

Livelihoods and natural resource use along the rural-urban continuum

A thesis submitted in fulfilment of the
requirements for the degree of

Master of Science

of

Rhodes University



By

Catherine Dale Ward

February 2012

Abstract

Over the last century, developing countries have undergone rapid urbanisation resulting in marked social, economic and environmental changes. Africa is the least urbanised continent in the world but trends indicate that it is also the most rapidly urbanising region, accompanied by rising urban poverty. Urbanisation processes are often most pronounced in smaller urban centres since they experience the most severe pressures of population growth. Little is known about the role natural resources play along the rural-urban continuum and even less is known about the contribution of these resources within an urban context, particularly in small urban centres. In many sub-Saharan African cities, urban agriculture (the informal production of food in urban areas) has been used as a strategy to cope with increasing poverty levels but its role remains widely debated and uncertain. This thesis seeks to analyse the impacts of urbanisation on livelihoods and natural resource use, including home gardening and the collection of wild resources, in two South African towns and data was collected along the rural-urban continuum in Queenstown (Eastern Cape province) and Phalaborwa (Limpopo Province). Practices and contributions associated with agriculture and wild resource use were found to be significantly higher in Phalaborwa and this could be attributed to favourable environmental conditions and accessibility to wild resources due to the surrounding Mopani Bushveld. Rural households in Queenstown and Phalaborwa were more reliant on natural resources than their urban counterparts, but still diverse and incorporated a number of land-based and cash income generating strategies. Urban households tended to rely on one primary cash income strategy such as wage employment or state grants. However, natural resources did appear to play a subtle role in urban settings and particularly in the townships, where exclusion of natural resource contributions saw poverty levels increase up to 5 %. Home gardening was practised by a wide range of people and not restricted to any one income group and, not surprisingly, wealthy cultivators who had access to resources such as land, water and fertilizer enjoyed increased benefits such as high produce yields. The results obtained suggest that rural-urban dynamics are complex and natural resource use in local livelihoods is contextualised within environmental settings, social preferences and historical contexts. Increasing pressures from the influx of people into small urban centres calls for a better understanding to how these processes are affecting livelihoods and natural resources to ensure sustainable management in the future.

Livelihoods and natural resource use along the rural-urban continuum

A thesis submitted in fulfilment of the
requirements for the degree of

Master of Science

of

Rhodes University



By

Catherine Dale Ward

February 2012

Declaration

The following thesis has not been submitted to a university other than Rhodes University, Grahamstown, South Africa. The work presented here is that of the author unless otherwise stated.

Abstract

Over the last century, developing countries have undergone rapid urbanisation resulting in marked social, economic and environmental changes. Africa is the least urbanised continent in the world but trends indicate that it is also the most rapidly urbanising region, accompanied by rising urban poverty. Urbanisation processes are often most pronounced in smaller urban centres since they experience the most severe pressures of population growth. Little is known about the role natural resources play along the rural-urban continuum and even less is known about the contribution of these resources within an urban context, particularly in small urban centres. In many sub-Saharan African cities, urban agriculture (the informal production of food in urban areas) has been used as a strategy to cope with increasing poverty levels but its role remains widely debated and uncertain. This thesis seeks to analyse the impacts of urbanisation on livelihoods and natural resource use, including home gardening and the collection of wild resources, in two South African towns and data was collected along the rural-urban continuum in Queenstown (Eastern Cape province) and Phalaborwa (Limpopo Province). Practices and contributions associated with agriculture and wild resource use were found to be significantly higher in Phalaborwa and this could be attributed to favourable environmental conditions and accessibility to wild resources due to the surrounding Mopani Bushveld. Rural households in Queenstown and Phalaborwa were more reliant on natural resources than their urban counterparts, but still diverse and incorporated a number of land-based and cash income generating strategies. Urban households tended to rely on one primary cash income strategy such as wage employment or state grants. However, natural resources did appear to play a subtle role in urban settings and particularly in the townships, where exclusion of natural resource contributions saw poverty levels increase up to 5 %. Home gardening was practised by a wide range of people and not restricted to any one income group and, not surprisingly, wealthy cultivators who had access to resources such as land, water and fertilizer enjoyed increased benefits such as high produce yields. The results obtained suggest that rural-urban dynamics are complex and natural resource use in local livelihoods is contextualised within environmental settings, social preferences and historical contexts. Increasing pressures from the influx of people into small urban centres calls for a better understanding to how these processes are affecting livelihoods and natural resources to ensure sustainable management in the future.

Table of Contents

	Page
Declaration	ii
Abstract	iii
Table of Contents	iv
List of Figures	viii
List of Tables	ix
List of Abbreviations	xi
Acknowledgements	xii
Chapter One: Introduction	1
1.1 Global urbanisation patterns	1
1.1.1 Effects of Urbanisation	2
1.1.2 Urbanisation trends in sub-Saharan Africa	3
1.2 Rural-urban interface	4
1.3 Livelihoods and natural resources	6
1.3.1 Rural context	6
1.3.2 Rural-urban context	7
1.3.3 Urban context	8
1.4 Feast to famine: The role of agriculture	9
1.4.1 Food security	9
1.4.2 Agriculture's role in food security	11
1.4.3 Urban agriculture in South Africa	13
1.5 Sustainable livelihoods	14
1.6 Situating this thesis	17
1.6.1 Objective	18
1.6.2 Key Questions	18
1.7 Structure of thesis	19
Chapter Two: Study Area	20
2.1 Introduction	20
2.2 Queenstown: Eastern Cape province	21
2.2.1 Chris Hani District Municipality	21
2.2.2 Lukhanji Local Municipality	22

2.2.3	Queenstown	22
2.3	Phalaborwa: Limpopo Province	23
2.3.1	Mopani District Municipality	24
2.3.2	Ba-Phalaborwa Local Municipality	25
2.3.3	Phalaborwa	25
Chapter Three: Livelihoods and natural resource use along the rural-urban continuum in Queenstown and Phalaborwa		27
3.1	Introduction	27
3.2	Methods	29
3.2.1	Approach	29
3.2.2	Framework	30
3.2.3	Data collection	31
3.2.4	Data analysis	33
3.2.4.1	Creating livelihood portfolios	34
3.2.4.2	Analysing livelihood portfolios	36
3.2.4.3	Spatialising livelihood strategies	37
3.2.4.4	Calculating poverty levels	37
3.3	Results	38
3.3.1	Household attributes along the continuum	38
3.3.2	Natural resource use along the continuum	40
3.3.2.1	Agriculture	40
3.3.2.2	Livestock	41
3.3.2.3	Wild natural resources	41
3.3.3	Cash income streams along the continuum	43
3.3.3.1	Queenstown	44
3.3.3.2	Phalaborwa	44
3.3.4	Relative contribution of natural resources to livelihood portfolios	45
3.3.4.1	Queenstown	46
3.3.4.2	Phalaborwa	47
3.3.5	Livelihood relationships along the continuum	48
3.3.5.1	Queenstown	48
3.3.5.2	Phalaborwa	49
3.3.6	Livelihood classes along the continuum	50
3.3.6.1	Queenstown	52
3.3.6.2	Phalaborwa	52

3.3.7	Livelihoods and poverty	55
3.4	Discussion	57
3.4.1	Household attributes along the rural-urban continuum	57
3.4.2	Natural resource use	58
3.4.2.1	Agriculture	58
3.4.2.2	Livestock	60
3.4.2.3	Wild natural resources	61
3.4.3	Cash income streams	63
3.4.4	Livelihood portfolios along the continuum	64
3.4.5	Spatialising livelihood strategies	65
3.4.6	Livelihoods, poverty and natural resources	67
 Chapter Four: Home gardening along the rural-urban continuum in two South African towns		 69
4.1	Introduction	69
4.2	Methods	70
4.2.1	Approach	70
4.2.2	Data collection	71
4.2.3	Data analysis	73
4.2.3.1	Creating and analysing a wealth index	74
4.3	Results	75
4.3.1	Extent of agriculture practiced along the continuum	75
4.3.1.1	Queenstown	76
4.3.1.2	Phalaborwa	77
4.3.2	Profile of home cultivators	79
4.3.2.1	Queenstown	79
4.3.2.2	Phalaborwa	80
4.3.3	Range of crops and fruits across the continuum	81
4.3.3.1	Queenstown crops	81
4.3.3.2	Queenstown fruits	82
4.3.3.3	Phalaborwa crops	83
4.3.3.4	Phalaborwa fruits	85
4.3.4	Contribution of home gardening along the continuum	87
4.3.4.1	Queenstown	87
4.3.4.2	Phalaborwa	88
4.3.5	Agricultural contribution in relation to wealth	90

4.4	Discussion	90
4.4.1	Extent of agricultural practices	90
4.4.2	Cultivator profiles	92
4.4.3	Range of crops and fruits	94
4.4.4	The contribution of agriculture along the continuum	96
Chapter Five: General discussion and conclusions		99
5.1	Introduction	99
5.2	Livelihoods along the rural-urban continuum	100
5.3	Livelihoods and natural resource use	102
5.4	The role of home gardening in urbanising livelihoods	104
5.5	Conclusions	106
References		110
Appendices		122
Appendix 1	Livelihoods interview schedule	122
Appendix 2	Wild natural resource identification	143
Appendix 3	Cultivation interview schedule	145
Appendix 4	Significant z-statistic results for crop and fruit types	149

List of Figures

	Page
Figure 1.1 Sustainable Livelihoods Framework	16
Figure 2.1 Study site localities of Queenstown and Phalaborwa in South Africa	20
Figure 3.1 Customised SLF describing potential livelihood portfolios in relation to natural resource use	30
Figure 3.2 Proportion of households (%) using a combination of wild resources in Queenstown and Phalaborwa	43
Figure 3.3 Principle Components Analysis reflecting association between different income streams and household attributes in Queenstown	49
Figure 3.4 Principle Components Analysis reflecting association between different income streams and household attributes in Phalaborwa	50
Figure 3.5 Proportion of households (%) in Queenstown and Phalaborwa in different livelihood classes	52
Figure 3.6 Location of livelihood classes in Queenstown	53
Figure 3.7 Location of livelihood classes in Phalaborwa	54
Figure 4.1 Proportion of respondent households (%) engaged in agricultural activities in Queenstown and Phalaborwa	75
Figure 4.2 Clustered dendrogram of households in Queenstown growing crops with no clear patterns emerging along the continuum	81
Figure 4.3 Clustered dendrogram of households in Queenstown growing fruits with no clear patterns emerging along the continuum	83
Figure 4.4 Clustered dendrogram of households in Phalaborwa growing crops with no clear patterns emerging along the continuum	84
Figure 4.5 Clustered dendrogram of households in Phalaborwa growing fruits with no clear patterns emerging along the continuum	86
Figure 4.6 The combined contribution of crops and fruits in terms of their gross mean annual value (ZAR) per household in Queenstown and Phalaborwa	87
Figure 4.7 The mean annual value (ZAR) per household of crops and fruits in Queenstown	88
Figure 4.8 The mean annual value (ZAR) per household of crops and fruits in Phalaborwa	89

