on stone terracing practice and this requires special expertise to unravel from these sources. Iron Age farmers may have already practised stone terracing, but we can only go back as far as the 19th century because of surviving literatures and records. In this particular research, there is scope and opportunity to trace the practice via surviving orality from the 19th century. There is also an opportunity to look at the survival of the practice to contemporary times.

The writing of South Africa's past is not without cases of conservation practices among black small holder-farmers (Critchley & Netshikovhela, 1998). Denison and Wotshela (2008) have written on stone terracing in Gogela but their research was not mandated to offer an account of origins of the practice and its influence on cultivation in the area. Although the authors state that the practice is a historical tradition in the area, critical issues such as how the practice originated,

and survived untill the present require elaboration. The implication is that there is insufficient literature on the history of stone terracing and its impact on rural crop cultivation in South Africa. This study attempts to address this problem by offering a study of the practice at village and household level.

Research Aim and Objectives

From the onset, this research had one overall aim that was encompassed by a set of three objectives. This research aimed to investigate the emergence, continuity, operations and the influence of stone terracing on crop cultivation in Gogela. The main three objectives of the research are to:

- provide a backdrop to stone terracing in Gogela in order to illustrate how the practice has survived over time.
- explain how stone terracing conserve soil and water, and how the practice has sustained crop cultivation in Gogela.
- identify socio-economic characteristics of households that use stone terracing as well as how they have sustained and transmitted the knowledge associated with the practice.

Research Questions

The empirical research was pursued in four main questions directed mainly at understanding the origins and survival of the practice as well as its impact on environmental management, crop production and cultivation practices. Questions were also directed at achieving an understanding of social or household forces at play in the practice's expansion and sustenance. These questions are as follows:

- When and how did stone terracing begin in Gogela?
- How has stone terracing continued from the time of its inception to the present?
- Has stone terracing enhanced cropping diversity, seasonality and quality, and to what extent does this contribute to crop production in Gogela?
- Who are the key role players in imparting and sustaining knowledge regarding stone terracing and crop cultivation in Gogela?

Research Methodology

This research used qualitative methodology. Qualitative research is a process of enquiry that explores human concerns. In the process, the researcher builds a holistic picture of research subjects, analyses their words and views. In fact the main focus of qualitative research is the social world, and how this world is

interpreted, understood, experienced and produced by human beings (Creswell, 1998).

Qualitative research's tendency to focus on individuals' lived experiences as they are presented in thoughts, ideas, feelings, attitudes and perceptions, made it the suitable methodology to investigate this theme (Ohman, 2005). Concepts such as soil conservation and crop cultivation are embedded in a community's social practices and traditions. Therefore unlike quantitative methodology which doubts the value of life narratives as media of knowledge construction, qualitative research's focus on the social allowed it to capture farmers' multiple experiences in relation to stone terracing and crop cultivation.

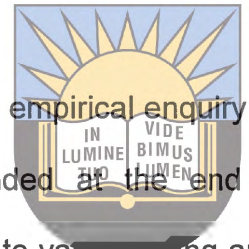
Qualitative research's assumption that realities are multiple, diverse between different groups of people and different social settings was critical to this research (Ohman, 2005). With the exception of the 1970s and 1980s whereby peasantry was the major focus of South African historiography, small-holder farmers are usually a peripheralised social segment, rarely given voice in mainstream knowledge production processes (Beinart, 1982; Bundy, 1979; Beinart & Delius, 1986; Keegan, 1986; Trapido, 1986). The use of qualitative techniques in this particular research therefore allowed these farmers to narrate their agrarian histories. This enabled the research to develop new knowledge

based on informants' own experiences and views, not on the researcher's predefined testable hypotheses (Ohman, 2005).

Moreover qualitative research's desire to grasp the complexity of the phenomenon is an effective way to apprehend human society, practices and experiences (Peshkin, 1988). This research used an in-depth holistic analysis to get a nuanced understanding of farming practices in Gogela (Johnson & Barach, 2008). This is crucial because the concept of agrarian livelihoods is situated in a complex social whole comprising intricate webs of relationships. It enables the understanding and presentation of multiple interactions between people, knowledge systems, culture and the physical environment in which survival is sought and experienced.

This research used an intensive case-study approach for data collection. It did not draw from a large representative sample of a whole population of interest but the researcher studied 28 homesteads intensively. This enhanced the understanding of nuances of life experiences as opposed to enumerating aggregate evidence (Whittemore, Chase & Mandle, 2001). This enabled the research work to answer the 'how' and 'why', rather than quantitative methodology's predominant focus on the 'what' (Ohman, 2005).

A triangulation approach comprising open-ended interview questions and on-site observation was used. Study subjects were chosen on the basis of purposive sampling. Purposive sampling focuses on data-rich cases (Ambert et al. 1995; Ohman, 2005). In this case, it is only residents that either once used, or were still using the stone terracing practice for field or garden cultivation that were interviewed.



Aspects to be covered through empirical enquiry were specified in advance in an outline form which is appended at the end of this dissertation text. The researcher was therefore able to vary wording and sequence of the questions to suit the emergent nature of the research process, a method that is widely endorsed by various experts (Baxter & Eyles, 1997; Ohman, 2005). Moreover, as the researcher, I had greater freedom to explore specific avenues of enquiry, and logical gaps within the data that was openly but strictly gathered. Interviews allow a more thorough examination of experiences, feelings and opinions that closed questions can never hope to capture (Baxter & Eyles, 1997; Kitchin &Tate, 2000; Peshkin, 1988). The non-subjectivity rule of quantitative methodology is not important here for qualitative research primarily relies on informants' own formulations and constructions of reality checked against those of other similarly situated informants (Ambert et al., 1995).

In order to enhance scientific rigour, informants' testimonies were checked against on-site observation. This involved a systematic noting and recording of terrace structures, cultivation practices and physical appearance of terraced fields. The strength of on-site observation lies in its directness (Peshkin, 1988). With the aid of an observation schedule, the researcher directly observed the terrace structures, crops in the terraced plots and signs of soil erosion over and above asking farmers about how they use stone terracing. This directness ensured a degree of validity as it concentrated upon what cultivators do as opposed to over-reliance solely on testimonies formulated in an artificial setting (Whittemore et al., 2001).

Secondary sources on conservation and cultivation were also consulted. This assisted the research to build an informed contextual backdrop against which stone terracing and cultivation in Gogela have to be understood. This was very critical in that it enabled the researcher to draw conclusions out of diversified findings and perspectives.

Limitations

Qualitative research is neither capable of, nor does it aim to achieve objectivity, the golden rule of quantitative studies. However, this does not mean that it is incapable of generating valid and authentic knowledge. Multiple informants and

multiple methods of data collection used within this research provided scope for recursive checks against informants' testimonies (Wolstenholme, 1999).

Relying on interviews remains a challenge, especially on matters relating to the beginning and modification of stone terracing in the area. Due to limitations of memory, informants sometimes give partial and even contradictory reports (Ambert et al., 1995). This is however a well known challenge regarding construction of a history, reality and narratives thereof are seldom the same. In such circumstances, the researcher would find it difficult to detect gaps between what was reported and what actually happened. In Gogela this danger was countered by asking informants on their recollection of seminal historical events related to conservation and rehabilitation, as well as national political developments that include apartheid policies.

Since one of the basic assumptions of qualitative research is the recognition of multiple realities, there is always scope for contradicting testimonies to emerge. To counter this weakness, the researcher used prolonged engagement technique. Prolonged engagement refers to the researcher's efforts to understand and become acquainted with the social context and nuances of activities of the people under study (Ohman, 1995).

Significance of the Research

Parts of the findings from this research contribute to the broader debate on the relevance and sustainability of local knowledge regarding land-use and environmental management. Cultivators in Gogela have been using stone terracing for more than a century. The continuation of the practice from the past to the present underpins its sustainability. Importantly, the study highlights use of local assets and capabilities in pursuit of cultivation livelihoods. This practice contributes to the broader framework of sustainable livelihoods. Yet, because this is an intensive case study, it is not possible to generalise its findings using traditional statistical inference (Ohman, 2005). Conclusions reached in this study fit and are applicable beyond the study area only on a theoretical level.

Chapter Summary

This chapter provided a succinct opening gambit to the broader research on the use of stone terracing for crop cultivation in Gogela. It has highlighted critical issues that inform and shape its subsequent subsections. These include literature survey, theoretical framework, research aim, the methodology and the significance of the study.

Literature survey has established that stone terracing is both a historical and a living practice in Africa (Critchley & Netshikovhela, 1998). The conceptual framework interprets terracing as a livelihood practice that uses locally available resources to sustain some rural communities. In the context of this conception, the research aims to study the emergence, continuity and influence of stone terracing on crop cultivation in the Gogela settlement of Transkei. This aim is achieved by using qualitative research method, whose main focus is to apprehend the social world.

CHAPTER II

STUDY AREA, GEOGRAPHICAL AND HISTORICAL CONTEXT OF TRANSKEI

Introduction

This chapter introduces the study area, Gogela settlement. This is done by outlining brief locative and historical accounts of Gogela. Gogela settlement has not been researched much and there are few reports on this area. The dissertation therefore draws largely from the general Transkei region to map out the geographical and historical con[illegible] Googela settlement.

Gogela: Location and Attributes

Gogela is a rural settlement located between 29° and 13° East, and 30° and 38° South. It is in Mount Ayliff magisterial district of what was the Transkei homeland. Following the formation of post-apartheid municipalities from the year 2000, Mount Ayliff fell under Alfred Nzo, the very eastern and smallest district municipality of the Eastern Cape Province (see figure 2). Gogela comprises seven administrative wards, located along the Umzimvubu river valley. The seven wards are; Gudlintaba, Macebini, Ndumundumu, Sihlahleni, Mbumbazi, Mwaca and Dambeni. Put together, these wards have approximately 350 households. Geographically, Gogela is located on a hilly, stony and undulating

landscape punctuated by a rough terrain. Predominantly, residents are settled and farm on hills that interlock along the Umzimvubu river valley. This valley provides limited gentle land since its larger part is rough and undulating.