List of Tables

		Page
Table 3.1	Number of respondents per town and zone	32
Table 3.2	Proportion of households (%) engaged in natural resource use in Queenstown and Phalaborwa	40
Table 3.3	Agricultural users across the continuum in Queenstown and Phalaborwa	40
Table 3.4	Livestock users across the continuum in Queenstown and Phalaborwa	41
Table 3.5	Wild resource users across the continuum in Queenstown and Phalaborwa	42
Table 3.6	Types of resources utilised by households engaged in wild resource use	42
Table 3.7	Percentage of households with cash income streams in Queenstown and Phalaborwa	44
Table 3.8	Income stream distribution (%) amongst households along the continuum in Queenstown	44
Table 3.9	Income stream distribution (%) amongst households along the continuum in Phalaborwa	45
Table 3.10	Mean annual livelihood income (ZAR) per household contributions in Queenstown and Phalaborwa	46
Table 3.11	Mean annual percentage (ZAR) contributions per household of livelihood incomes in Queenstown	47
Table 3.12	Mean annual percentage (ZAR) contributions per household of livelihood incomes in Phalaborwa	48
Table 3.13	The percentage contribution of different sources for each livelihood class from Queenstown and Phalaborwa combined (n = 245)	51
Table 3.14	Proportion of households (%) under the poverty line in terms of their total income with and without wild and/or domestic natural resource use income	55
Table 3.15	The representation of livelihood classes (%) amongst poor households in Queenstown and Phalaborwa	56
Table 4.1	Number of respondents per zone and town	72
Table 4.2	Top five reasons why households did not engage in agricultural activities in Queenstown and Phalaborwa	76
Table 4.3	Proportion of respondent households (%) engaged in crop and fruit production in Queenstown	76
Table 4.4	Significance levels between crop and fruit production in Queenstown	77
Table 4.5	Proportion of respondent households (%) engaged in crop and fruit production in Phalaborwa	78
Table 4.6	Significance levels between crop and fruit production in Phalaborwa	78

Table 4.7	Differences in the proportion of households (%) growing selected crops and fruits in Queenstown	82
Table 4.8	Differences in the proportion of households (%) growing selected crops and fruits in Phalaborwa	85
Table 4.9	Mean direct use and sale annual values (ZAR) per household for crops and fruits in Queenstown	88
Table 4.10	Mean direct use and sale annual values (ZAR) per household for crops and fruits in Phalaborwa	89
Table 4.11	Average household wealth index along the continuum in Queenstown and Phalaborwa	90
Table 5.1	Generalised differences along the rural-urban continuum in Queenstown and Phalaborwa	107

List of Abbreviations

AFSUN	African Food Security Urban Network
CBD	Central Business District
CSIR	Council for Scientific and Industrial Research
DFED	Department of Finance and Economic Development
GIS	Geographical Information System
GPS	Geographical Positioning System
HKI	Helen Keller International
IDP	Integrated Development Plan
IFPRI	International Food Policy Research Institute
LUNA	Livelihoods, Urbanisation, Natural resources in Africa
NGO	Non-governmental organisation
NTFPs	Non-timber forest products
OECD	Organisation for Economic Co-operation and Development
PCA	Principle Components Analysis
SACN	South African Cities Network
SASSA	South African Social Security Agency
SDF	Spatial Development Plan
SLF	Sustainable Livelihoods Framework
Stats SA	Statistics South Africa
UNFPA	United Nations Population Fund
UN-HABITAT	United Nations Human Settlements Programme
UNPD	United Nations Population Division
USA	United States of America
ZAR	South African Rand

Acknowledgements

Firstly, I would like to thank the Queenstown and Phalaborwa communities who participated in this research – all the people who let me into their homes and gave up their time to participate in my study. I would like to personally thank Alan and Bev Marsh, Jacques and Sue Morel, Mr C.K. Joseph and the Phalaborwa SANParks team for always assisting me without hesitation. I would also like to thank my translators – Sean, Luthando, Lundi, Bongani, David, Petunia and Inocentia for the laborious task of many hot and cold days walking from house to house, conducting interview after interview.

I would like to acknowledge my supervisor, Professor Charlie Shackleton, and co-supervisor, Ms Gillian McGregor, for their advice, support and enthusiasm throughout this project for which I am extremely grateful. I would also like to acknowledge Muhammad Jamal for his invaluable contribution to the statistical analyses for this thesis and Dr James Gambiza for his assistance with some analyses. I am thankful to the LUNA project for giving me the opportunity to conduct the research described in this thesis and financial support from the VW Foundation and DAAD is gratefully acknowledged. I would also like to thank the people in the Environmental Science Department at Rhodes University for their assistance with my many requests.

Finally I would like to thank my partner Sunny for his patience, wisdom and phenomenal formatting skills; my mother Vivienne for her thorough editing of this thesis; my father John for lending me his social networks; my family for their continued support; John Mendelson for sharing his vast knowledge on related topics; and my friends for lending a sympathetic ear and good Friday company. Thank you.

Chapter One

Introduction

1.1 Global urbanisation patterns

The world is rapidly evolving into a new age of human society and Burgess *et al.* (1997) emphasise this point by noting that people find themselves in an age of “profound technological, social, economic and political change, and that this process of change is accelerating” (Burgess *et al.* 1997: 3). The world population in 2011 is an estimated seven billion with the majority of population growth concentrated in the world’s poorest countries (Haub & Gribble 2011). Rapid urbanisation of the human population is one of the dominant trends shaping and transforming the world, and by 2008 more than half of the world’s total population was urbanised (Burgess *et al.* 1997; UNFPA 2007; World Bank 2009). In the last century, demographic transformation from rural to urban areas was largely concentrated in regions of Europe, North America and Latin America (UN-HABITAT 2006). However, the current demographic transformation has shifted to developing countries where approximately 90 % of urban growth occurs within these regions (World Bank 2009). Africa has experienced the highest urbanising rates over the last four decades, and it has been predicted that urban populations in Africa and Asia alone will double in the next 20 years (Bhattacharya 2002; World Bank 2009).

Human settlement has always been influenced by the opportunities different areas have to offer. For example, after sedentary agriculture came into existence people settled according to the availability of arable land (UNPD 2008). In modern history, the mechanisation of production through the industrial revolution resulted in an influx of people from rural into urban centres, thus increasing urbanisation levels throughout the world (UNPD 2008). Urbanisation is described as the “concentration and intensification of human life and activity” (Jaquinta & Drescher 2000: 3), which is not a homogenous process and varies between nations and even regions within countries (Millennium Ecosystem Assessment 2005). There are many factors which influence the increase of a country’s urban population, such as natural growth within urban centres; the reclassification of rural areas; and net migration between rural and urban areas, or even between different countries (Bhattacharya 2002; UNPD 2008). Highly urbanised countries tend to have natural growth rates as the primary reason for their urban population increase, whereas less urbanised regions are predominately influenced by rural-urban migration patterns (Bhattacharya 2002). Sub-Saharan Africa owes the majority of its urban population growth to migration, whilst Latin America experiences the majority of its urban expansion through natural increase rates (Bhattacharya 2002).

1.1.1 Effects of urbanisation

Urbanisation trends have resulted in the formation of metacities, which are massive urban agglomerations comprising of more than 20 million people and mainly found in developing countries of Asia, Latin America and Africa (UN-HABITAT 2006). However, these metacities have a relatively slow growth rate and only house 4 % of the world population (UN-HABITAT 2006). The majority of urban migrants are moving to smaller urban settlements and cities of 500 000 inhabitants or less now host around 52 % of the world's urban population (UN-HABITAT 2006; World Bank 2009). Economic, social and environmental consequences of urbanisation are often most pronounced in relatively small cities in very poor countries as they experience the most severe pressures of population growth (Drakakis-Smith 1995). Yet these smaller cities and towns have largely been neglected in urban studies (Nel & Rogerson 2007; Nel *et al.* 2011). Whilst urban areas only account for 2.8 % of the Earth's land share, urbanisation has dramatically altered human ecology and urban areas are predominately sites of consumption (Millennium Ecosystem Assessment 2005).

The expansion of cities and urban areas has caused the extreme alteration of natural environments and how people function within them (Smith *et al.* 2005). It has been noted that many ecosystems within urban areas are diverse and can provide food, water, psychological and spiritual value if well managed (Millennium Ecosystem Assessment 2005). Urbanisation can provide opportunities for social and economic progress which is not only confined within city limits (Lundqvist *et al.* 2003). For example, urban dwellers generally have higher incomes in comparison to their rural counterparts, as well as better access to services such as education and health (UNPD 2008). The UNPD (2008) argues that to pursue sustainable development, it may be necessary to continue the urbanisation of the world population. Urban settlements have the potential to manage and regulate social and environmental issues as producers, consumers, businesses, polluters and resource users are concentrated into one area (UNPD 2008). "Countries with higher levels of urbanisation tend to have higher per capita incomes, more stable economies and stronger political institutions" (UNPD 2008: 4).

However, urbanisation is not always associated with positive impacts such as economic growth and, for example, in Africa it appears to be decoupled from economic development to a large extent (Cohen 2004). Urbanisation has also had numerous unfavourable effects related to environmental degradation and poor living conditions for some urban dwellers. Unfavourable environmental effects include the loss and fragmentation of habitats, creation of artificial habitats, the alteration of resource flows, temperature change, air and water degradation, and alteration of species composition and diversity (Smith *et al.* 2005; Tratalos *et al.* 2007). "An outstanding feature of urban population growth in the 21st century is that it will be composed, to a large extent, of poor people." (UNFPA 2007: 6). Urban poverty and inequality are fast becoming major issues, particularly within many developing

regions and it is not surprising that urban growth is associated with the development of slums in these regions (UN-HABITAT 2006).

1.1.2 Urbanisation trends in South Africa

Despite being the least urbanised region in the world, sub-Saharan Africa has the highest annual growth rate (4.6 %) globally and is predicted to maintain this trend for several decades (UN-HABITAT 2006; UNFPA 2007). Particular features that characterise urbanisation and migration trends in sub-Saharan Africa are low population density, smaller city dominance and circular migration patterns (UNFPA 2007). Sub-Saharan Africa has the highest rate of slum growth (4.5 %) and many African urban areas have deteriorated over time, thus some of these regions experience the highest levels of urban poverty in the world (UN-HABITAT 2006; UNFPA 2007). Southern Africa is the most urbanised sub-region on the continent, with an estimated 61.7 % of its population living in urban areas (UN-HABITAT 2010). Rural-urban migration remains a prominent characteristic of urbanisation in this sub-region; however inequalities from the colonial and apartheid eras, followed by neoliberal economic policies, continue to shape urban development within southern Africa (UN-HABITAT 2010).

South Africa's population of approximately 50 million is predominately concentrated within the eastern and north-eastern parts of the country (South African Risk and Vulnerability Atlas 2010; Stats SA 2011). South Africa has a range of urban settlements, which consist of metropolitan areas, large cities and large to medium sized towns which make a substantial contribution to the South African economy, as well as provide livelihood opportunities and basic services to millions of inhabitants (van Huyssteen *et al.* 2009; South African Risk and Vulnerability Atlas 2010). More than 70 % of the South African population live in urban areas, from which 90 % of country-wide economic activity is generated (South African Risk and Vulnerability Atlas 2010). Smaller urban centres have been acknowledged on a global scale as important players in urbanisation processes as they absorb more than half of the world's urban population (UN-HABITAT 2006). However, in South Africa, and indeed other parts of the world, these urban centres are often overlooked in favour of larger city centres resulting in the economic decline of small towns with escalating poverty levels (Nel & Rogerson 2007; Nel *et al.* 2011).