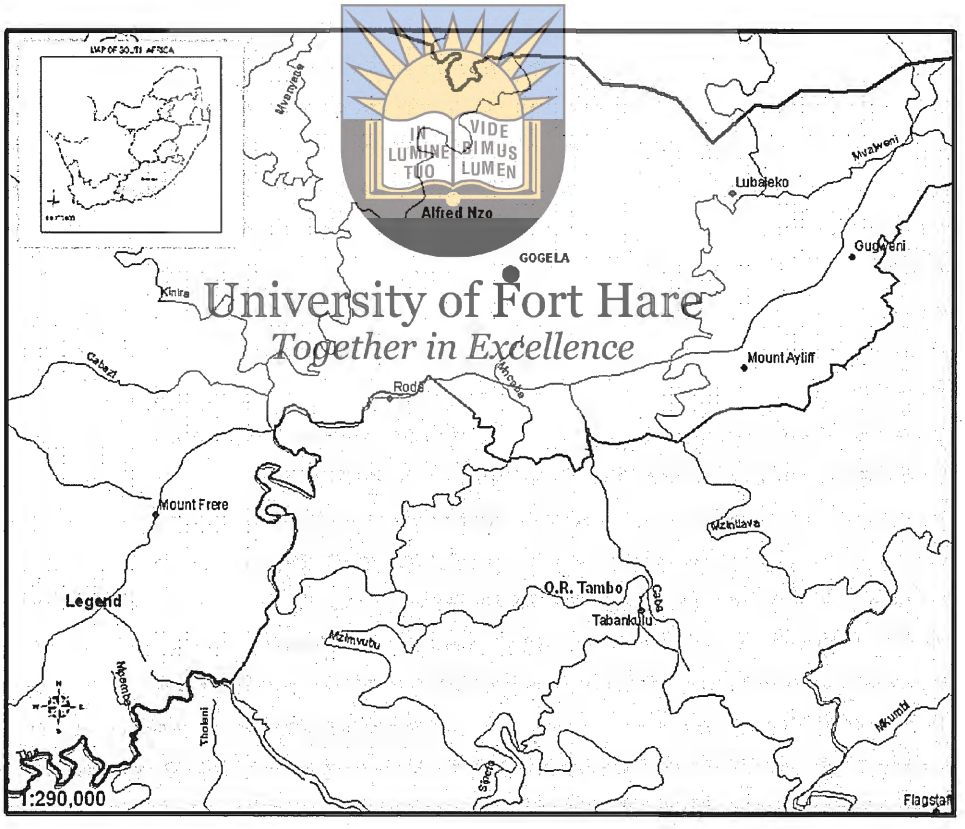


Figure 2. Gogela in Eastern Cape, South Africa

Ethnically, Gogela is mainly settled by the Xesibe group, and interspaced by few Bhaca and Zulu households speaking largely Xhosa with Zulu dialects. This is a traditional settlement under a Gogela chieftaincy. Land is distributed by traditional authority in a communal tenure arrangement. Land is categorised into grazing and arable zones. Cultivation fields are attached to residential plots. Land allocation has over the years not been uniform in size. Mainly families that settled in the area prior to the 1960s, have lands as big as three hectares each. From the 1960s to the 1980s land was allocated on fixed sizes of 75 x 75 m, to give a hectarage of 0.5625. From the 1990s to the present land is allocated at a size of 45 x 45m. Clearly, there is an overtime decrease in size and this lack of uniformity is mainly because, as a communal village, land is always allocated according to availability and demand at particular points in time (N. Nduku, personal communication, October 13, 2009).

The chief of Gogela settlement reported that at some stage in the early 1800s, the Xesibe group settled on gentle land closer to the modern day Kokstad town. They were relocated from this place to where they are currently settled by the Cape colonial government when Griqualand East was annexed to this government in the late 19th century. Their former land was dispensed into commercial farms held largely by settler families and some of the names, Briden,

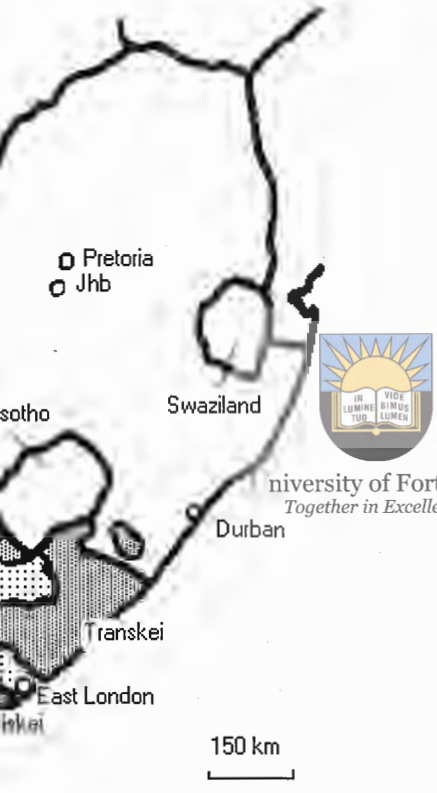
James and Peter became entrenched in the countryside (M. Gogela, personal communication, October 6, 2009).

On arrival at their present settlement (Gogela), land was abundant relative to prevailing population size. For this reason, it was mainly the most suitable land in terms of cultivation that they occupied first. The mid 20th century saw a relative decrease in land size per household. Black people deemed 'surplus' in white industrial and farming areas were relocated into reserves which were already congested in the post colonial conquest (1910) and the Transkei became one of the recipients of these families. By the time the Transkei territorial administration or the Bunga was functioning in the late 19th century, Gogela had also become an outlying settlement of Mount Ayliff, one of Transkei's magisterial districts that were not immune to influx (M. Gogela, personal communication, October 6, 2009).

Continued influx generally put pressure on land allocation, and thus forced some adjustments in land allocated to new residents. In keeping with the principle of allocation according to availability and demand, sizes decreased dramatically in the latter half of the 20th century. From the 1990s land sizes shrunk due to population increase from both the natural process and immigration.

tinued to survive as a village relying on

ontext of Transkei



African landscape (after Perret, 2002

g. Its landscape can be generally divided
kensberg highlands, the interior plateau
Drakensberg highland is of high altitude
sea-level.

Transkei territory has hilly surfaces that often result in immature shallow soils because the hilly slopes discourage accumulation of soil (Nompozolo, 2000; The Republic of Transkei, 1976). The interior plateau ranges from 300-900m in altitude. Its proximity to the Indian Ocean coastline allows it to enjoy moderate climate. The coastal plateau ranges from 300m to 500m above sea level with steeply sloping lands.

The terrain receives an average annual precipitation of 815 mm. This is enough to support risk-free dry-land crop cultivation (The Republic of Transkei, 1976; Van Averbeke, 2002). Spatial distribution of rainfall is influenced by topography, thus as a result there are three major rainfall zones: namely the coastal plain, the interior and the mountain terrain. Rainfall is high on the coastal plain where average maximum is 1400mm per annum. It is slightly low in both the interior and mountain areas where the average maximum is 1200mm but this is significantly higher than in other parts of the Eastern Cape that include the Karoo and parts of the Ciskei. In all these zones most of the rain is received in summer between October and March (Feely, 1987). Gogela is situated in the mountain zone.

Transkei receives a variety of precipitation forms that include frontal and conventional rainfall, thunderstorms, mists, as well as drizzles. This puts the region at an agriculturally advantageous position over most parts of the country.

Considering water requirements for dry-land cultivation, the best planting period seems to be October to November during a normal climatological cycle.

This high rainfall average is complimented by the presence of many rivers, chief among which are the Umzimvubu, Umtata, Bashee, the Kei, Umtamvuna, Umzimkulu, Orange, Telle, Umtente, Umguzi and Qora. Added to the rivers are a number of dams, mostly which were constructed during the late 1960s and 1970s. These include Xonxa, Lubisi, Ncora, Tsojana, Xilinxa, Gcuwa Weir, Umtata, Majola Weir and Mabeleni. Many were linked to the food plots, dairy and show case homeland irrigation schemes of the 1970s (Phillips-Howard & Porter, 1996).

Most of Transkei's soils fall in the sandy to sandy loam groups. These are mainly light-texture soils. This makes cultivation easy and promotes good permeability. Clayey heavy soils are not common, except on gentle slopes. The main disadvantage is that the soils are of low water-holding capacity and this makes them very vulnerable to erosion. This constitutes a critical problem because farmers cultivate on steep slopes (ADRI, 1989).

Natural vegetation varies from open grassy plains on the high-lying interior plateaus to dense forest growth along large river valleys. Vegetation is grouped into nine veld types which are usually grouped into three main categories: coastal forest and thorn veld, valley bushveld, and Transkei grassveld (The Republic of Transkei, 1976).

Transkei has high potential to sustain crop production. In a 1976 assessment of Transkei's 4.4 million hectares, 4.2 were deemed to be available for farming. Of the 4.2 million hectares, 383 000 hectares were assessed to be suitable for crop cultivation (The Republic of Transkei, [illegible]).

Historical Background of the Transkei

Xhosa speaking people in both the Transkei and the Ciskei historically fell within the Cape Nguni (Peires, 1981). Derricourt (1974) decries that it is difficult to know the pure history of the Cape Nguni because much of the available documentation dates from the time when these communities had already undergone several changes. Remnant records of their past reflect an ever-changing context, denoting a remarkable shift from their pre-colonial traditional organisation.

The Nguni are sub-divided into two major groups: Northern Nguni (Zulu speaking) and Sothern Nguni (Xhosa speaking) (Hammond-Tooke, 1993; Peires, 1981). The Southern Nguni include Mpondo, Mpondomise, Thembu, Gcaleka, Mfengu, Bhaca, Xesibe and Xhosa groups (Peires). The term 'Xhosa speaking people' is used to refer to all these groups because, Xhosa is, with minor dialectical variations, the language spoken by all the Cape Nguni (Jackson, 1975).

Xhosa speaking communities were occupying the eastern half of the Eastern Cape by at least the 14th century ([illegible], 1975). From the 16th century, some gradually drifted westwards until in 1702, they met eastward moving white pioneers in the Great Fish river region (The Republic of Transkei, 1976). Here they also came in contact with Khoi groups with whom they fought and traded. In this process, they settled in dispersed single homesteads (*umzi*), preferably situated on sloping lands overlooking a river (Peires, 1981). Their homesteads consisted of several huts around a byre, and these were generally independent economic units, determining matters of production and consumption (Bundy, 1979; Derricourt, 1974).

The Cape colonial government's influence in the Transkei began from the 19th century, indirectly through missionary and even trade activities. The early

decades of the 19th century saw the establishment of many missionary stations including the Methodist Church Wesleyan Mission station founded at Butterworth in 1827 (Brownlee, 1923). Formal annexation and imposition of magisterial rule began in the 1870s and ended in the 1890s (Bundy, 1979). Following this, the area was re-arranged into four chief magisterial districts, namely, Transkei Proper, Thembuland, Griqualand East and Pondoland (Bembridge, 1984).