South Africa's current migration and urbanisation trends are strongly influenced by the country's historical legacy of apartheid, thus giving urbanisation patterns a distinct racial component which is still reflected in many urban areas (Mears 1997, Kok & Collinson 2006). Inequalities of the past which resulted in discriminatory settlement patterns have created long lasting ill effects on the population distribution (Kok & Collinson 2006). The homeland policies of apartheid trapped many

poor rural people within impoverished rural areas, and has further perpetuated temporary labour migration as people move between rural and urban areas in search of employment (Kok & Collinson 2006). Large urban areas in South Africa have developed and profited from large inflows of low-skilled migrants who work in mining and industrial sectors as diggers, labourers, drivers and security guards (Kok & Collinson 2006). Rural-urban migration patterns in South Africa are usually fluid, with many people returning to rural hinterlands after working in urban areas and this temporary migration is seen as a leading cause of poor urban living conditions due to over-crowding (Kok & Collinson 2006). Increased population pressure has also caused widespread poverty in South Africa, particularly within former homeland and metropolitan areas (South African Risk and Vulnerability Atlas 2010).

Some of the challenges faced by people living in urban areas within South Africa as a result of increased urbanisation and past inequalities include limited access to economic opportunities, secure housing, basic services and social services (South African Risk and Vulnerability Atlas 2010). These inequalities are often further spatially entrenched due to the infamous apartheid legacy of South Africa (South African Risk and Vulnerability Atlas 2010). Poverty is concentrated in low-income and informal settlements in urban areas of South Africa, which are occupied predominately by black people (van Averbeké 2007). However, social and economic conditions have improved in South African cities over the last decade, leaving room for positive change within the urban sphere in the future (SACN 2011). “Cities can be crucibles of enormous creativity and economic dynamism, and also sites of deep social divide, poverty and disadvantage. Looking ahead, cities are critical to the achievement of national environmental objectives, such as reducing greenhouse gas emissions and conserving resources” (SACN 2011: 6).

1.2 Rural-urban interface

Urban and rural areas are often viewed as separate entities, both defined individually in terms of their functions and characteristics – urban areas are associated with industry and technology and rural areas are associated with primary production such as agriculture (Tacoli 2006). However, urban areas are difficult to define as there is no uniform, globally accepted definition to describe the term „urban“ (Cohen 2004; Knuth 2006). Urban areas are usually distinguished from rural areas according to a variety of characteristics making a single global definition insufficient, as it would not fully account for different characteristics within all nations, nor be applicable to all circumstances experienced by different countries (Knuth 2006). In general, urban areas are described by different governments based on one or a mixture of the following criteria: population size thresholds, administrative or political status, and national census data which demarcate urban areas or concentrations of services and infrastructure (Tacoli 2006). However, it is generally agreed that urban areas or agglomerations

(such as cities) have larger population sizes and densities than rural centres or villages (Millennium Ecosystem Assessment 2005).

The increase of urban transformation over the last century has resulted in the emergence of complex settlement systems, blurring the distinction between urban and rural areas (Cohen 2004). “This process of urban growth, largely in non-contiguous transitional zones between countryside and city, is increasingly being referred to as „peri-urbanisation” (UNFPA 2007: 48). New settlement systems and activities have created intersections between cities and rural areas that cannot be clearly defined as one or the other; yet contain elements of both traditional urban and rural areas (Cohen 2004). The concept of peri-urban was created due to limitations of urban and rural terminology to describe the interface between these two areas (Jaquinta & Drescher 2000). In conventional terms, peri-urban areas describe the „no man’s land” as it has a mixture of urban and rural characteristics. For example, peri-urban areas can be associated with increasing population size which is an urban characteristic; however the same areas can also engage in activities such as agriculture, which is viewed as a rural characteristic.

Most small urban centres in low to middle income countries are associated with having a mix of both urban and rural characteristics (Satterthwaite 2006). Rural, peri-urban and urban environments frequently interact along a continuum which is dynamic and transformative (Jaquinta & Drescher 2000). As such, urban and rural areas are linked through the flow of people and goods, money and information, as well as social exchanges that encourage socio-economic and cultural transformation (Agergaard & Birch-Thomsen 2006; Tacoli 2006). Peri-urban areas host a variety of activities from farming, husbandry, cottage industries to industrial expansion, residential urbanisation and waste disposal (UNFPA 2007). These areas can deliver goods such as food, energy, water and building materials, as well as ecological services such as wildlife corridors, green spaces, microclimates and buffer areas against flooding (UNFPA 2007). Peri-urban areas usually fall beyond legal and administrative boundaries of urban centres causing unplanned, informal and often illegal urban development, for example poor practices associated with water and sanitation for peri-urban consumers (UNFPA 2007).

The term „desakota” was coined as a result of merging urban and rural zones in Pacific Asia, where these areas are predominately engaged in cultivation activities with a rural appearance, however the dominant source of income is non-agricultural (Cohen 2004). Desakota refers to “closely interlinked rural/urban livelihoods, communication, transport and economic systems” (Moench & Gyawali 2008: 2) and there is increasing recognition that livelihoods in the developing world are organised along informal social networks which blur the rural-urban divide (Naude *et al.* 2008). For example, Satterthwaite (2006) points out that in many nations rural households often rely on non-agricultural

employment opportunities to reduce rural poverty, whilst agricultural practices in urban areas also contribute to diversifying livelihood income strategies for the poor (Satterthwaite 2006; Hebinck & Shackleton 2011). As noted by the IFPRI (2005), livelihood strategies are not static and evolve according to opportunities and constraints that emerge from the growth of towns and cities, as well as the increasing complexity of the rural environment.

1.3 Livelihoods and natural resources

All people are dependent on ecosystem services – whether they are city dwellers who procure their food and water indirectly from outside ecosystems, or rural inhabitants that supply their needs directly from their natural environment (Biggs *et al.* 2004). Ecosystem services are defined as benefits that people derive from ecosystems, which range from food, timber and water to soil fertility, climate regulation and cultural values (Biggs *et al.* 2004). Livelihoods are basically described as a means of gaining a living which meets individual and community needs, linked either directly or indirectly to ecosystem services and natural resources (Chambers & Conway 1991; Dovie *et al.* 2003). Livelihood strategies are influenced by household characteristics, composition, decision making and social networks, and the diversification of assets is viewed as the key to procuring a sustainable and healthy living (Barrett *et al.* 2001; Dovie *et al.* 2003).

1.3.1 Rural context

Rural households often draw on diverse strategies to procure a living and land-based activities such as subsistence agriculture, livestock husbandry and wild resources contribute significantly to rural livelihoods (Shackleton *et al.* 2001). In developing regions such as Saharan Africa, rural household income is closely related to the utilisation of natural resources (Campbell *et al.* 2002). Natural and semi-transformed environments can provide an array of goods and services to rural communities such as fuel wood, wild herbs, wild fruit, wild animals and medicinal plants which are used to meet basic needs such as food provision, contribute to livelihood security by providing an income source through trade, as well as act as safety nets in times of hardship (Campbell *et al.* 2002; Shackleton & Shackleton 2004). Specific natural resources, such as wild edible herbs, have a high vitamin and nutrient value and can make an important contribution towards a balanced diet in resource poor communities (Shackleton *et al.* 1998).

It is well documented that people make use of biological products harvested from the wild (also disturbed areas or agro-ecosystems), which are referred to as non-timber forest products (NTFPs) (Shackleton & Shackleton 2004; Shackleton *et al.* 2007a). These NTFPs (for example land, water,

forests, fisheries, etc.) are used by the majority of rural dwellers in the developing world, estimated to make up some 1.6 billion people, to enhance livelihood security through diversifying strategies (Baumann 2002; Shackleton 2005; Shackleton *et al.* 2007a). The function of natural resources in rural livelihoods can be grouped according to contribution: direct consumption or use by the household; a mainstream or supplementary income generation; as safety nets or buffers in times of adversity; and cultural and spiritual functions (Cocks *et al.* 2003; Shackleton & Shackleton 2004; Shackleton 2005). The use of NTFPs in rural communities also fosters the development of social networks and encourages the transfer of old traditions to younger generations (Shackleton *et al.* 2007a).

In recent decades, numerous studies have taken an interest in the role natural resources play in rural livelihoods within a developing country context, particularly within the context of poverty alleviation strategies and policies (Shackleton *et al.* 2008). Access to natural resources by the rural poor has been examined by Baumann (2002) from a global perspective with examples predominately from developing countries. Barrett *et al.* (2001) explore conceptual issues surrounding livelihood diversification in rural Africa with reference to policy implications for the rural poor. Jumbe *et al.* (2008) focus on forestry in Zambia as this natural resource plays an important role in rural livelihoods. The importance of natural resources used within rural communities in a South African context has been well documented (Cousins (1999); High & Shackleton (2000); Shackleton *et al.* (2001); Shackleton *et al.* (2002), Shackleton & Shackleton (2004), Dovie *et al.* (2005); Paumgarten (2005); Shackleton (2005), Hajdu (2006); and Shackleton *et al.* (2007a).

1.3.2 Rural-urban context

Whilst there is a growing body of knowledge on rural livelihoods and their association with natural resources, there are significant gaps in research regarding the link between livelihoods and natural resources within an urban context. Some research acknowledge the rural-urban link in the use and trade of natural resources. For example, Shackleton *et al.* (2001) mention the sale of natural resources from rural areas to urban and peri-urban households and the implications of these transactions. In another study, it was found that the diversification of rural livelihoods in southern Africa included multiple farm activities as well as non-farm activities, such as informal trading (in wild plants for example) or participating in urban-based employment (Wiersum & Shackleton 2005). In some instances, as much as one-third of rural income can be derived from non-farm sources in sub-Saharan Africa (Baker 1990). From a rural perspective, the diversification of livelihoods is due to the incorporation of rural areas into outside commercial networks, hence strengthening the links between rural and urban areas (Wiersum & Shackleton 2005).

To a large extent poverty has been discussed from a rural perspective; however urbanisation trends are shifting the locus of poverty from rural into urban domains in the developing world – particularly in Africa (Ambrose-Oji 2009). “As in rural areas, urban households seek to mobilize resources and opportunities and to combine these into a livelihood strategy” (Foeken & Owuor 2008: 1978). At the rural-urban interface in Tanzania, Baker (1995) found that rural and urban households which adopted a range of both rural and urban based activities as part of their livelihood strategies were more secure than those who focused on just one alone. In Botswana, rural attitudes and assets were retained in cities along with close links to migrant home villages (Kruger 1998). This is a common practice throughout sub-Saharan Africa (Tacoli 2006; Hebinck & Lent 2007; de Wet 2011). Urban livelihood practices in sub-Saharan Africa have increasingly incorporated urban farming into survival strategies (Crush *et al.* 2010). However, the urban poor are also increasingly reliant on rural food resources as a coping strategy (Foeken & Owuor 2008). “Whilst the persistence and adaptation of rural-urban interrelations as an integrated part of the urbanisation process in sub-Saharan Africa has been widely recognised, their impact on urban livelihoods has received little consideration” (Kruger 1998: 134).

1.3.3 Urban context

Natural resources potentially represent important livelihood assets, particularly in poor households, yet little attention has been paid to the contribution of natural resources within an urban setting, even though they can play a key role in urban livelihoods (Slater & Twyman 2003; Davenport *et al.* 2011). Whilst the contribution from natural resources is presumed to be small, they potentially play a significant role in urban livelihoods, particularly amongst the urban poor (Slater & Twyman 2003; Davenport *et al.* 2011). Natural resources usually form part of „hidden“ livelihoods within urban areas as many “NR (natural resource)-dependent activities are not recognised, or are overlooked, in assessments of urban livelihoods” (Slater & Twyman 2003: 2). The deconstruction of rural, peri-urban and urban concepts has led to the recognition of the fluidity and mobility of these areas and the assumed predominant activities over space and time. As livelihoods evolve along the rural-urban continuum as part of the dynamic process of urbanisation, the use of natural resources will evolve within urban contexts and be affected by factors such as the access to land, education, length of stay in an urban area, links to rural homesteads and involvement in the formal urban economy (Iaquinta & Drescher 2000).

People living in urban areas are predominately reliant on the cash economy as a means to procure a living, whilst rural dwellers combine subsistence and income earning activities (Slater & Twyman 2003). Even though the cash economy is central to urban livelihoods, the urban poor can make use of a wide range of natural resources either directly or indirectly to contribute to their livelihoods (Slater & Twyman 2003). The use of natural resources within an urban context can diversify livelihood

strategies as poor households use these resources either directly for consumption or indirectly to generate income (Stoian 2005). There are numerous strategies for livelihood diversification within urban areas such as urban agriculture, forestry, aquatic production, horticulture and livestock keeping in urban areas (van Veenhuizen 2006). Urban space is a key resource for people who engage in activities related to natural resource use and has tangible benefits such as fuel, fodder, food and building materials (Knuth 2006). Issues around access or tenure to land within urban settlements tend to impact activities associated with natural resource use, such as agricultural production (Gordon *et al.* 2000). Access to water has also been pointed out as an issue by Gordon *et al.* (2000), particularly in the context of urban poverty as it affects livelihood activities associated with domestic use and irrigation.

In many sub-Saharan African cities urban agriculture (the informal production of food in urban areas) has been used as a strategy to cope with increasing poverty (May & Rogerson 1995; Ashebir *et al.* 2007; Crush *et al.* 2010). Small scale quarrying and mining in urban areas are also used as a livelihood strategy in both South Africa and Namibia, where sand is taken from beaches and river beds and sold or used for construction purposes (Slater & Twyman 2003). Other livelihood activities associated with natural resources can have knock-on effects for different uses, for example using water in beer brewing and so producing the by-products from this process which are used as fertiliser in urban agriculture in South and East African cities (Slater & Twyman 2003). Livelihoods and the incorporation of natural resources into poor urban household strategies are complex, multi-dimensional and diverse (Slater & Twyman 2003; Davenport *et al.* 2011).

1.4 Feast to famine: The role of agriculture

1.4.1 Food security

Food security has been a topic of debate for several decades; however growing concern around this issue has increased in the last decade (Kannan *et al.* 2000; Rosegrant & Cline 2003; Barrett 2010). The 1996 World Food Summit defined food security as „a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life“ (Barrett 2010: 825). Food is an intrinsic basic human need that is necessary for survival, health and general well-being (Schönfeldt *et al.* 2010). It has been recognised that humans cannot live a sustainable livelihood without an adequate supply of food (Schönfeldt *et al.* 2010). According to Schönfeldt *et al.* (2010), “poverty is a state where physiological human needs are not adequately met as the amount of available money is not enough to purchase a basic nutritionally balanced diet” (Schönfeldt *et al.* 2010: 255).

Households tend to access food through sources such as markets, subsistence production and reciprocation from programmes or community members (Baiphethi & Jacobs 2009). The collection of wild resources, particularly in (but not restricted to) rural communities has also been noted as an important method for poorer households to access food (Shackleton & Shackleton 2004; Shackleton *et al.* 2007a; Shackleton *et al.* 2008; Davenport *et al.* 2011). Historically, rural households have produced or collected the majority of their food needs, whilst urban households tended to purchase most of their food (Shackleton & Shackleton 2004; Baiphethi & Jacobs 2009). However, over time rural and urban households have become dependent on markets and food expenditure can account for 60 % to 80 % of the total income within low-income households (Baiphethi & Jacobs 2009). Within sub-Saharan Africa, food insecurity tends to impact the urban poor severely as they are dependent on markets and are affected by the household's ability to earn cash income, as well as fluctuating global food prices (Alemu 2010; Ruel *et al.* 2010). Rural households are better able to access natural resource reserves to provide food or generate income; however these households also look for opportunities to diversify their strategies to optimise livelihoods (Baiphethi & Jacobs 2009).

Globally, over one billion people are estimated to lack access to sufficient dietary energy and an even higher number of people suffer from micronutrient deficiencies (Barrett 2010). Africa is the only continent where per capita agricultural production has decreased since the 1970s, and the number of malnourished people on the continent has increased (Schönfeldt *et al.* 2010). Whilst other developing countries have reported a decrease in undernourished people over the last 40 years, the sub-Saharan African region has reported an increase (Schönfeldt *et al.* 2010). South Africa has been recognised as a food secure nation in terms of aggregate food availability; however there is a widespread problem in terms of food insecurity (Alemu 2010; Schönfeldt *et al.* 2010; Faber *et al.* 2011). Wealth distribution within South Africa is highly uneven with a Gini co-efficient of 0.72, making it one of the most unequal countries in the world (Schönfeldt *et al.* 2010; Faber *et al.* 2011).

Poverty is a widespread phenomenon throughout South Africa and affects millions of people (Aliber 2003). Increased population pressures have aggravated the high number of poverty stricken people throughout the country, and the worse incidences of poverty are located in metropolitan areas and former homelands (South African Risk and Vulnerability Atlas 2010). The measurement of poverty varies between countries and the "US dollar a day" per person poverty line is usually applied as a global poverty indicator (Stats SA 2007). The South African poverty line has been calculated at R283 per month per person according to 2008 prices (National Treasury 2011). According to the South African National Treasury Department, the percentage of the population below the poverty line has decreased from 38 % in 2000 to 22 % in 2008 (National Treasury 2011). However, approximately half of the jobs acquired between 2003 and 2008 in South Africa were lost by 2010 due to the recession in 2009 (National Treasury 2011). The South African government uses a social security

system to provide income support in an effort to alleviate poverty. Approximately 15 million people received social grants from the state in 2011 (National Treasury 2011).

Due to a lack of sufficient studies concerning food security in South Africa, measurements and estimates tend to vary (Alemu 2010; Schönfeldt *et al.* 2010). However, there is a general consensus that food insecurity remains a widespread issue throughout South Africa and an exceptionally large number of households suffer from food poverty (Alemu 2010; Schönfeldt *et al.* 2010). Food security also has a spatial dimension in this country, with some provinces experiencing higher instances of food insecurity than others (Alemu 2010). Within poorer South African households, people tend to adopt unvaried diets to cope with poverty as the majority of their income tends to be spent on food (particularly within urban contexts) (Schönfeldt *et al.* 2010; Faber *et al.* 2011). These diets consist mainly of starch staples such as maize meal, with little fruit intake and only a few affordable (which tend to have low nutrient contents) or collected vegetables (Schönfeldt *et al.* 2010; Faber *et al.* 2011).

1.4.2 Agriculture's role in food security

Agricultural-based activities are viewed as important contributors to rural livelihood strategies, as well as rural economies (Dovie *et al.* 2003; Hajdu 2006; Valdes & Foster 2010). Homestead gardening and other small-scale agricultural activities have been receiving interest as a means to enhance food security and livelihood well-being, particularly within impoverished or disadvantaged communities. The role of homestead food production in improving participants' diets, increasing income and decreasing gender inequality have been deemed successful in regions such as the Asia-Pacific (HKI 2010). For example, programmes run in the Asia-Pacific region through non-governmental organisations (NGOs) such as Helen Keller International (HKI) focus on homestead cultivation and nutrition education as a way to improve food security within impoverished communities (HKI 2010). Work by Faber *et al.* (2011) point to home-grown food production as being a feasible strategy for food and nutrition security amongst the rural poor of South Africa.

Rural and urban areas are not divorced and remain connected through numerous flows as previously discussed, both directly and indirectly (Jaquinta & Drescher 2000; Tacoli 2006). The flow of goods, such as food, between rural and urban areas remains an important linkage, particularly amongst the urban poor (Gordon *et al.* 2000). The type of food and the way it is supplied to urban centres has been rapidly altered through the globalisation of agricultural trade, as well as the industrialisation and commercialisation of global and regional food systems (Ambrose-Oji 2009). The alteration of food systems can provide cheaper food products, alongside greater nutritional value and diversity within foodstuffs found in urban contexts; however it has been argued that these food systems also marginalise the urban poor leading to intensified food insecurity concerns (Ambrose-Oji 2009).

Semi-subsistence farming within urban contexts has gained increasing attention as it is believed to contribute to livelihoods of the urban poor in many developing countries (Gordon *et al.* 2000). Urban agriculture has been described to contribute towards food security, poverty reduction, decreasing distances travelled by fresh produce to markets, as well as urban greening (Shackleton *et al.* 2009a).

Drawing on Mougeot (2000), a concise definition for urban agriculture is given by Ambrose-Oji (2009:7-8) as “an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area”. Urban agriculture can include livestock production, horticulture, floriculture, forestry and aquaculture (Mougeot 2000). Urban agriculture differs from its counterpart in rural contexts through the legal status of farming in urban boundaries, and constraints around access to suitable land for the activity and smaller unit size of land cultivated (Gordon *et al.* 2000). Whilst urban agriculture will not entirely replace agricultural produce from rural areas, it has numerous benefits to urban centres and in many cases complements its rural counterpart (Mougeot 2000; Shackleton *et al.* 2009a).

Literature surrounding the potential benefits of urban agriculture has a tendency to be fragmented and research does not necessarily substantiate claims of this practice benefiting the urban poor (Thornton 2008; Crush *et al.* 2010; Webb 2011). Nevertheless, urban agriculture has been steadily increasing in developing nations since the 1990s, with a projected 70 % of the urban population engaged in agriculture to some degree in Africa and 60 % in Asia (Bryld 2003). The increase of urban agriculture in developing countries has been attributed to rural-urban migration, as well as the declining economic situation of urban populations as a result of the Structural Adjustment Programs (Bryld 2003). Whilst urban farmers are often portrayed as poor members of society, Lee-Smith (2010) cautions against this generalisation in such examples as “the majority of such farmers are poor so is the majority of the urban population” (Lee-Smith 2010: 488). Studies from equatorial Africa indicate that a large portion of urban farmers are middle-income to wealthy members of the community, as well-placed people benefit from urban agriculture due to better access of land and resources (Lee-Smith 2010). Mkwambisi *et al.* (2011) echoed this observation in Malawi, noting that remunerations from urban agriculture favour educated middle to upper class families.