Griqualand East and Mount Ayliff District

Griqualand East is closely and historically linked to the district of Mount Ayliff as shown in figure 4 below. Before annexation, the Cape colonial government's desire to control the region led to the formation of Griqualand East. As has been mentioned in the introduction to this chapter, Gogela is located within Mount Ayliff. This makes the history of Griqualand East a special case in this study, and hence warrants more detailed account than some other parts of the Transkei.

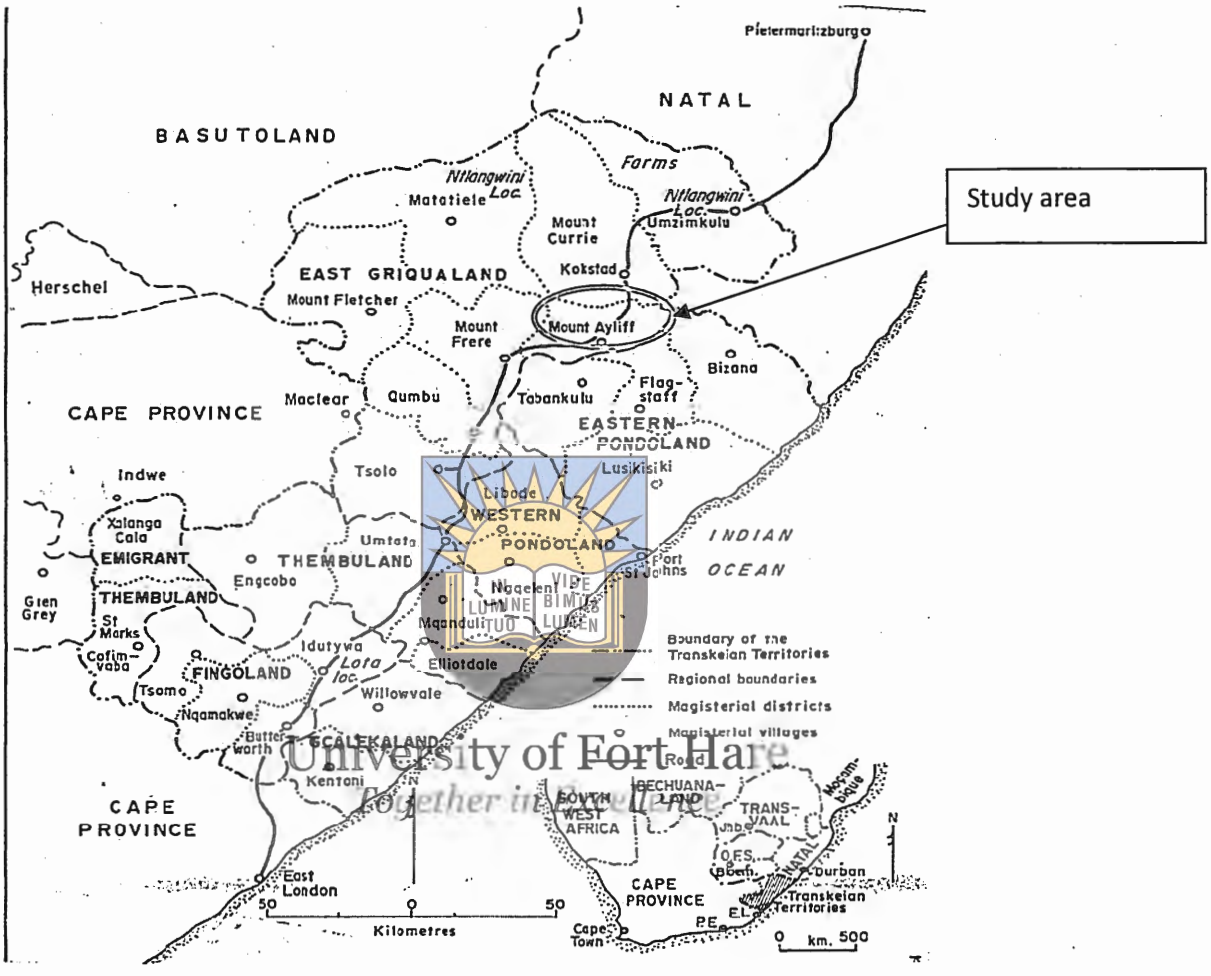


Figure 4. Mount Ayliff in the East Griqualand, c. 1913 (after Beinart & Bundy, 1986)

Early formation of Griqualand East therefore necessitates an examination of Griquas' history and particularly movements of Adam Kok. After Kok and his fellow Griquas lost land around the Orange river catchment to the *trekboers* during the 1840s, they gravitated southwards and eventually settled in the eastern shadows of the Drakensberg mountains and the valleys of the

Umzimvubu by 1863. At that time, the area was sparsely settled by small African chieftaincies that included the Bhaca, Ntlangwini, Batloka and Basuto (Beinart, 1986).

The Griquas established loose hegemony over what later became settlements of Umzimkhulu, Kokstad and Matatiele with the support of the government, which desired to conquer and expand its frontier (Brownlee, 1923). They established settlement at Kokstad, and accumulated farms amounting to 15 000 morgen[1]. These farms were systematically lost when the Cape colonial government took over direct control of the area in 1874 (Beinart, 1986).

Establishment of Griqualand East is significant to the history of Mount Ayliff. The latter became a magisterial district area on a tract of land of about two hundred and forty square miles in extent, and was occupied by the Xesibe clan of the Xhosa sub-groups. The territory lay between the northern border of Pondoland and Kokstad. Its boundary with Pondoland was not well defined, but was understood to be where Xesibe kraals ended and Pondo kraals began (Brownlee, 1923). Following incessant skirmishes between the Xesibe and the Mpondo groups, Mount Ayliff was incorporated into the Griqualand East

[1] One morgen is equivalent to 2.116 acres (Magubane, 1979).

magisterial district in 1886. Since the 16th century, the Xesibe had sparsely settled on parts of Ntabankulu and Mount Ayliff (Brownlee, 1923).

Transkei, from 'Reserve' to Democracy

The 1913 Land Act ushered in the formation of 'reserves', as areas exclusively for black South Africans. Transkei was scheduled, as a result for Xhosa people in parallel with the discrete lands that formed Ciskei territories. The creation of reserves unleashed the policy of separate development, which was sustained until the end of apartheid rule in 1994 (Ntsebeza, 2005).

The policy involved Bantustan programme of developing rural reserves as homelands for the major African chiefdoms. In 1963, Transkei was declared a semi-autonomous state. This ostensibly was a process towards achieving ultimate 'independence' (Ntsebeza, 2005). In 1976, Transkei became the first homeland to achieve independence. Upon this, people of Transkei lost their South African citizenship. This independence did not however enjoy international recognition. Upon the inception of democratic rule in 1994, Transkei, together with all other homelands was reincorporated into the Republic of South Africa. The Transkei and the Ciskei homelands were combined with parts of the Cape Provincial areas to make the current Eastern Cape Province.

Chapter Summary

This chapter has introduced the study area, which is the Gogela settlement. It has done this by giving brief overviews of the geographical and historical context of the Transkei. Transkeian territories receive summer rainfalls high enough to support crop cultivation. This is complemented by a multitude of rivers and dams that the region possesses. Nonetheless, the pervasive distribution of steeply undulating lands across the region poses a conservation challenge for crop cultivators.

Historical developments had significant impact on rural farming. Conquest of land as well as colonial administration affected land tenure system. Creation of reverses reduced the reliance of black farmers on land and they were also discriminated against in terms of government support. Agrarian livelihoods faced stiffer challenge during the 20th century as successive governments did not support rural African agriculture.

CHAPTER III

CROP CULTIVATION, SOIL AND WATER CONSERVATION AND LAND HOLDING IN TRANSKEI

Introduction

This chapter discusses land tenure, crop cultivation, soil and water conservation practices in theTranskei areas. The section on land tenure focuses on the descriptive accounts of the three main land tenure systems found in the region, namely, communal, quitrent and leasehold. Crop cultivation started around the Late Iron Age (Shillington, 1989). It reached its apex in the late 19th century and began a progressive decline that has continued till the present. In this period, soil and water conservation has also been practised.

Traditional Cultivation and Environmental Adaptation

Prior to contact with the whites, the Cape Nguni were pastoralists –cum-hoe cultivators (Beinart, 1986; Bembridge, 1984; Bundy, 1979; Hammond-Tooke, 1937; 1962; Sobahle, 1982). They embarked on cultivation to meet some of their subsistence needs, but much of their economy derived from pastoralism. Less

social and economic importance was attached to crop cultivation although its importance increased in the late Iron Age (Shillington, 1989).

Tillage was commonly entrusted to women, while men concerned themselves with cattle economy (Bundy, 1979). Women were responsible for weeding fields, harvesting, thrashing, winnowing and for bringing the harvest home (Hammond-Tooke, 1937). Men assisted only with heavier duties that included clearing new land (Beinart, 1982).

Cultivation was a labour intensive feat, done using rudimentary technology including wooden hoes (*ikuba*) made of sneezewood (*umthathi*) and ironwood (*umhlebe*). This made cultivation hard and strenuous so much that the cultivators had to sit or squat down when digging (Bundy, 1979; Denison & Wotshela, 2008; Sobahle, 1982). Not only did this limit the size of land cultivated, but it only allowed superficial cultivation, consisting largely of the mere turning of the top layer of earth. Naturally, the harvest was often negligible.

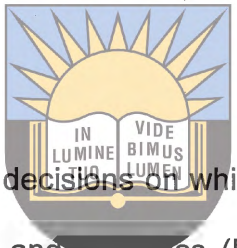
Land was the principle resource in Nguni agricultural economy especially in the Late Iron Age period. Land holding transcended economic practice and it evolved through patriarchal households which were scattered in kinship arranged

hamlets. Although a collective of these used and controlled communal land, allocation was primarily a function of the chieftaincy. Yet once a piece of land was allocated to a particular household, it was defined in terms of that particular family's rights of use, and not ownership. Allocated land could be alienable only by dispossession. If a man lost his land, he lost his membership in the community (Bundy, 1979).

There were several traditional crops among the Cape Nguni, including sorghum, pumpkins, gourds, calabashes, melons, wild peas, and varieties of beans and fruit trees. The most important grain crop at least from the Late Iron Age, was sorghum. Sorghum had two distinct varieties: *inife* and *amabele.* From the mid 19th century, sorghum was increasingly supplanted by maize (Bundy, 1979). From its inception, maize was preferred because it has a shorter growing season, higher yield per unit area and it makes green mealies available for consumption early in the season (Beinart, 1982).

Through trade and missionary activities, a lot of new crops including coffee, cotton, wheat, peaches and a variety of vegetables were introduced in the late 19th century (Beinart, 1982). Winter crops such as wheat and vegetables offered livelihood security in times of poor summer harvests. Mission stations also served as agricultural demonstration points (Bundy, 1979).

This period (the 19th century), also saw introduction of the plough and iron hoe. This made it possible to cultivate larger areas than what was possible before. As cultivation evolved into a serious livelihood activity, the Cape Nguni communities initiated an array of environmental adaption practices to ensure sustained harvests. One of them was shifting cultivation. It entailed cultivation of a specific piece of land for some years and leave it to regain its fertility through disuse (Bundy, 1979).



Cultivation process began with decisions on which land to use for cropping, and which one to devote to kraals and gardens (Bundy, 1979). Hammond-Tooke (1962) who studied cultivation among the Bhaca, found an intricate selection of cultivation lands. Humid valleys where rainfall was high, river banks and bushy forests were selected for cropping. Nguni communities associated soils on which sour grass (or *ijojo*) grew with fertility (Sobahle, 1982).

Choice of sowing time was made in conjunction with floral, faunal and astronomical changes (Bundy, 1979). Smith (1893, cited in Sobahle, 1982) "the kaffir year is the agricultural year. It begins with seed time, and that time is fixed astronomically by the appearance of the constellation named *isi-limela* (Pleiades) in the eastern sky a little before the rising of the sun" (p. 15). In addition, when the cuckoo locally named *lungalegwaba,* began making sounds, and also when

the hoope (*ubhobhoyi*) made its appearance, the Xhosa knew that the summer season had come. They also read floral signs. When ragwort (*inkanga*), produced its yellow flowers, the ploughing season had arrived (Sobahle, 1982).

Planting time was not fixed on mere dates of the year, but rather it was adjudged from an informed knowledge of the relationship between weather conditions and dynamics of seasonality. Conditions of a season such as times of warmth and rain influenced plants and animals to act in a certain way (Sobahle, 1982).

After cultivating, farmers left the pug-up weed to decay and die. The weed was left until plant blades had begun to shoot above clods. Thereafter they would be gathered into heaps and burnt. This was a mulching practice that performed multiple functions. It protected tender plants against scotching heat and heavy down pours. Naturally, mulch also adds warmth in the soil, and hence promotes early germination (Sobahle, 1982).

Historically, the Xhosa used to till their arable lands after harvesting. They called the practice *gelesha umhlaba* (turn over the soil). This was mainly a water conservation practice. The idea was to soften the land in order that any falling

rain, dew or frost infiltrates the soil. This would keep the moisture in the soil profile for the next planted crop (Van Averbeke, 2003).

Contemporary Status of Crop Cultivation in Transkei

Arable production in the Transkeian territories is dominated by maize. In the latter half of the 20th century maize accounted for about 88% of the area under cultivation (Bembridge, 1984; Van Averbeke, 2002). This was seconded by sorghum, which took 7%. The remaining 5% was planted with legumes, vegetables and other minor crops. Studies have shown that crop production has been in a constant state of flux since the early decades of the 20th century (Bembridge, 1984; Bundy, 1988; Dovie, Witkowski & Shackleton, 2002; McAllister, 1992). In order to give perspective to arguments and claims that shall be made, the following discussion tries to draw some cases and statistical data relating to crop cultivation, from the past as much as it is necessary.

As early as the mid 20th century, communities of Transkei underwent a transition from being peasants mainly living on the produce of their fields to "... sub-subsistence rural dwellers manifestly unable to support themselves by agriculture and dependent for survival upon wages..." (Bundy, 1979, p. 1).

Decline of cultivation is based on a number of factors including involvement of African peasantry in the broader South African economy, shrinking of arable land available to Africans following the promulgation of the 1913 Native Land Act and the incidence of migrant labour system (Bundy, 1988). In the 1960s, the Transkei had an average population density of 100 people per square mile (Rutman, 1969). Amount of arable land available per family was estimated at 1.5 hectares (Porter & Phillips-Howard, 1997). It was estimated that a rural family needed 3.4 hectares of arable land to sustain farming life (Slovo, 1976 cited in Bembridge, 1984). In the 1980s, 10% of the households had no arable land, while 52% had only one hectare or less (Bembridge, 1984). In the 1990s, the Transkei had 590 000 households, of which 215 000 had no arable land (Van Averbeke, 2002).

Mean grain yield was about 2.5 bags per hectare during the 10- year period of 1954-1964. The Tomlinson Commission (1955) had estimated that a family of six required a minimum of 15 bags of grain per year. About three decades later, in the 1980s, the average rural Trasnkeian household was getting about 90% of its income from non-farm activities (Bembridge, 1986). The picture is even bleaker in current years. In 2000, farming contributed only 4% of households' livelihoods in Eastern Cape, including the Transkei (Perret et al., 2000).

In fact farming during the latter parts of the 20th century had since been secondary to migrant labour in meeting households' basic subsistence needs

(Heron, 1991). In a survey conducted in the Tsolo district in the 1970s about 42% of total income was provided by remittances from migrant workers (Westcott, 1977). In a 1995 survey of agricultural livelihoods in Transkei, Phillips-Howard and Oche (1995) found that not one out of a sample of 120 famers considered agriculture their main source of income.

In the course of the 20th century, declining cultivation livelihood led to burgeoning of labour migrancy. In the 1960s, it was estimated that 225 000 to 250 000 African males were engaged in migrant labour. This amounted to about 50% of adult males from the age of 15 to 50 years (Donaldson, 1992; Perret, 2002; Rutman, 1969). In very recent years especially the early 2000s, remittances from migrant labour constituted 43% of households' livelihoods (Perret et al., 2000)

This general decline in crop productivity led to a widespread shift from field to garden cultivation in other areas such as Shixini in Willowvale (McAllister, 1992). From the mid 20th century, population increase there put pressure on arable lands. The fallow system became impossible, and continuous cropping of land led to progressive decline in soil fertility. Households responded by gradually stopping to cultivate their fields and started to develop gardens close to their homesteads. Flexibility associated with communal land tenure and scattered settlement pattern facilitated the shift (McAllister, 1992).

Andrew and Fox (2003)'s study in the same area as McAllister (1992), found that yields from gardens were much higher than yields from fields. This led them to conclude that shifting from fields to gardens was a process of intensification that helped farmers to maintain yields in the face of resource shortage (Andrew & Fox, 2003; McAllister, 1992).

Soil and Water Conservation Practices in the Transkei

While South Africa has a long history of conservation practices, a lot of documentation has deliberately excluded or minimised the roles and perceptions of the black people particularly in the post peasantry and hidden rural struggles historiography of the 1980s that explored the Transkei extensively. Before democracy, conservation policies were largely underpinned by two major traits; racial exclusivity and a top-down implementation approach (Khan, 1997). This had the effect of alienating or even antagonising the black people. This brief section below gives an overview of soil and water conservation practices and policies that have been prevalent within the Transkei.

In African homelands, including the Transkei, the state often implemented conservation policies aggressively. The state believed that "it was essential to enforce conservation measures in African areas because of the implications of ecological deterioration there for white farming regions. The discourse and justification of conservation in the African areas became bound up with the

political imperatives of segregation: stemming African urbanisation, maintaining the migrant labour system and developing Africans within their own areas" (Beinart, 1989, p. 153).

State conservation policy or what modified as betterment planning or villagisation in South Africa has a peculiar but equally controversial history. From the 1930s, the Union Government implemented rehabilitation schemes in African reserves, which included the Transkei. By 1960s, rehabilitation schemes had nationally evolved or modified to betterment planning, underpinned by villagisation and removals (De Wet, 1987; Hendricks, 1989; McAllister, 1989). Betterment planning or rehabilitation therefore refers to "successive attempts by various central and homeland governments to *inter alia* combat the deterioration of natural resources and contribute towards the agricultural development of black rural areas" (McAllister, 1992, p. 207).

Betterment included a systematic land use planning according to which land was to be balkanised into residential, arable and grazing plots (De Wet, 1989; Hendricks, 1989). It also involved implementation of conservation measures including filling of dongas, construction of contour bunds, ploughing along contours and excising heavily eroded land from cultivation (Hendricks, 1989; McAllister, 1992). The schemes also provided for implementation of domestic water supply facilities such as boreholes and reservoirs. In Transkei, however,

most of these provisions fell short as the central budget ran out. For instance materials for fencing to subdivide and control grazing camps, were rarely supplied (McAllister, 1992).

Transkei homeland government inherited the National Party government's betterment policy and after 1976 implemented the Transkei Soil Conservation Programme (TSCP) to help alleviate soil degradation through erosion and loss of fertility. The function of the TSCP was to promote soil and water conservation technology dealing with erosion control, soil reclamation and veld management strategies in order to increase crop production. It identified overland-flow as a major cause of soil loss through erosion. As a result, the TSCP constructed several overland flow management structures including bush packs, shallow earth dams, earth contour bunds and cut-off drains. Nonetheless, it has to be noted that the Transkei Department of Agriculture and Forestry depended on budget from Pretoria. This limited its ability to fund and implement projects (Lado, 1998).

Phillips-Howard and Oche (1996) list about 25 different soil and water conservation techniques practised over 12 locations in the Transkei. These include pre-planting cultivation (*gelesha*) terraces, contour bunds, tied ridges, inter-cropping, irrigation, rainwater harvesting, to state but a few. The study is a

survey, and it discusses the different practices but does not analyse these different operations.

Intercropping is one of the most traditional and widely applied soil conservation practices in the Transkei. The practice involves growing of multiple crops in the same field, for example, grass crops such as maize, sorghum or millet and legumes such as groundnuts, beans or cowpeas. Intercropping assists in exchange of nutrients among crops resulting in high crop production. For instance, leguminous crops have root modules that contain nitrogen fixing bacteria for the soil, which can be utilised by grass crops. This serves to balance the natural ecosystem of the soil (Mukhal et al., 1999).

In 2007 the Department of Water Affairs and Forestry (DWAF) initiated rain water harvesting projects to sustain crop production in several regions of the country including the Eastern Cape. Rain water harvesting involves a range of techniques used to slow down, catch, store, and use every drop of rainfall (Botha et al., 2007; Oweis, Ahmed & Adriana, 2004). Harvested water can be used for drinking, washing, growing vegetables in home-gardens or crops in field and provide water for stock. The project was meant to alleviate poverty through ensuring food security. It was therefore named 'Intensive Home Food Production'. Intensive Home Food Production was implemented in several

districts of the Transkei including Mthatha, Engcobo, Port St Johns and the Umzimvubu Development Area (DWAF, 2007).

Intensive Home Food Production project promoted permaculture, a concept that denotes indigenous methods to grow food through nature. Crops feed on organic waste. Trench gardening and mulching were the main conservation techniques that were introduced to sustain home vegetable gardens (DWAF, 2007).