Urban agriculture has been acknowledged for its potential to improve livelihoods of urban citizens, particularly impoverished households (Bryld 2003). The emphasis of food security has shifted away from merely looking at availability of food, but rather at individual and household access to healthy food. For a number of years the contribution of urban agriculture towards food security of poor

households has been recognised in African contexts (Crush *et al.* 2010). Research carried out in the city of Kampala, Uganda, found that urban agriculture is a successful strategy in improving the nutritional status of economically marginalised people (Maxwell *et al.* 1998). Urban agriculture also has negative aspects which impact its effectiveness in providing benefits, particularly to the urban poor. Agriculture is often perceived as not belonging within urban environments and is illegal within many developing countries' urban centres (Crush *et al.* 2010). Urban agriculture can also be hazardous to public health as mismanagement can lead to the spread of disease through the use of contaminated manure and wastewater (Bryld 2003). In terms of benefiting the urban poor, agriculture is restrictive as low-income households engaged in this sector tend to be marginalised in terms of access to land and water and face problems of theft and government intervention due to illegalisation of this practice (Bryld 2003; Mkwambisi *et al.* 2011).

1.4.3 Urban agriculture in South Africa

Urban agriculture has been on the increase in a number of southern African cities, with studies proposing that it is an important livelihood strategy within poor and newly urbanised households across Africa (Crush *et al.* 2010). In a regional baseline survey conducted by AFSUN across southern Africa in 2008, the research suggested that urban agriculture was largely attributed to household survival rather than income-generating opportunities (Crush *et al.* 2010). Within this region food insecure households tended to engage in urban food production, suggesting that it was used as a successful strategy to alleviate food poverty (Crush *et al.* 2010). However, the majority of such households remained food insecure, which alternatively indicates that whilst urban agriculture relieves severe food insecurity issues, it does not solve the problem (Crush *et al.* 2010). Urban agriculture appears to be a limited practice in poor urban households within South Africa, despite high poverty levels (Thornton 2008). The South African cities of Cape Town and Johannesburg had low participation rates in urban agriculture by poor households; however Crush *et al.* (2010) did note that this might not reflect the entire situation within South Africa. Urban farming is thought to be more prevalent in the country's smaller urban centres found in poorer provinces, such as the Eastern Cape (Crush *et al.* 2010).

In informal settlements of Atteridgeville near Pretoria, urban agriculture was found to be of importance to poor rural migrants that came to cities as it allowed them to re-create social and physical elements of their rural homes in order to adapt to harsh urban realities (van Averbek 2007). Reuther & Dewar (2006) illustrated that if practiced under the correct circumstances, urban cultivation could be economically and socially viable to informal settlements in South Africa, drawing on examples from Khayelitsha in Cape Town. However, conclusions around the incidence and impact of urban agriculture in impoverished urban households in South Africa remain tentative and uncertain

(Webb 2011). Many people who engage in urban agriculture do not regard themselves as full-time farmers, but see it rather as a supplementary strategy to their livelihoods (Shackleton *et al.* 2010). Thornton (2008) examined the extent and impact of urban agriculture in poor urban areas of two small South African towns; and concluded that the dependence on social welfare grants provided little incentive for the urban poor to engage in subsistence or commercial activities of urban agriculture.

The potential of urban agriculture has been advocated in larger city centres of South Africa, for example Shackleton *et al.* (2010) suggest that agriculture does play a role in the urban poor's livelihoods and therefore should be recognised as an important contributor towards developing sustainable cities. Even though urban poverty is viewed to be most severe in South Africa's small towns; these areas are often over-looked by policy-makers in favour of larger urban centres (Thornton 2008; Nel *et al.* 2011). Literature, models and understanding around urban agriculture in sub-Saharan Africa tend to be dominated by a focus on vegetables (thus excluding fruits), exotic crops (limited research on indigenous species) and largely confined to cultivated plants, thereby giving limited attention to possible collection of edible plants. For example, Shackleton *et al.* (2010) reported that 96 % of urban and peri-urban farmers around Durban collected indigenous vegetables, indicating that urban agriculture was more complex than current literature suggests. Thus, research needs to be broadened to address knowledge gaps in these sections.

Despite the limited use of extensive and productive urban agriculture amongst impoverished urban dwellers of South Africa, it is a strategy that deserves attention as a means to improving food security within developing urban contexts. In other regions of sub-Saharan Africa, urban agriculture has been given increasing attention as a valuable food resource and has been found to contribute to markets and employment, livelihoods and poverty alleviation strategies (Cofie *et al.* 2003). Drawing on examples from Germany, Drescher (2001) suggests that the adoption of allotment gardening into southern African cities or towns could enhance food security and reduce poverty, as proven in European experience during times of crisis. However, as noted by Maxwell *et al.* (1998), urban agriculture alone does not stand as a single solution to improve food security amongst the urban poor as not everyone can have access to resources to farm in urban cities.

1.5 Sustainable livelihoods

As previously noted, all people are directly or indirectly dependent on ecosystem services, regardless of whether they live in urbanised settings, peri-urban communities or rural environments (Biggs *et al.* 2004). Livelihoods are intricately linked to natural resource use, yet the rapid increase in the human population has resulted in pressures on these resources, often leading to the fragmentation of ecosystems, degradation of the natural environment and limitations in food supply (Smith *et al.* 2005;

Tratalos *et al.* 2007; Ambrose-Oji 2009). The sustainable use of natural resources is thus essential to livelihoods across the rural-urban continuum. In accordance with the increasing population pressures of the 21st century (particularly in developing nations), there has been a shift in development thinking and research (Chambers & Conway 1991; Scoones 1998).

Terms surrounding „sustainable development“ gained momentum in the 1990s and, as a result, more participatory approaches were adopted particularly in studies dealing with issues around poverty and rural development (Solesbury 2003). This school of thought moved away from conventional indicators of poverty which were usually based on one or two factors (e.g. income) and instead viewed livelihoods of the poor as complex and diverse (Chambers & Conway 1991). Chambers and Conway (1992) pioneered the way for „sustainable livelihoods“ concepts and their definitions have been widely adapted in sustainable development fields, for example by the DFID (Solesbury 2003).

The definition for sustainable livelihoods according to Chambers and Conway (1992: 6):

“A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term”.

Subsequently, the Sustainable Livelihoods Framework (SLF) was created which views people as managers of their asset base and attempts to understand the complex dynamics that influence livelihood strategies within institutional contexts (Figure 1.1) (Scoones 1998; Solesbury 2003). The analytical framework was initially tailored for (impoverished) rural livelihoods (Chambers & Conway 1991), thus was designed mainly for analysing the rural poor within a sustainable livelihoods context (Scoones 1998; Bebbington 1999; Farrington *et al.* 1999; Carney 2002). This multi-scale framework focuses on the household level and assets the household controls, which are influenced by external factors and shocks (Figure 1.1) (Scoones 1998; Solesbury 2003).

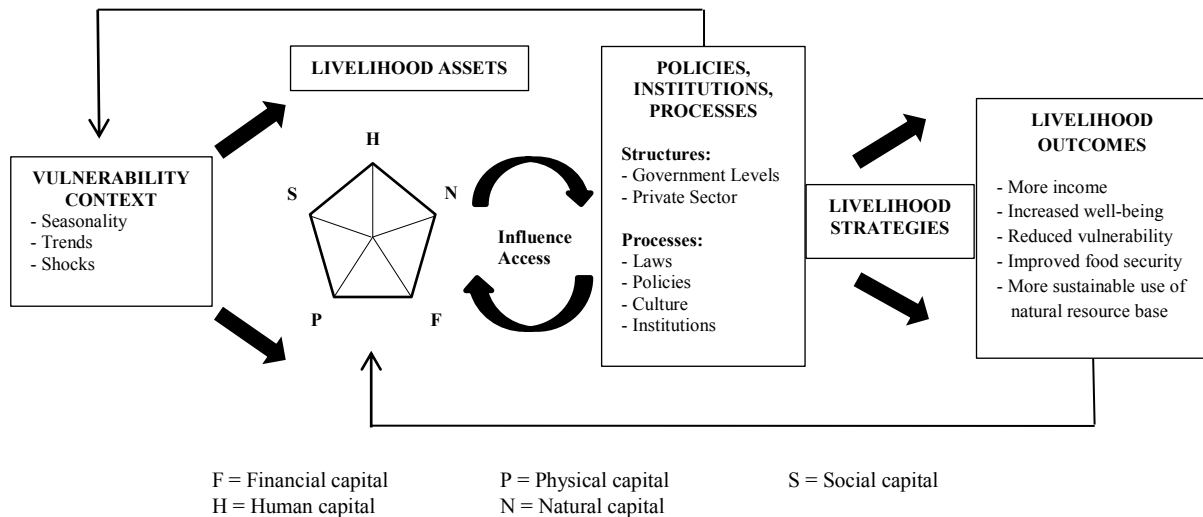


Figure 1.1: Sustainable Livelihoods Framework

Household assets are comprised of financial, physical, social, human and natural capital (Figure 1.1) (Chambers & Conway 1991). Physical capital refers to basic infrastructure and equipment, for example water supply and sanitation. Financial capital is usually derived from available stocks such as savings, wage income and pensions. Human capital is made up of skills and ability to work in order for people to pursue different livelihood strategies. Social capital is the networks and relationships that enable people to co-operate. Natural capital consists of natural resources that sustain life. Access to these assets is influenced by external factors such as policies and institutions, which are then further shaped through shocks and trends, determining a household's vulnerability context (Scoones 1998).

Although the SLF originated to assess rural contexts, it has been recognised as a valuable approach which is increasingly adopted within peri-urban and urban contexts (Meikle *et al.* 2001; Farrington *et al.* 2002). Whilst the basic principles of the livelihoods approach remain the same for rural and urban areas, there are contextual differences with regard to social, economic, environmental and governmental factors (Meikle *et al.* 2001). The asset pentagon of the SLF (Figure 1.1) remains the same in terms of the generic types of assets; however urban settings change the importance of the different assets according to livelihood needs, as well as policies, institutions and processes that shape livelihood strategies (Meikle *et al.* 2001). A key difference between urban and rural contexts is the enhanced importance of the cash economy within urban livelihoods (financial capital), and such contextual differences impact the nature of sustainable urban livelihoods, as well as policy intervention (Meikle *et al.* 2001).

Despite its holistic, people-centred approach, the SLF does have shortcomings in the analysis of sustainable livelihoods. Livelihood approaches do not give macro-level economic processes enough consideration in shaping local livelihoods and as such do not adequately deal with shifts in global

markets and politics (Scoones 2009). The SLF also has been criticised for not capturing the importance of power and politics, which are often viewed as a key capital assets (Scoones 2009). Livelihood approaches also have a tendency to represent livelihoods as materialistic, which focuses on economic dimensions and subsequently overshadows cultural, historical and spatial dynamics (King 2011). In many livelihood analyses, space is often examined purely as location, not accounting for how it can be an enabling and constraining factor in livelihood systems (King 2011). This is imperative when examining urban agriculture and natural resource collection as both activities require space.

Sustainable livelihoods thinking has risen to sophisticated levels since it gained momentum in the 1990s and has resulted in a wide-ranging, valuable knowledge base (Carney 2002). As noted by Scoones (2009: 191) “livelihood perspectives offer an important lens for looking at complex rural development questions” and livelihood approaches have also gained attention within the realm of urban development (Meikle *et al.* 2001; Farrington *et al.* 2002). Despite recognised shortcomings, the SLF is a useful analytical framework that can be used to understand households and their available assets; as well as strategies adopted and the influence of external factors on livelihoods.