Land Tenure in Transkei

Overall, there is a legacy of severe land pressure in South Africa's former homelands, including the Transkei. The 1913 Native Land Act and the 1936 Natives Trust Act saw the majority of the country's population being squeezed into only 13% of the country's total land surface (Adam, Cousins & Manona, 1999). This 13% constituted the area that could be legally farmed by blacks. As highlighted, by the turn of the 20th century, cultivation had become a core livelihood activity among the Xhosa speaking communities. Yet land tenure remained contentious, and problematic. Conventionally, land tenure may be understood as the institutions governing rights to use, own or transfer land. These institutions also determine what duties go with these rights, as well as how the fruits obtainable from the land may be disposed of (Nompozolo, 2000). There are generally three major land tenure forms in the Transkei: communal, quitrent

and leasehold. Small pockets of freehold land, formerly known as 'black spots', are mainly found in districts that lie between the Ciskei and Transkei known as Border corridor. This section gives descriptive accounts of these three major land tenure categories.

Communal Land Tenure

Most of land in the Transkei is held under communal tenure system. This covers about 84.3% of the total land. About 30.96% of this is devoted to cultivation production (Agriculture, Planning Division, 1993, cited in Nompozolo, 2000).

Communal tenure system has its origins in the history of the Xhosa communities but has also been modified by conquest and apartheid enforced chieftaincies. Prior to conquest, the Xhosa had abundant land for agriculture. Therefore, there was no incentive to privatise land holding. Land was considered as a communal good, to be shared equally by all members of the community according to their needs (Rutman, 1969). This guaranteed every community member the right of access to residential and arable plots, as well as commonage to graze their livestock, collect firewood and cut thatch grass.

Communal land is only transferable by inheritance. Women are permitted to temporarily inherit the land as widows following the death of their husbands.

Upon her death, the land passes to the designated male heir (Cross, 1991, cited in Nompozolo, 2000).

Under this tenure, once a piece of land is allocated to a particular household, it is defined in terms of that particular household's rights of use, and not ownership (Bundy, 1979; De Wet, 1995). Over time, communal tenure was modified by the South African and Transkeian legislations (Bundy, 1988; Nompozolo, 2000). For instance, in communities that got affected by betterment planning, the right to arable land became limited to availability of such land. As a result some community members started failing to access cultivation land.

Modifications were effected by the 1936 Natives Trust and Land Act. As a result, communal land is now held in terms of:

- Certificate of Occupation, in which the right of individual to a residential stand and arable plot is registered with the magistrate after approval by the Tribal Authority. This became largely a norm with the application of betterment.
- Permission to Occupy. This is similar to Certificate of Occupation only that it applies to business or institutional premises such as trading stores, garages and churches.
- Grazing rights. This entails access to commonages by every stockowner in the community.

Currently, all communally owned land is *de jure* state land and in contemporary years it falls under the jurisdiction of the minister of Land Affairs (Nompozolo, 2000).

Lease Hold

Leasehold involves a formal agreement between two parties to rent land for purposes of agricultural production for a specified period of time. During the homeland era, Transkei government entered into agreements with individuals to lease farms known as 'leased areas'. These areas were white owned farms located within the boundaries of Transkei. The farms were bought up by the South Africa Development Trust (SADT) previously the Native Trust and by the 1936 Act in order to consolidate the homeland. SADT transferred them to the Transkei homeland administration. Sections of these were used to settle landless households mainly evicted from white owned farms. Other leased areas were allocated to individuals for commercial farming on a leasehold arrangement (Nompozolo, 2000).

Land under leasehold was registered with the Transkei Department of Local Government and Land Tenure. According to the Transkei Land Reform Research Group (1995), leasehold applied in districts that include Cala, Butterworth, Umzimkulu, Lady Frere, Cofimvaba, Mount Currie, Maluti, Port St Johns, Tsolo,

Mount Fletcher and Centane. In 1994, land under leasehold was about 95 400 hectares (Transkei Land Reform Research Group, 1995).

Quitrent

Quitrent is a form of conditional individual tenure. It was a brain-child of the Cape colonial government's Glen Grey Act of 1894. Quitrent gave farmers relative security while maintaining the means to dispossess them if the state did not permit of their land use practices. Quitrent was based on the principle of one-man-one-plot. The grantee paid annual rentals to the government (Mills & Wilson, 1952; Nompozolo, 2000; Parry, 1983; Wotshela, forthcoming, 2010).

Just like communal tenure, under quitrent, grantees have rights to residential, arable and grazing land. The official size of residential sites in Transkei was limited to 0.43 hectares, while arable allotments were 3.43 hectares (Kruger, 1995 cited in Nompozolo, 2000).

Quitrent was subject to a lot of restrictions (Wotshela, forthcoming, 2010). Allotments could not be subdivided or held by women. According to Cokwana (1988), selling or mortgaging of land under quitrent required authorisation from relevant government structures. The land could not be transferred by will, and inheritance was determined by the state. A holder could forfeit his rights if he

failed to pay annual rent, did not cultivate his land or was guilty of stock theft (De Wet, 1987; Hendricks, 1989).

Chapter Summary

In South Africa, environmental conservation discourse has historically been state-centred. One of the implications is that conservation initiatives that are localised, such as stone terracing in Gogela, do not receive specific attention in most of the mainstream literature. This implies that South Africa's environmental conservation history is incomplete. This resonates well with Khan (1994)'s call for a broadening of the scope of South Africa's conservation history.

From the early 20th century to the present, Trasnkeians have progressively transformed from the status of subsistence rural dwellers to being sub-subsistence croppers (Bundy, 1979). This coincided with a widespread concern over soil erosion in South Africa (Delius & Schirmer, 2000). Perceptions of declining crop yields and physical evidence of erosion fuelled anxiety over the effects of cultivation practices, especially in the 'reserve' areas. However, strategies to combat this problem were dominated by racist notions that invariably blamed black cultivators and ignore their conservation perceptions and practices. This was further manifest in the betterment planning that was implemented without consulting the local African farmers.

CHAPTER IV

PRESENTATION OF RESEARCH FINDINGS

Introduction

This chapter presents empirical data on the emergence, development and use of stone terracing in Gogela. It describes the emergence and continuity of stone terracing and how stone terraces are constructed. Moreover it outlines how stone terraces conserve soil and water on croplands. The chapter further presents the status of crop cultivation in Gogela and highlights the concept of rural livelihoods sustainability, in relation to the practice of stone terracing.

Observations made by Bundy in 1979 about African crop cultivation in the Transkei still hold, at least in Gogela. One of the observations is that historically African cultivators have had a nuanced understanding of their respective physical environments including rainfall, topography and soils. The second one which several writers (Andrew & Fox, 2003; Beinart, 1992; Bembridge, 1984; McAllister, 1992) have as well made is that cultivation has substantially declined as a household livelihood activity. These two observations run central in this chapter.

Livelihood Sources and Activities

Gogela is a settlement remotely located from major centers of economic activities. Though it is located in the magisterial district of Mount Ayliff, its economic hub is the town of Kokstad[2] lying at a distance of about 30km north of Gogela itself. The main source of livelihood outside land is seasonal labour offered to commercial farms around Kokstad. Of the 28 interviewed farmers, 22 reported that their family members (mainly husbands or sons) were absent working in the outlying farms. Remittances became a major livelihood source in the area since the late decades of the 20th century. Of the 28 informants, 16 had once been migrant labourers in [illegible] of Johannesburg, Bloemfontein, Cape Town and Durban (Z. Johanes, personal communication, October 16, 2009).

Apart from crop cultivation, the community has a strong tradition of livestock economy. Of the estimated 350 households that make up the Gogela settlement, 90% have livestock. Livestock mainly comprises cattle, goats, sheep, donkeys and horses. Economically, cattle are used for meat, draught power and *lobola* payments. Donkeys and horses are used for transporting both people and goods,

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[2] Whereas Gogela is in the Eastern Cape Province, Kokstad is under Kwazulu-Natal province. Mount Ayliff, the magisterial district of Gogela is a small and relatively poor town. For this reason, most residents of Gogela do their business in Kokstad.

especially around hilly areas where vehicles cannot move (N. Jola, personal communication, October 9, 2009).

Crop Cultivation and Stone Terracing

A Community Development Coordinator reported that crop cultivation is a prevalent livelihood activity with a long-standing tradition in parts of the Transkei, and particularly Gogela. Several crop types are grown using different cultivation methods (B. Nxakweni, personal communication, February 11, 2008). As is detailed in among others, Bundy (1979) and Sobahle (1982), crop cultivation in Southern Nguni communities has been daunted by environmental challenges, which included soil characteristics, hilly topography and lack of rainfall. This necessitated various initiatives of environmental adaptation by local cultivators.

Cultivation in Gogela began with the gradual evolution of settlement in the late 19th century. The main crops were maize, sorghum, pumpkins, melons and beans. Currently, maize and vegetables, such as spinach, beans and pumpkins are the staple crops. This is complemented by fruit trees that include apple, peach and prickle pear in some households. Although farmers were not precise on the period when stone terracing began, the general consensus was that it started when households began cultivating on the lands that are located on

steeply slopes. There is very little gentle or flat-lying land in Gogela. Therefore cultivation of steeply sloping land began with the start of settlement during the late 19th century (N. Nduku, personal communication, October 13, 2009).

Most of the Gogela settlement, especially the sub-villages of Macebini, Dambeni and Gudlintaba in their respective wards, is heavily strewn with stones. Not only does it appear persuasive, rather it is more logical to argue that the practice began as an imperative need to create arable lands from the available surfaces. The mere presence of stones makes ploughing difficult. Even where the surface has some visible soil layer, just a few centimeters below are stones, making root growth and pedological exploration difficult. Not only this, but stones are solid structures highly impervious to infiltration. As a result most of the rains received in the area would be lost to surface run-off. Therefore, removing stones also served a soil and water conservation purpose.

A Lima Extension Officer (Lima Rural Agricultural Foundation, a Non-Governmental Organisation) reported that stone terracing is the major soil and water conservation practice in the area. It involves removal of stones from intended crop lands using iron bars and pickaxes. Because it is strictly a physical feat, it is an exercise that has historically been an exclusive male occupation. Before people overly emphasised cash as the medium of transactions, work

parties (*illima*) were relied upon in terracing. Households or families would brew beer for people to drink when working on the digging and removal of stones (L. Maphamela, personal communication, October 13, 2009).

Illima tradition had a special concept of division of labour that spanned across age, gender and social processes. Men would be involved in removal, transporting and stacking of stones into designated piles. Women would help with cooking and serving food to the working group. Young boys were involved in fetching water and wood-fuel to the fields where terracing was being done. Fire and water were used to break stones that were too big to be removable using simple technology involving picks and iron bars. Some fire would be made around such big stones using hardwood locally known as *isiqalaba* and *umvuvu* (B.Ngxabi, personal communication, October 17, 2009).

Illima practice was important in stone terracing for at least two major reasons. First, it enabled the poor (who could not get money for hired labour) to get their fields terraced. This was even more critical with female-headed households who generally would find it difficult to do terracing. Second, by bringing together all social segments (men, women and the young) to do stone terracing, it did not only promote and consolidate social cohesion, but it provided a critical space for transferring of local knowledge associated with the practice, from one generation

to the other. Thus young boys got terracing skills through both participation and observation (G. Phetshula, personal communication, October 10, 2009).

Stone terracing has an evolutionary history that corresponds with development of cultivation in Gogela. When it began in the late decades of the 19th century, the practice comprised discrete heaps of stones, and not terraces as shown in figure 4 below. Earlier farmers used to remove stones from arable surfaces, pile them in heaps on the same crop lands. The heaps were not uniform: not in size nor in style. The size was determined by what distance field-workers were prepared to walk with a stone on the head or hands. The piles were never arranged linearly. At this point, removal of stones was mainly meant to create cultivable land (T. Ndlovu, personal communication, October 18, 2009).

The concept of associating stone piles with retention of moisture and promotion of soil fertility was well manifest from this early age. Rare and highly prized crops including hybrid seeds (melons, beans, cucumbers and pumpkins) gotten from nearby mission stations were invariably planted in the immediate area surrounding the stone mounds. Crops in such vicinity would often grow faster and healthier in comparison to same varieties planted away from the stone mounds. Stone mounds acted as barriers to in-field run-off, they reduced its velocity, and thus forced it to deposit its load.

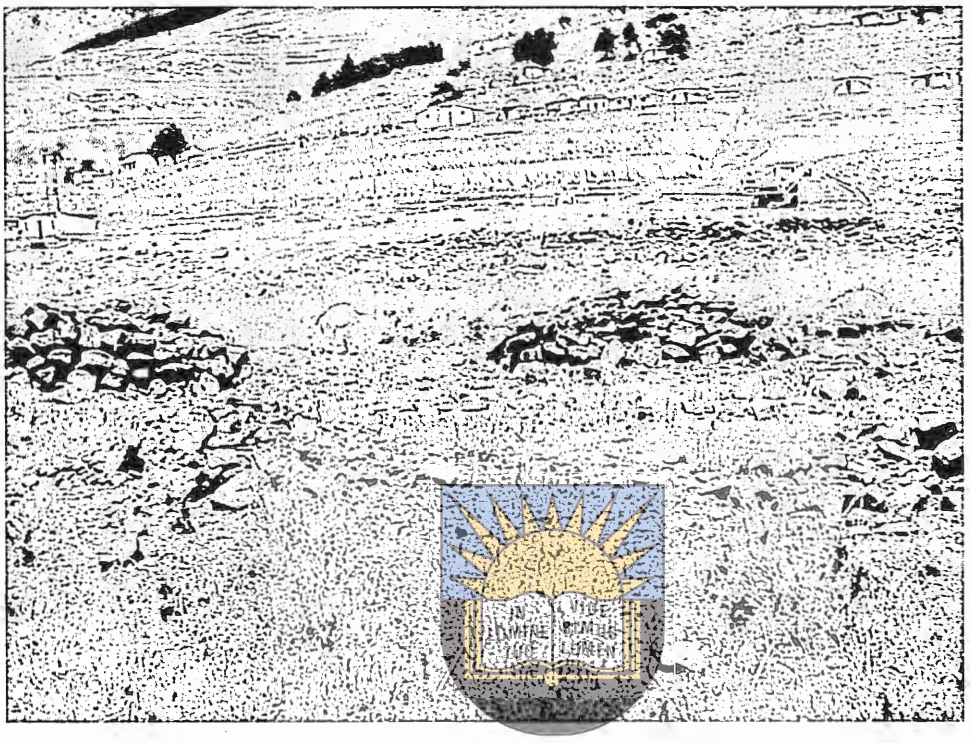

Figure 5. Discrete mounds of stones heaped on a former cropland

The load generally consisted of top soil, twigs and leaves taken from the upper parts of the land, including the arable land itself and uncultivated hillsides (X. Jwili, personal communication, October 7, 20009).

The combination of water, top soil and debris is critical in resuscitating soil fertility in crop lands. Yet the informants testified that this knowledge was accidentally discovered. Prior to this discovery (around the late 19th century), farmers used to think that all the parts of the same field carried the same fertility levels. It was only after discovering a consistent pattern of this differentiated growth that they

noticed the contribution of stone mounds to soil fertility and moisture retention, and began to treat them as special planting zones (X. Qungule, personal communication, October 18, 2009).

To the present, digging stones is associated with creation of soil fertility in the sub-villages of the Gogela settlement. Informants testified that fields whose stones have just been recently removed tend to give more crop production than the ones that have had their stones removed long time ago. They even stated that such fields can be even more productive than fields that have never had stones at all. They associate some types of stones such as granite with fertility. Removing stones and cropping in such fields would demonstrate a fertility cycle, close to the one experienced in slash-and-burn cultivation, in which production decreases progressively with the length of time. Conversely, sand stones are associated with poor soils (L. Ngcobo, personal communication, October 7, 2009).

Stone mounds were used until *circa*, the early decades of the 20th century. Over the years, households in Gogela used mainly hand-hoes for cultivation. Hand-hoeing is flexible in movement. Barriers such as stones and tree-stumps can be easily avoided by a hand-cultivator. This flexibility enabled stone mounds to co-

exist in harmony with long-term cultivation (S. Magwaza, personal communication, October 17, 2009).

Nevertheless, these structures were not effective in conserving soil and water. They could only obstruct a few streamlets of run-off that would flow directly out. By excavating and removing stones, the practice created soil for cultivation but the soil loosened to an extent that it became easily erodible. This accelerated the problem of soil erosion especially on steeply sloping fields (L. Maphamela, personal communication, October 13, 2009).

Historians of cultivation livelihoods in Nguni communities including Bundy (1979; 1988) and Beinart (1982; 1986; 1992) have noted that development and acquisition of new technology modified cultivation. In Gogela, a widespread adoption of ox-drawn ploughs by farmers occurred in the early decades of the 20th century. Randomly placed mounds of stones, made ox-drawn ploughing difficult. Avoiding stone mounds with a span of oxen often caused problems with controlling the plough. This resulted in some parts of the fields being left uncultivated. As a result, from the early 20th century, farmers shifted from random piling to a linear arrangement of stones, quite typical of the common contour ridging practice (N. Ndimandi, personal communication, October 5, 2009).

This contour-like stone terracing is what is currently found in Gogela. Construction of terraces became more technical than was the case with earlier practice involving stone mounds. On steeply sloping fields, the part of the field on which the terrace is to be constructed is marked. A trench of about 20 cm deep and 30 cm wide is dug. The base of the trench is leveled and cleared of stones. Big stones especially with flat surfaces are laid first. Then small stones are piled as the wall progresses up. The trench and big stones are meant to provide a stable foundation for the terrace wall. The terraces generally become wider at the base and progressively thinner as the wall goes up (D. Zondi, personal communication, October 5, 2009).

Stone terraces make linear strips that span across the length of the croplands, as is illustrated in figure 5 below. In Gogela, there is no single technical way of determining the length, width and spacing of terraces. Some terrace walls are as high as a meter, while others are only 20 cm high. There are at least two major reasons to explain this lack of uniformity. First, terracing is done by households and it is at that level where and how terracing is determined. Each household can terrace as much as its family labour-force can be supplied (H. Mzinyathi, personal communication, October 16, 2009).

Second, terracing is generally done using stones in the cropland. No stones are brought in from the outside fields. On this aspect, the height of terrace walls is determined largely by the amount of stones available. Thus, low wall may indicate scarcity of stones, or that the construction process is still at an infant stage (B. Mbunjana, personal communication, October 9, 2009; Critchley & Netshikovhela, 1998).

Intervals between terraces are also influenced by the steepness of the slope. Using an observation schedule, the researcher found out that terraces tend to be closer together on very steep slopes than on gentle ones. This is because steep slopes are more susceptible to erosion than gentle ones. Hence they need more closely spaced terraces to enhance the prevention of soil loss.

As pointed out, terrace walls obstruct run-off gravitating down the cropland. This obstruction has two major effects. First, it reduces the velocity of the run-off forcing it to gather together and stagnate. Resultantly, some of it percolates into the soil. Second, the reduction of velocity reduces load-capacity of the run-off. When this happens, the debris and top-soil which this short-lived runoff would have collected gets deposited along the terrace edges (E. Mgwabashe, personal communication, October 10, 2009).

Figure 6. Stone terraces on a cropland

Therefore terracing influences cropping pattern in several ways. The part of the cropland along the edge of the terrace becomes more fertile and moist than the upper part. For this reason, it is mainly crops occupying this zone that grow faster and healthier. Using an observation schedule, the researcher found that some farmers have even responded to this by shifting their cultivation only to the bottom part, leaving the upper part uncultivated.

Perennial crops such as fruit trees are generally planted on the terrace edges in order to exploit the water deposited there following rainfalls. The idea is to place

them at positions where moisture can be available for relatively long periods of time. Retention of moisture keeps the soil soft, thus allowing roots to penetrate easily down the soil. This corroborates Critchley, Reij and Seznec (1992)'s observation that farmers in Yatenga, Burkina Faso, began planting fruit trees after the introduction of stone terracing.

Comparatively speaking, terracing has been found to be more effective in conserving soil and water than its predecessor—stone mounds. The main advantage of terraces is their genuine length shape which allows obstruction of run-off across elongated space. In spite of this, stone terraces are not fool-proof. In terms of water management, stone terracing stores the captured water in the soil profile and this limits its capacity to support cultivation over long dry spells. This is even worse during winter seasons when there is very little or no rain at all. For this reason, the stone terracing practice cannot support dry-cropping in winter (B. Mbunjana, personal communication, October 8, 2009).

Within some households of the Gogela settlement, crop cultivation was a vibrant livelihood activity at least up to the early 1990s. Overall, there was enough to eat during and after the growing season. Maize was the staple crop, and was consumed in many ways. Green mealies were harvested for boiling, roasting and making bread. Bread from green mealies was and is till called *umukhupha.*

Tender mealies would be removed from the cob then grounded or squashed using grinding stones. The dough would be rolled into half-brick size chunks wrapped in maize leaves and placed in pots for boiling (B. Ngxabi, personal communication, October 10, 2009).