1.6 Situating this thesis

Current understanding of global urbanisation processes and the role of natural resources in livelihoods in sub-Saharan Africa can be summarised as follows:

- Over the last century developing countries have undergone rapid urbanisation which has resulted in drastic social, economic and environmental change, particularly within African and Latin American countries.
- Whilst a fair amount of attention has been paid to metacities emerging as a result of urbanisation, little consideration has been given to small and medium sized urban centres, even though they account for the majority of urban dwellers throughout the world.
- Natural resources are well known for the important role they play in rural livelihoods, particularly within the context of sub-Saharan Africa; however, little is known about the role natural resources play along the rural-urban continuum, and even less is known about the contribution of these resources within an urban context.

- Analytical frameworks such as the SLF have been proven to be effective in guiding understanding of livelihoods within internal and external contexts, both in rural and urban settings.

Gaps which exist in current literature on urbanisation, livelihoods and natural resource use include:

- The potential contribution natural resources could make to urban livelihoods, urban poverty alleviation and food security is largely neglected in current literature, and this is further compounded by the lack of research in smaller urban centres.
- Few urban studies concerning natural resources have examined natural resources as a unit of analysis and intervention within households, or included natural resources in household income flows.
- The role of natural resource use in urban environments, such as urban agriculture, remains contested and research is limited to vegetable production and exotic plant species.

1.6.1 Objective

Within the context of the gaps in existing literature, the objective of this study was to analyse the impact of urbanisation on livelihoods in medium-sized towns with an emphasis on the contribution of natural resources, including urban agriculture.

1.6.2 Key Questions

1. How do livelihoods change along the rural-urban continuum, with an emphasis on natural resource use?
2. To what extent does home gardening contribute to livelihoods and how does this change along the rural-urban continuum?

This study forms part of a collaborative research programme funded by the Volkswagen Foundation known as „LUNA“ – Livelihoods, Urbanisation, Natural resources in Africa. The aim of the LUNA project is to analyse the impact of urbanisation on the use of natural resources and on livelihoods in transition in selected African countries bridging research, networking, capacity building for young scientists and policy work. The LUNA project is currently conducted in Botswana, Cameroon, Cote d’Ivoire, South Africa and Tanzania.

1.7 Structure of thesis

Chapter 1 introduces the theoretical background and research gaps to the theme of this study. The extent and effects of urbanisation is discussed, focusing on these processes in contemporary South Africa. The role of natural resources is then unpacked, moving along the rural-urban continuum and narrowed down to issues surrounding food security and agriculture. The literature draws on general examples and narrows down the focus from sub-Saharan Africa to South Africa. An overview is given of the SLF, which is discussed as a suitable analytical framework for studies involving urbanisation processes and the role of natural resources. The purpose of this study and the objectives and aim are then presented.

Chapter 2 describes the respective study sites to provide background context. The two study areas are each contextualised according to the province in which they fall followed by their district municipality, local municipality and then the study site itself. For each area the socio-economic situation is discussed, as well as climate and vegetation.

Chapter 3 addresses Key Question 1 and drawing on the SLF, examines how livelihoods and natural resource use change along the rural-urban continuum. The methods, results and discussion are presented in a paper format style. This chapter shows how livelihoods and natural resource use differ along the continuum and between Queenstown and Phalaborwa. Spatial composition and poverty levels in each study site are also discussed.

Chapter 4 examines home gardening activities along the rural-urban continuum, which addresses Key Question 2. This chapter specifically focuses on crop and fruit production in the home space and to what extent these practices contribute to livelihoods along the continuum. Findings in and between Queenstown and Phalaborwa are discussed.

Chapter 5 consists of general discussion and conclusions, which contrast findings from this study to existing literature to address gaps in current research. This chapter reinforces that the rural-urban continuum in both Queenstown and Phalaborwa were not static and the dynamics of natural resource use were fluid along this continuum depending on availability, demand and social preferences within local contexts. Rural livelihoods were most dependent on natural resource use, whilst urban areas were more reliant on cash income strategies; however natural resources did play a subtle role in urban centres, particularly within poorer urban households. The role of home gardening was questioned in terms of enhancing food security, as it is not possible for all poor urban households to access resources, and is rather recommended as a supplementary strategy to many in terms of poverty alleviation.

Chapter Two

Study area: Queenstown and Phalaborwa

2.1 Introduction

The two sites for this study, Queenstown and Phalaborwa, were selected in South Africa's Eastern Cape and Limpopo provinces, respectively (Figure 2.1). The selection criteria for suitable towns were a population size between 100 000 and 200 000 inhabitants, as well as close proximity to populated rural areas. Each study area consisted of the urban complex of the town and a rural site within close proximity of the town, and data was collected along the rural-urban continuum. For both study areas rural sites fell into former homeland areas, which were devised under the previous apartheid regime as a means to control black urbanisation and exploit cheap labour (Lester *et al.* 2000).

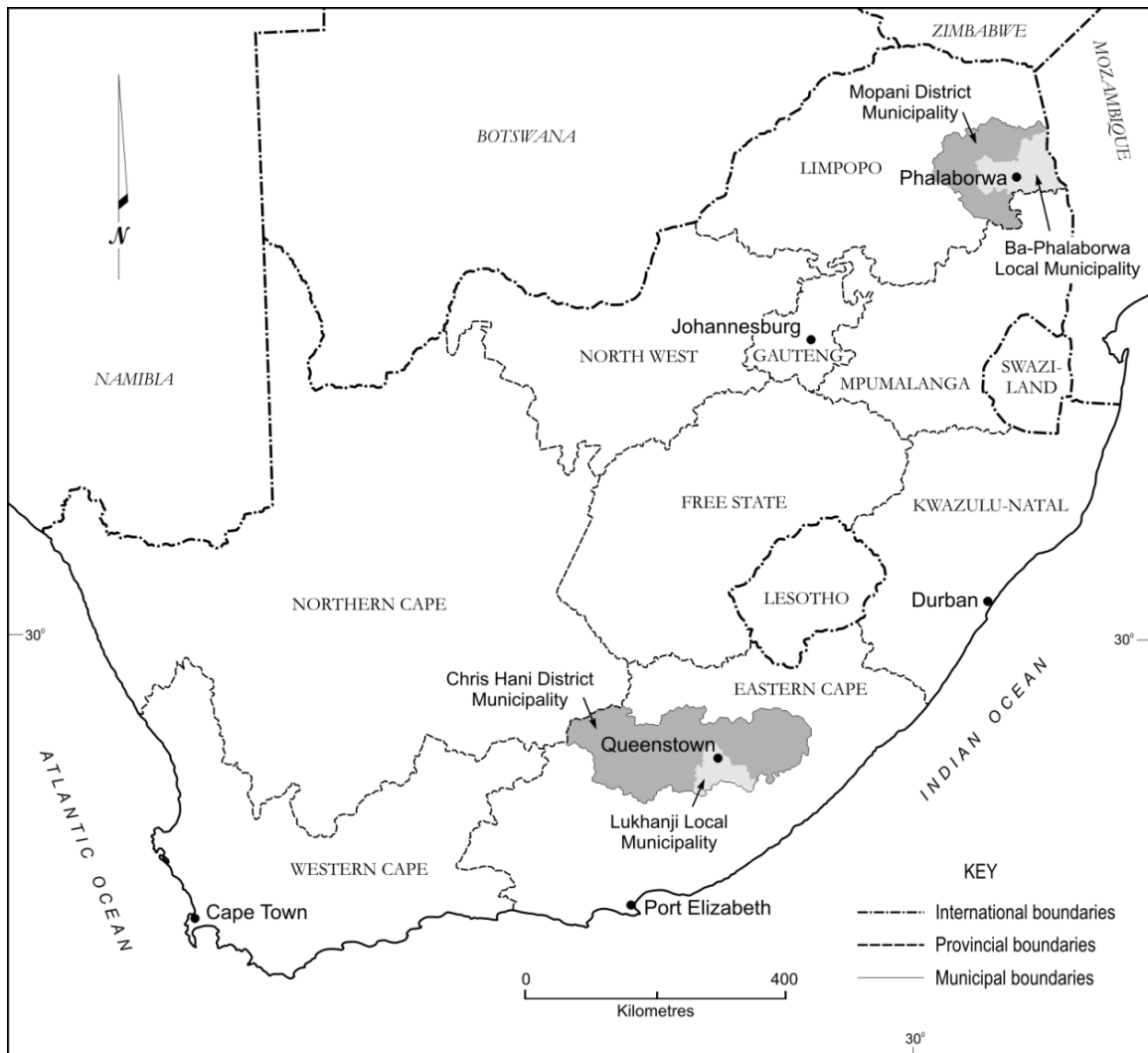


Figure 2.1: Study site localities of Queenstown and Phalaborwa in South Africa

2.2 Queenstown: Eastern Cape province

The Eastern Cape Province is situated on the south eastern seaboard and is the second largest province in South Africa, representing 13.9 % of the country (Figure 2.1) (CSIR 2004). There are six district municipalities in this province, namely Cacadu, Amatole, Chris Hani, Ukhahlamba, O.R.Tambo and Alfred Nzo; as well as the metropolitan municipality of Nelson Mandela (CSIR 2004). According to the mid-year population estimates for 2011, the Eastern Cape has approximately 6.83 million inhabitants which accounts for 13.5 % of the total South African population (Stats SA 2011). Migration plays a key role in shaping the distribution of the population and the Eastern Cape has been estimated to experience one of the highest net out-migrations from the province of 215 000 between 2006 and 2011 (Stats SA 2011). The Eastern Cape has the lowest average monthly expenditure and thus is deemed the poorest province in the country (CSIR 2004). Despite having plentiful human and natural resources, the Eastern Cape remains a predominately impoverished province due to the insufficient accumulation of physical and human capital (CSIR 2004).

Out of the nine provinces in South Africa, the Eastern Cape has the highest number of biomes and vegetation types (CSIR 2004). There are seven biomes and 29 Acocks veld types in this province, as well as a high variety of animal and bird species (CSIR 2004). The climate ranges from mild temperate along the coast to more extreme conditions further inland. Mountainous inland areas tend to have summer rainfall patterns and winter snow (CSIR 2004).

Impacts of land use in the Eastern Cape have been affected by agricultural practices such as over-grazing by livestock, industrial expansion and alien species invasion (CSIR 2004). A large portion of prime agricultural land was allocated to a few commercial farmers under the apartheid regime, leaving the majority of the population to depend on subsistence farming in marginalised areas known as homeland reserves (CSIR 2004). Former homeland areas located in this province included the Transkei and Ciskei. As a result, the Eastern Cape has been identified to have one of the highest degradation levels in South Africa because of poor land management due to historical inequalities of land distribution (CSIR 2004).