After harvesting, grain was stored in various facilities that include granaries (*amadladla*) and grain-pits (*isisele*). Granaries were built about one meter above the ground. This was meant to protect the grain from being damaged by moisture and even maize weevils. Grain in granaries would normally last just for a year. Some grain would be stored in grain-pits, of about four meters deep into the ground. Floor and walls of the pits were polished using cow-dung. The pit would be closed by a big flat stone on the surface. Grain stored in pits would stay for three to five years. This grain was used mainly to relieve food shortages during drought years. Drought has hit parts of the Transkei, including Gogela in a number of years especially during the seasons of 1973/74, 1983/84 and 1992 (M. Gogela, personal communication, February 12, 2008).

Betterment planning was introduced in 1965 in Gogela but did not have a direct influence over stone terracing (M. Gogela, personal communication, February 12, 2008). Its main agenda, which was conservation cropping was not anything new to the Gogela farmers. It only attempted to tamper with a practice already in

existence for nearly a century. Importantly no material equipment was supplied by officials to promote terracing. This might be because the practice involves simple technology (pickaxes and iron-bars) that are easily accessible to every household. It also uses readily available resources such as stones (B. Nxakweni, personal communication, February 11, 2008). .

Betterment planning introduced the use of stones to reclaim land lost to donga erosion, and that is illustrated in figure 7 below. Dongas are usually found in gentle fields immediately bordering hillsides. This is mostly the case where the hills are not cropped, but set aside for communal grazing. Generally, gentle fields in the Gogela settlement are not terraced. One of the explanations is that they often lack stones. When raining, run-off collects into rivulets down slope, into the unterraced fields where they contribute to the formation of dongas. Some of the dongas are about one and a half meter deep and two meters wide (Y. Mankanku, personal communication, February 10, 2008).

In Gogela, terraces are constructed with no diversion furrows or drainage channels. The terraces therefore mainly catch and use rain water that falls directly on given terraced arable plots. Uppermost parts of terraced fields catch some run-off that flows from uncultivated hillsides bordering the fields.

Figure 7. Stones used to mitigate soil erosion

Through observation, the researcher found that soil in these parts of the fields is often reddish with exposed stones. This is contrasted with the lower parts of the fields which often show humus dark and deep soils.

Although most of the construction work is done at specific periods, terracing remains a continuous process. Terrace walls are gradually built over time as stones get exposed during ploughing. Some terraces get adjusted, shifted or re-arranged to suit the dynamic demands of cultivation at different times. Moreover, repairing of terrace structures also results in continuous building and

modification. Terraces on fields that are ploughed using draught power often get destroyed during the planting season. Draught animals step on them whilst negotiating their way in the terraced plot (B.Ngxabi, personal communication, October 17, 2009).

Contribution of stone terracing to crop production is widely commended in Gogela. Farmers reported that terraced fields produce much more harvest than unterraced ones. Exact statistical figures for crop production are difficult to locate. Much of the produce is consumed by its producers, making it difficult to measure and give value to production in terms of surplus and markets (Beinart, 1992; Bembridge, 1984). Like what Dovie, Witkowski and Shackleton (2002) found in Limpopo, farmers in Gogela harvest different crops at various stages of their growth, depending on their requirements at that time. A 76-year old farmer reported that her terraced field of about one hectare used to yield enough grain to feed her family of five until the late 1980s (M. Mtambo, personal communication, October 14, 2009). "Even though cultivation production has generally declined, terraced plots are more reliable than unterraced ones" (J. Dlamini, personal communication, October, 13, 2009). Reliability of terraced plots was corroborated by field observation. In very hilly wards including Gudlintaba, Macebini and Dambeni, the researcher observed most unterraced fields are left uncultivated.

In terms of individual households' participation in terracing and cultivation, the researcher observed that it is mainly households whose family members have once been or are migrant labourers that are practising relatively vibrant, full-time cultivation. Bundy (1979) and Heron (1991) observed that whereas migrant labour pulls productive men out of farming, it in turn created opportunities for its capital to be re-invested into farming. V. Sibiya observed: "I stopped cultivation because I do not have money to fence my field and hire labour for ploughing, as well as weeding" (personal communication, October 15, 2009). The same problem was voiced by Y. Gogela (personal communication, October, 8, 2009) when she said that she had left cultivation because she had no money to hire people to terrace her field. Gogela, a widow of 70 years, living on social grant mentioned that each time she planted some crops on the field, they would take too long to grow. At times the crops would not flourish, would die and there would be little or no harvest at all.

Andrew and Fox (2003), as well as McAllister (1992), note that the decline of crop cultivation as a livelihood source influenced change in cultivation practices, at least in the Transkei. As noted, McAllister (1992) found a progressive shift from fields to home-yard gardens in Willowvale. In Gogela, a move from field cultivation to gardening has also been prevalent.

Although the researcher did not investigate on the extent of de-agrarianisation (for this would constitute a research project of its own), he learnt about fundamental signs of decline of crop production. In all of the 28 homesteads visited, no one mentioned crop cultivation as their main source of livelihood. They reported that they stopped relying on cultivation from the mid 1990s. As a result some fields are left uncultivated. Farmers cited about two main reasons for decline of cultivation. First, the control of livestock. "With the arrival of democratic rule, all children go to school leaving no one to herd cattle" (H. Nyameko, personal communication, October 7, 2009). Second, most of them do not have capital to buy farming equipment and hire labour. These two factors have been widely noted to be the main causes of the decline of cultivation in most of the post-betterment settlements.

Informants did not mention soil loss or shortage of water as a factor contributing to de-agrarianisation. Farmers reported that stone terracing was sustainable in many respects. Apart from conserving soil and water, stone terracing is generally regarded as an integral social practice of the area. "Our fathers were born on terraces, we were born on terraces, and our children are born in terraces" (B. Mfazwe, personal communication, October 8, 2009). This observation is different from what Andrew and Fox (2003) found in Nompa village of Willowvale, in the

Transkei. In a study of cultivation trends Andrew and Fox (2003) found that some farmers abandoned field cultivation due to loss soil fertility.

The on-going shifting from fields to gardens is fundamentally influencing stone terracing tradition. A Lima Extension Officer reported that from about 2005, Lima has been implementing food production projects in Gogela. Among Lima's programmes is Abalimi Phambili Programme (APP) which promotes vegetable gardening in home-yards. Lima Extension officers teach households to make vegetable beds using stones. They promote two types of these stone-made vegetable beds: keyhole gardens and trench beds (G. Mbunjana, personal communication, October 16, 2009).

Keyhole garden got its name from its shape, as shown in figure 6 below. It is a round structure with one opening space used as an entrance into the perimeter. The structure looks like a keyhole plate. It is made of dry-bonded stone wall. Its height is flexibly fixed. The idea is to make it about waist-high in order to allow for an easy arm's length access by the owner. The open space is filled with waste matter including manure, bones, ash and aloe leaves. When added to soil, this material forms a compact piece of humus capable of storing water for a period of about seven days.

Figure 8. Stones used to make a keyhole vegetable bed

A trench bed is made by digging a trench of about half a meter deep, three meters long and one meter wide. Overall, it suits the size of a common vegetable bed. When digging the trench, top soil is placed separately from the sub-soil. A dry-bonded stone wall is built above ground along the frame of the trench. The wall rises for about 30cm above ground. The trench is then filled with organic material including vegetable waste, bones, maize stalks and tin cans. Top-soil mixed with manure is then added as the final layer. In fact, the final product is a vegetable bed raised above ground framed by stones on the sides, as shown in

while trench beds had since been introduced in different parts of South Africa from the 1950s (Y. Mankanku, personal communication, October 18, 2009).

Nevertheless, the fact that both of these practices use stones makes them naturally fit in Gogela's ages-old cultivation tradition. In fact the concept of using stones in gardening was received as mere continuation of stone terracing practice (L. Maphamela, Lima Extension Officer, personal communication, October 13, 2009).

Chapter Summary

Stone terracing began as a rudimentary exercise comprising removal and piling of stones onto discrete mounds. Its modification from this state to neatly aligned terraces was an adaptation to developments that were taking place in cultivation including adoption of ox-drawn ploughs. Terraces also increased efficiency in soil and water conservation. This contributed to increased crop production.

As is with the rest of the Transkei region, crop cultivation in Gogela has been on a progressive decline, especially prevalent during the 1990s. This has culminated in *inter alia*, a general shift from extensive field cultivation to intensive home garden cultivation, a factor that has been generally noted on literature writing on

livelihoods in rural South Africa. This has further modified the practice from terracing to keyhole and trench beds. The purpose of keyhole and trench beds, as with terraces, is to manage water and soil in order to ensure crop production.

This continuity suggests that the practice of stone terracing is sustainable. First, it is a local innovation, initiated by men and women with a long history of interaction with their environment (Oweis et al., 2004). It has become socially embedded in the livelihoods culture of the local people. Second, the practice is a simple technology that uses locally available resources such as stones. This has enabled even poor households to adopt and use it.

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

Introduction

This chapter synthesises some observations and facts that have been stated in the broader research. These syntheses therefore provide scope for evaluation of research findings and a basis for further suggestions. The research has looked at how stone terracing has been used to sustain crop cultivation in the Gogela settlement. The theme has been placed in the broader context of cultivation and conservation among small-holder cultivators in the Transkei. In doing this, the notion of sustainable livelihoods has been used theoretically to inform the research.

Syntheses and Conclusions

The research has drawn cases of cultivators using stone terracing from several counties of Africa including Ethiopia, Burkina Faso, Morocco, Tanzania, Zimbabwe and South Africa. These cases have revealed a number of aspects and dynamics associated with stone terracing. First, literature reveals that the practice has been in use for as far back as pre-colonial times at least in countries that include Morocco, Tanzania and Zimbabwe. Stone terracing is therefore

widely recognised as a historical or local practice in Africa. In this study, local knowledge has been used to denote practices that are initiated by local men and women with a long history of interaction with their internal environment.

As highlighted in the literature, in cases that include Inyanga of Zimbabwe and Engaruka of Tanzania, there have been debates over whether or not the practice was invented by local people. Again, in this research, the concept of historical knowledge has been used in a dynamic fashion; one that includes adaptation and indigenisation of externally innovated practices.

Second, stone terracing is used as a means and practice to adapt to local environments. Under literature review, the study has identified several cases in which cultivators are farming on hilly stony lands. Removal of stones in such cases is meant to create cultivable land. Stacking the stones in linear terraces serves to prevent soil from being washed down slope by run-offs. This simultaneously serves a water conservation purpose, and it has significantly increased crop productivity. The fact that terraces arrest run-off often laden with top-soil and debris, forcing it to stagnate and deposit the load on the field, enhances soil fertility.

The study has established that stone terracing was initiated by the local residents in Gogela. The practice can be from the late 19th century with the beginning of settlement in the area. It began as an adaptation to the local environment that is characterised with hilly and stony terrain. These characteristics militate against optimum crop productivity. Availability of stones in excessive quantities does not only make cultivation difficult but also limits the quantity of soil available to support plant growth. Hilly topography facilitates loss of water through run-off. As run-off gravitates down slope, it carries with it some top-soil and this causes soil erosion.

This then leads to at least two conclusions. First, stone terracing is a traditional practice innovated by local farmers after identifying their livelihood needs and attendant challenges. Through interviews farmers in Gogela reported that stone terracing is practised mainly to conserve soil and water for purposes of crop cultivation. This critically speaks to both the theoretical framework and methodology used in this particular research.

The concept of sustainable livelihoods is people-centered. It gives the ordinary people space to identify their own needs and the means they use to achieve them. Qualitative methodology used to collect information is complimentary to the theoretical framework in that it proceeds from the notion of multiple realities. This

opened space to ordinary small-holder croppers to narrate their farming experiences and how they use stone terracing. For this reason, the facts found, and conclusions reached in this research were not built on the researcher's pre-conceived knowledge, but on the informants' reported experiences, perceptions and practices.

Second, stone terracing is a sustainable livelihood activity. This has been established mainly by the survival and continuity of the practice since the late 19th century to the present. The practice needs simple technology including pickaxes and iron bars to construct. These tools are generally cheap and accessible to ordinary farmers. Additionally, stone terracing uses locally available resources, stones, to construct. This is relevant to the theory of sustainable livelihoods that emphasises local assets and capabilities in pursuit of a livelihood activity. The theory proposes that in order for a livelihood to be sustainable, it should use assets that are accessible and affordable to the practitioners. Moreover, the livelihood has to be practised using locally understood knowledge.

Use of local knowledge in stone terracing has been critical in the continuity of the practice in Gogela. As has been established in chapter four, stone terracing is a continuous process. It involves constant repairing and adjustment of the terraces.

This has been easy to do in Gogela because the knowledge required is locally known and has been part of livelihood culture for a long time.

Corollary to this is modification and adaptation that stone terracing has under gone over years in the area. As has been shown in chapter four, the practice started as mounds of stones removed from the ground to stone terraces supporting crop cultivation in fields, to garden keyholes and trench beds supporting vegetable production gardens. These modifications have been taking place as adaptations to changing dynamics of local cultivation practices. This development demonstrates the sustainability and perseverance of local knowledge in addressing environmental challenges.

Survival and continuity of stone terracing has been fundamentally dependent on how households sustain and transfer knowledge from one generation to the other. As indicated, stone terracing is a local practice. Therefore knowledge associated with it is not exclusive to a particular segment of technocrats. Although it is mainly men that construct terrace structures, children and women get involved in auxiliary duties. This enables them to get the knowledge through both observation and participation.

Survival of stone terracing for over a century in this settlement suggests that it is beneficial to crop cultivators. Chapter four has demonstrated that the practice is useful in conserving soil and water in croplands. This helps retain moisture and enhance soil fertility. In turn, this enhances crop productivity and hence promotes continuity of cultivation livelihood in the area. Terracing also influences planting of fruit-trees. Removal of stones creates soil deep enough to support trees' long roots. This helps diversify households' livelihood bases.

The tale of the emergence and continuation of stone terracing in Gogela is significant to the broader conservation history of the Transkei. Chapter three has shown that official records have paid minimal attention to local communities' conservation knowledge and practices. Conservation history in the region has largely been state-centered. The history of stone terracing in Gogela in particular, provides a case to argue that local communities have historically been practising conservation cultivation. This history needs to be recorded and celebrated.

Nevertheless, stone terracing is not fool-proof. In terms of water conservation, the practice has a number of limitations. First, it is an in-situ conservation technique and practice and thus only stores water in the soil profile. This limits the amount of water it can capture and store at a time. For this reason, stone terracing can not alleviate water shortages during non-rain seasons or in

prolonged dry-spells. Resultantly, the practice does not have significant influence in crop seasonality in the area. It simply helps sustain crops that are planted in the rainy and mostly summer season.

Second, the removal of stones makes soil loose, and hence susceptible to soil erosion. As a result, top soil from the upper parts of terraced fields gets eroded and deposited on the bottom half of the fields. This unevenly distributes fertility on the same cropland. Farmers in Gogela have responded by confining cultivation to this fertile bottom half leaving the upper part uncultivated. This does not only reduce cultivation land, but it also significantly reduces harvest.

These limitations may be some of the reasons to explain the continuing decline of cultivation livelihoods in Gogela inspite of having a long tradition of conservation cultivation. As has been shown in chapter three, the broader Transkei region has been undergoing a progressive influx in crop cultivation since the mid 20th century. The terraced fields of Gogela have not been significantly exceptional.

Suggestions

Researchers and academic institutions need to document and celebrate these particular historical and local knowledge practices. This helps reconstruct the past and even revive dying traditions. This becomes more critical in this 21st century era when the development community is largely disillusioned by externally innovated knowledge and practices. The on-going, widespread call to promote local and historical knowledge may not be fully realised until enough research is done on cases of this knowledge system.

Comprehensive study projects of local innovations have the potential to reveal both strengths and weaknesses of these practices. This helps institutions identify appropriate intervention strategies in promoting local livelihoods. In the case of Gogela, a simple practice—stone terracing, has been instrumental in the continued practice of environmental adaptation and sustenance of rural livelihoods.

Findings from this study may not indiscriminately apply over different spaces. This is an intensive case study researching on environmental management practices on a particular geographical space. The findings and conclusions may be applicable beyond the study area only on a theoretical point of view. Yet they

are significant to be noted and disseminated for use to other rural South African settlements.

APPENDICES

Appendix A: Open-ended Interview Questions

(a)

- When did settlement begin in Gogela?
- Who are the first group of people (ethnic groups) to settle in Gogela?
- What were the reasons of their settlement in Gogela, and not settling somewhere else?
- Was cultivation an important component of their livelihood activities?
- How was cultivation practised at the beginning of settlement in Gogela?
- How has crop cultivation modified since the beginning of settlement to the present?

(b)

- How did stone terracing begin in Gogela?
- When, and how did you start stone terracing, as a household?
- What were the reasons of starting stone terracing?
- What tools are used when constructing terraces?
- Has terracing changed or modified in any way since its beginning till the present?
- What contribution does stone terracing make to soil conservation?

- Do you have any knowledge about what good or bad cultivation soil is?
- If yes, do you notice any signs that show that terracing makes good or bad cultivation soil?
- What are these signs?
- How does terracing contribute to water conservation?
- Does this enhance crop productivity in any way?

(c)

- What people make up the household in terms of gender and age?
- What are the socio-economic characteristics of the household?
- What are the life histories of the household-heads?
- Have the households been introduced to any other soil and water conservation practice?
- How do households manage to pass terracing knowledge from generation to generation?
- Who are the key role players in imparting and sustaining knowledge regarding stone terracing and crop cultivation in Gogela?
- Has stone terracing enhanced cropping diversity, seasonality and quality, and to what extent does this contribute to household livelihoods in Gogela?
- What are the problems found in practicing stone terracing?

Appendix B: Observation Schedule

Terrace height	
Spacing distance between terraces on the same cropland	
Terrace length	
Lands associated with terracing, general topography, state of stoniness,	
Plants common on terraced fields, eg perennial like fruit trees, and seasonal crops	
Soil appearance on terraced fields eg. of erosion,	
Signs of water retention, eg presence of water-demanding plants like fruit trees, vegetables	
State of terraces, eg intact appearance, loose, moribund	
Any other relevant features	

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Oral Sources

Mr. J. Dlamini, (an expert in terracing who usually gets hired to terrace some people's fields) October 13, 2009.

Mr. M. Gogela (the chief of Gogela settlement) February 12, 2008.

Mrs. Y. Gogela (a 70-year old widow) October 8, 2009.

Ms. Z. Johanes (an 87-year old single mother and retired teacher) October 16, 2009.

Mrs. N. Jola (her fields are unterraced on the gentle Umzimvubu river valley) October 9, 2009.

Mr. X. Jwili (a prosperous farmer with well terraced fields) October 7, 2009.

Ms. S. Magwaza (a former seasonal worker) October 17, 2009.

Mrs. J. Makhalane (has shifted from field to garden cultivation) October 14, 2009.

Ms. X. Mankanku (a village coordinator of Abalimi Phambili Programme) October 18, 2009.

Mr. Y. Mankanku (Lima Project Manager) February 10, 2008.

Mr. L. Maphamela (Lima Extension Officer) October 13, 2009.

Mr. B. Mbunjana (Lima Extension Officer) October 19, 2009.

Ms. G. Mbunjana (has shifted from field to garden cultivation) October 16, 2009.

Mrs. B. Mfazwe (a Village Development Coordinator who has shifted from field to garden cultivation) October 8, 2009.

Ms. E. Mgwabashe (abandoned cultivation, and has now resorted to trading at the local business center) October 10, 2009.

Ms. M. Mtambo (a 76 year-old widow whose family was among the first group to

settle in Gogela) October 14, 2009.

Mr. H. Mzinyathi (a well-to-do farmer who holds about three hectares of arable land) October 16, 2009.

Mr. N. Ndimandi (a 90 year-old man who spent most of his life as a migrant worker in Johannesburg) October 5, 2009.

Mrs. T Ndlovu (a housewife, her husband is a migrant worker in Durban) October 18, 2009.

Mr. L. Ngcobo (his parents settled in Gogela soon after the Anglo-Boer War) October 7, 2009.

Mrs. B. Ngxabi (a prosperous farmer, her husband is a migrant worker in Kokstad town) October 17, 2009.

Mr. N. Nduku (an 82 year-old man [illegible] family is one of the pioneers in the area) October 13, 2009.

Ms. B. Nxakweni (a Community Development Coordinator) February 11, 2008.

Ms. H. Nyameko (89 year-old widow) October 7, 2009.

Ms. G. Phetshula (a single-mother who does terracing by her self due to lack of male work-force) October 10, 2009.

Ms. Qungule (a single mother, she has abandoned half her field due to stray animals) October 18, 2009.

Mr. V. Sibiya (settled in Gogela in 1949) October 15, 2009.

Mr. D. Zondi (a retired teacher) 5 October 5, 2009.