2.2.1 Chris Hani District Municipality

The Chris Hani District Municipality is situated in the centre of the Eastern Cape province and consists of eight local municipalities (Chris Hani IDP 2010). Overall, this District Municipality is experiencing a negative population growth rate of -1.92 % per annum with an estimated population of approximately 800 000 people (Chris Hani IDP 2010). Possible reasons attributed to the negative

growth rate are the increasing education levels and urbanisation in other areas (Chris Hani IDP 2010). The majority of people in the Chris Hani District Municipality are employed in community services and the economy is viewed as being underdeveloped, with many sectors in decline or stagnant in terms of GDP growth (Chris Hani IDP 2010). The District Municipality has an unemployment rate of approximately 57 %, which is higher than the Eastern Cape (51 %) and national (37 %) rates (Chris Hani IDP 2010). Subsequently, there is a high dependence on social welfare grants (Chris Hani IDP 2010). Chris Hani District also experiences exceptionally high levels of chronic malnutrition and incidences of people going hungry (Chris Hani IDP 2010).

2.2.2 Lukhanji Local Municipality

The largest population concentration in the Chris Hani District Municipality resides in the local municipality of Lukhanji (Chris Hani IDP 2010). The majority (91%) of the population residing in the Lukhanji Municipality is African and the dominant language is isiXhosa (Lukhanji IDP 2009). One of the population trends for this municipality is the migration of former rural dwellers into urban centres such as Queenstown, Whittlesea and Ilinge (Lukhanji IDP 2009). This migratory pattern has seen an increase of the municipality's population from an estimated 184 542 to 208 081 people between 2001 and 2007 (Chris Hani IDP 2010). Urban centres in Lukhanji Municipality offer chances for employment and this is seen as a driving factor behind migration patterns, in which government and domestic economic sectors account for over half of formal employment (Lukhanji IDP 2009; Chris Hani IDP 2010). The Lukhanji municipality contributes 37 % to the overall GDP of the Chris Hani District Municipality and is thus an important economic sub-region in the district (Lukhanji IDP 2009). However, unemployment and poverty remain critical challenges in the municipality, which are further compounded by a stagnant economy (Lukhanji IDP 2009).

2.2.3 Queenstown

Queenstown (31° 54' 0" S; 26° 53' 0" E) is the regional capital for the Chris Hani district and its local municipality, Lukhanji. The urban area comprises of the formal town and its two satellite townships, Mlungisi and Ezibeleni. The surrounding environment is characterised by dry high veld Sandy Grassland and Valley Thicket (Mucina & Rutherford 2007). Queenstown is situated in a high altitude area, which can reach over 1 070 m above sea level. Temperatures between the seasons vary significantly as summer can reach over 30 °C, whilst winter can drop to sub-zero temperatures. The area has a summer rainfall pattern, with the majority of rainfall occurring between December and March. Queenstown and surrounding areas have a mean rainfall of 500 mm per annum.

Queenstown is the largest urban centre in Lukhanji and is an important centre for industrial activity, commerce and infrastructure (Lukhanji IDP 2009). The town is surrounded by a number of productive commercial farms, as well as the former homeland areas of Ciskei and Transkei. Queenstown (including the town and its two satellite townships) has an estimated population of 126 084, but this figure was obtained from the last census in 2001 and local experts estimate the population to be between 150 000 and 200 000. The municipality has a population make-up that is similar to national trends with 52 % female and 48 % males (Lukhanji IDP 2009). The population is predominately youthful, with a large portion of people in this area under the age of 20. Whilst 54 % of adults (20 years old and above) in the municipality are functionally literate, only 30 % of this group have secondary school education (Lukhanji IDP 2009). Unemployment remains high within the municipality, with close to 50 % of the total population without a formal income (Lukhanji IDP 2009). However, the urban centres such as Queenstown have a much higher employment rate in comparison to Lukhanji, with approximately 50 % of people employed in the town, 25 % in Ezibeleni and 23 % in Mlungisi (Lukhanji SDF 2005). The rural areas in Lukhanji remain particularly low in terms of employment, for example in the Hala tribal-rural areas only 4 % of people are employed (Lukhanji SDF 2005).

Queenstown was one of the two research sites for this study and data collection took place in the urban complex of Queenstown and an adjacent rural area in the former Transkei homeland (refer to Figure 3.6, page 53). The urban complex comprised of the town's CDB, formal suburban areas known as „Top Town“, and the two satellite townships of Mlungisi and Ezibeleni. In terms of the total population distribution of Lukhanji Municipality, approximately 10.9 % reside in Queenstown, 20.4 % in Mlungisi and 14.6 % in Ezibeleni (Lukhanji SDF 2005). The rural site is situated south east of the Queenstown urban complex and falls under the Hala-Caca Tribal Authority. In terms of the Lukhanji population distribution, this tribal area accounts for 2.9 % of the total municipal population (Lukhanji SDF 2005). The area consists of 14 villages and is collectively known as the Macubini community.

2.3 Phalaborwa: Limpopo Province

Limpopo Province is situated in the northern-most corner of South Africa and shares international borders with Zimbabwe, Botswana and Mozambique (Figure 2.1) (Limpopo DFED 2004). The province comprises 10.2 % of the surface area of the country and is divided into six districts, which in turn are comprised of 26 local municipalities (Limpopo DFED 2004). The six district municipalities include Bohlabele, Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg. Limpopo has approximately 5.55 million inhabitants, which accounts for 10.98 % of South Africa's total population (Stats SA 2011). The province experienced a net out-migration of approximately 140 000 people from

2006 to 2011, as people went in search of employment in urban centres (Stats SA 2011). Limpopo also experiences immigration of people from neighbouring and other African countries, who either stay in the province or move to the neighbouring province of Gauteng (Limpopo DFED 2004). Despite having a high potential for economic development and a rich mineral presence, Limpopo is the second poorest province in South Africa (Limpopo DFED 2004; Mopani IDP 2009).

The Limpopo Province falls within the savanna biome, and is largely semi-arid in the western part and subtropical within the eastern part. The Lowveld region of Limpopo is mostly conserved through private reserves, provincial and national parks. The province has a summer rainfall pattern and the western to northern parts often experience recurrent droughts (Limpopo DFED 2004). Winter tends to be mild and predominately frost free throughout the area. A large portion of the population in Limpopo is confined to within former homeland reserves, as the previous apartheid regime determined settlement and urbanisation patterns in Limpopo (Limpopo DFED 2004). Former homeland areas in this province include Gazankulu, Venda and part of Lebowa. Due to inequalities of the past in terms of resource distribution and land allocation, communities within homeland settlements are largely dependent on subsistence agriculture, government grants and remittances from family members engaged in migrant labour (Limpopo DFED 2004).

2.3.1 Mopani District Municipality

The Mopani District Municipality is located in the north-eastern part of the Limpopo Province and shares international boundaries with Mozambique and Zimbabwe (Mopani IDP 2009). The district received its name from the nutritional mopane worm (*Gonimbrasia belina*) which is found in abundance in the area (Mopani IDP 2009). The Kruger National Park occupies 43 % of the Mopani District's land area and thus the district is also part of the Great Limpopo Transfrontier Park (Mopani IDP 2009). The total population of this district has been in a steady decline since 2000, with an estimated 1.07 million people living in this area (Mopani IDP 2009). Within the entire Mopani District, the largest formal sector employer is the government sector, followed by the farming sector (Mopani IDP 2009). The majority of people live in rural areas in this district and most of these rural residents are poor (Mopani IDP 2009). Of the total population in Mopani District, approximately 48 % have no income and an overwhelming majority of people earn less than R800 per month (Mopani IDP 2009).

2.3.2 Ba-Phalaborwa Local Municipality

The Ba-Phalaborwa Municipality is one of the five local municipalities situated in the Mopani District and constitutes 27 % of the total district area (Ba-Phalaborwa IDP 2010). The majority of the people residing in the municipality are African and the dominant languages spoken are Xitsonga and Sepedi (Ba-Phalaborwa IDP 2010). The area has experienced the migratory movement of people from former homeland areas into the urban complex of Phalaborwa, thus encouraging racial integration (Ba-Phalaborwa IDP 2010). However, there is still an increasing gap between the rich and poor; as racial segregation is replaced by socio-economic divides (Ba-Phalaborwa IDP 2010). Between 2001 and 2007, the percentage of people without a declared cash income in the municipality decreased from 69.6 % to 43.2 %; however these figures are still high and poverty remains widespread (Ba-Phalaborwa IDP 2010). Ba-Phalaborwa is viewed as the economic hub of the Mopani District, as it contributes close to 50 % of the district GDP (Ba-Phalaborwa IDP 2010). The largest formal employment sector in the municipality is mining, followed by agriculture, manufacturing and tourism (Ba-Phalaborwa IDP 2010).

2.3.3 Phalaborwa

Phalaborwa (23° 57' 0" S, 31° 7' 0" E) is a town located in the Ba-Phalaborwa Municipality, in the north-eastern section of the Limpopo Province. The urban area is made up for the formal town of Phalaborwa and the two satellite townships of Lulekani and Namakgale. The area is characterised by sandy soils and Mopani Bushveld, with a subtropical climate of constant temperatures between 23 – 33 °C or higher (Ba-Phalaborwa SDF 2009). The greater area is situated at 405 meters above sea level, with a mean annual rainfall of approximately 550 mm (Ba-Phalaborwa SDF 2009).

The town is largely reliant on mining activities for copper, phosphate and vermiculite as the area's key economic and employment generation (Ba-Phalaborwa SDF 2009). Phalaborwa also serves as a gateway to the Kruger National Park. The formal town of Phalaborwa was established in 1955 largely as an apartheid urban structure for the mines, and its former „black“ townships of Namakgale and Lulekani were built in 1962 (Ba-Phalaborwa SDF 2009). The Phalaborwa urban complex houses 94 % of the Ba-Phalaborwa Municipal population which is approximately 100 000 people, however this figure is expected to be much higher as the last population census count was in 2001.

According to the 2007 Community Survey, approximately 50.9 % of the population are male and 49.1 % female in the Phalaborwa area (Ba-Phalaborwa IDP 2010). The majority of people residing in this municipality are between the ages of 15 to 34, suggesting a socially and economically active group of

residents (Ba-Phalaborwa IDP 2010). In general, there are high levels of no schooling in the Phalaborwa area and this is concentrated in traditional tribal areas such as Makhushane, where approximately 22.5 % of adults have no formal education (Ba-Phalaborwa SDF 2009). In Ba-Phalaborwa municipality 29 % of people have not attended school and only 19 % completed secondary school (Ba-Phalaborwa SDF 2009). The incidence of poverty remains high within the municipal area; however, Phalaborwa is considered a popular destination for labour migration due to mining employment opportunities, and the labour force participation rate is at an estimated 39 % (Ba-Phalaborwa SDF 2009).

Phalaborwa was chosen as the second research site for this study. Data collection took place in the urban complex of Phalaborwa and an adjacent rural area in the former homelands (refer to Figure 3.7, page 54). The urban complex consisted of the CDB, formalised suburban areas, and its two peripheral townships of Lulekani and Namakgale. Within the urban complex, 20 % of its population resides in Phalaborwa town and the majority (49 %) live in Lulekani and Namakgale, situated in the former Lebowa and Gazankulu homelands, respectively (Ba-Phalaborwa IDP 2010). The remaining population live in traditional settlements around the edge of the urban complex. The rural site is located in the peripheral traditional settlements known as the Makhushane, Maseke and Mashishimale tribal areas, south-west of the urban complex.

Chapter Three

Livelihoods and natural resource use along the rural-urban continuum in Queenstown and Phalaborwa

3.1 Introduction

Rapid urbanisation, described as the increased concentration of the human population, is one of the dominant trends shaping and transforming the world and by 2008 more than half of the world's total population was urbanised (Burgess *et al.* 1997; Iaquina & Drescher 2000; Millennium Ecosystem Assessment 2005; UNFPA 2007; World Bank 2009). Current demographic transformations have shifted from the developed regions of Europe and North America to developing countries in Africa and Asia (UN-HABITAT 2006; World Bank 2009). The African continent has experienced the highest urbanising rates over the last four decades, where the sub-Saharan Africa region has the highest rate of slum growth (4.5 %) and many African urban areas have deteriorated over time thus experiencing some of the highest levels of urban poverty in the world (UN-HABITAT 2006; UNFPA 2007). Southern Africa is the most urbanised sub-region on the continent, with an estimated 61.7 % of its population living in urban areas (UN-HABITAT 2010).

Urbanisation is not a homogeneous process as there is variation within and between regions. While urbanisation processes have resulted in the formation of metacities (over 20 million inhabitants), these urban agglomerations only house 4 % of the world population and the majority of urban migrants move to smaller urban settlements (UN-HABITAT 2006; Nel *et al.* 2011). Smaller cities and towns of 500 000 inhabitants or less now host around 52 % of the world's urban population and economic, social and environmental consequences of urbanisation are often most pronounced in smaller urban areas of poor developing countries (Drakakis-Smith 1995; UN-HABITAT 2006; World Bank 2009). Despite the majority of urbanisation processes occurring in smaller urban settlements, these areas have largely been neglected in urban studies (Satterthwaite & Tacoli 2003; Nel *et al.* 2011).

Livelihood strategies are influenced by household characteristics, composition, decision making and social networks. The diversification of natural resources and assets available to households is viewed as the key to procuring a sustainable and healthy living (Barrett *et al.* 2001; Dovie *et al.* 2003). Livelihood strategies are not static and evolve according to opportunities and constraints that emerge from the growth of towns and cities, as well as the increasing complexity of the rural environment (IFPRI 2005). South Africa's current migration and urbanisation trends are still strongly influenced by

the country's historical legacy of apartheid, thus giving urbanisation patterns a distinct racial component which is still reflected in many urban areas (Mears 1997, Kok & Collinson 2006). Livelihoods are often spatially bound in that historical and contemporary spatial patterns result in the formation of community clusters which shape livelihood possibilities (King 2011). South Africa is no exception as it displays complex links between livelihoods and space due to historical segregationist regimes and modern pressures of rapid population expansion (King 2011).

In developing regions such as sub-Saharan Africa, rural household income is closely related to the utilisation of natural resources and in recent decades numerous studies have illustrated the importance of land-based strategies (such as arable farming, livestock husbandry and wild resource collection) to rural livelihoods (Shackleton *et al.* 2001; Campbell *et al.* 2002). Whilst there is a growing body of knowledge on rural livelihoods and their association with natural resources, there are significant gaps in research regarding the link between livelihoods and natural resources within an urban context. Rural livelihoods in southern Africa often incorporate non-farm strategies such as urban based employment to supplement the use of natural resources, which strengthen rural-urban linkages (Fox & Nel 1998; Wiersum & Shackleton 2005; Agergaard & Birch-Thomsen 2006; Kruger 2006). People in urban areas are predominately reliant on the cash economy as a means to procure a living (Slater & Twyman 2003). Within urban environments the contribution of natural resources to livelihoods is presumed to be small, although this topic has been little explored. However, their role should not be discounted as they can make significant contributions, particularly to the urban poor (Slater & Twyman 2003; Davenport *et al.* 2012).

Poverty in Africa has been discussed extensively from a rural perspective; however urbanisation trends are shifting the locus of poverty from rural into urban domains in Africa (Ambrose-Oji 2009). Poverty is a widespread phenomenon throughout South Africa and affects millions of people (Aliber 2003). Increased population pressures have aggravated the high number of poor people throughout the country, and the highest incidences of poverty are located in metropolitan areas and former homelands (South African Risk and Vulnerability Atlas 2010). Some of the challenges faced by poor people living in urban areas within South Africa include limited access to economic opportunities, secure housing, basic services and social services (South African Risk and Vulnerability Atlas 2010). Natural resources have been found to act as invaluable safety nets and contribute towards the survival of the rural poor (Shackleton *et al.* 2001; Shackleton *et al.* 2008). Whilst natural resources typically do not make large contributions to urban livelihoods, they can be viewed as an important strategy utilised by the urban poor in an effort to diversify their livelihoods to secure a better living (Slater & Twyman 2003; Stoian 2005).

There are research gaps surrounding urbanisation processes in smaller cities and towns, as well as the potential contribution natural resources make to urban livelihoods (Nel 2007; Davenport *et al.* 2011; Nel *et al.* 2011). This thesis aims to characterise livelihoods along the rural-urban continuum in medium-sized towns with an emphasis on the contribution of natural resources. The research for this study was divided into two parts. The first part of the research aimed to broadly capture the use of selected natural resources across the rural-urban continuum in Queenstown and Phalaborwa. The second part of the research (Chapter 4) focused on home gardening practices along the continuum in each town.

This third chapter considers the first part of this study which addresses Key Question 1, namely “how do livelihoods change along the rural-urban continuum with an emphasis on natural resources?”. Livelihood portfolios were created across the continuum in both towns to compare natural resource activities in relation to cash income streams and highlight differences within and between the study sites in terms of livelihood composition. Livelihood links were then further explored in terms of spatial composition and prevailing poverty levels.

3.2 Methods

3.2.1 Approach

Information to address the key question was collected through structured interview schedules. Interviews were conducted in the preferred language of the respondent and therefore, translators were used in areas that did not predominately speak English or Afrikaans. For example, in the township and rural areas of Queenstown isiXhosa was the preferred language, and in similar areas of Phalaborwa Xitsonga and Sepedi were the dominant languages. The research approach and content conformed to Rhodes University Ethical Guidelines.

The two medium sized towns of Queenstown and Phalaborwa with a population count of approximately 100 000 – 200 000 inhabitants were selected as study sites. As the LUNA Project wished to compare studies conducted in five African countries, town size and the main interview schedule were standardised. South African towns in close proximity to former homeland areas are artificially zoned, making it difficult to see a clear rural-urban continuum due to previous racial town planning. For the case of South Africa, the „idealised“ continuum was divided up into the Central Business District (“CBD”), formal suburban residential areas (“town”), peripheral township and informal settlement areas (“township”), and proximate rural sites consisting of communal villages (“rural”). Rather than sampling along a clear continuum, the South African students chose zones within the study sites that move from the centre of town gradually outwards. The rural-urban

continuum could then be defined and compared to other African countries once the data was collected and analysed.

Action research was viewed as a key process and thus stakeholder engagement was imperative in both the site selection and data collection process. It is widely acknowledged that there is a communication gap between science and decision makers; however processes such as participation, communication and interaction have increasingly been used to bridge this gap (Shackleton *et al.* 2009b). Action research was used with the possibility of leading to a discussion paper or policy brief (currently in preparation) on different approaches used across the five African countries. The engagement process begins at the beginning of the project, to continue throughout the project and communicate the results at the end with interested stakeholders.

3.2.2 Framework

The Sustainable Livelihoods Framework was used as the analytical framework for this study. As discussed in Chapter one, the SLF examines the household and its assets – namely financial, physical, social, human and natural capital within a multi-scale framework. The SLF has subsequently been remodelled based on work carried out by Hadju (2006) to specifically depict livelihood portfolios created through this data collection (Figure 3.1).

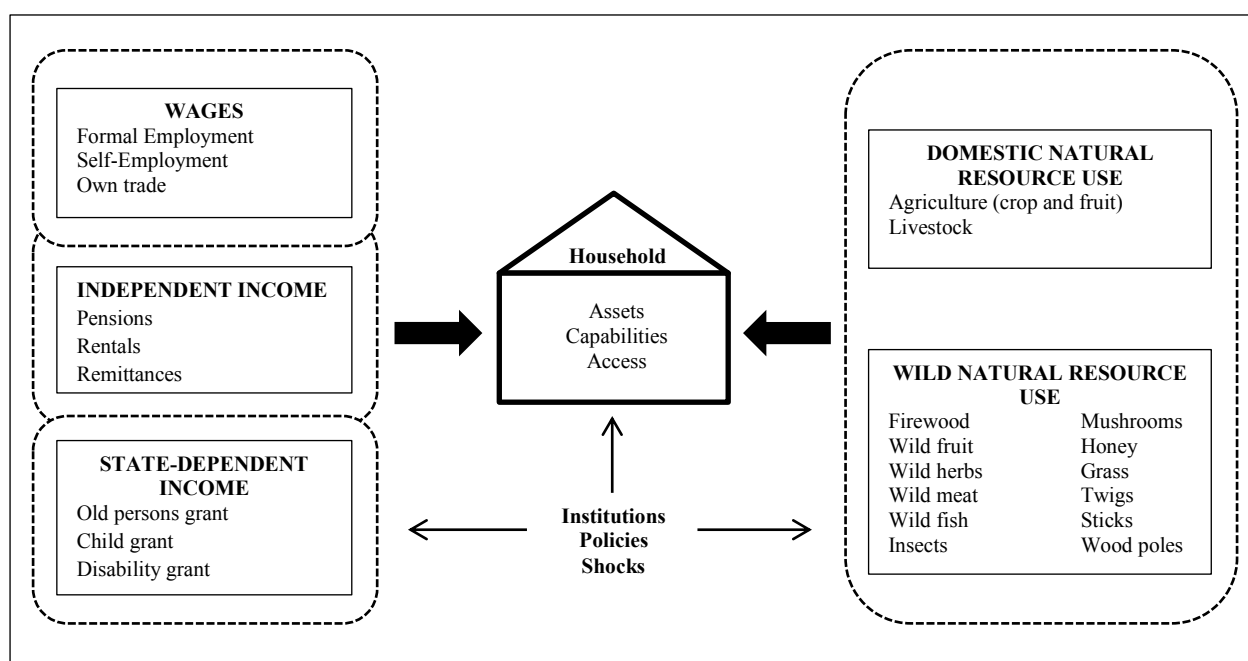


Figure 3.1: Customised SLF describing potential livelihood portfolios in relation to natural resource use

The unit of measurement and analysis for this study was therefore the household, which consists of all permanent occupants, as well as migratory household members who live permanently away and send remittances. The household is depicted in the middle of the diagram with the assets, capabilities and access elements that household members would draw on when making choices concerning their livelihoods options (Figure 3.1). The model focuses on two distinct groups of livelihood generating options, namely natural resource use and monetary income. This framework acknowledges that livelihoods are affected by external factors such as institutions, policies and shocks. Whilst these external factors were discussed to some extent in this thesis, they are not a primary focus.

3.2.3 Data collection

A standardised survey was administered in all study sites in the five countries involved in the LUNA project (Botswana, Cameroon, Cote d'Ivoire, South Africa and Tanzania) (Appendix 1). The interview schedule aimed to capture livelihood portfolios and the use of natural resources at a household level along the rural-urban continuum. The Livelihoods interview schedule is based on the asset pentagon of the SLF (Figure 1.1), which captures the kind of natural resources used by the respondents as well as social, human, physical and financial capital people can access. To standardise the survey, the questions and layout were developed by the LUNA research team and postgraduates. In South Africa, fieldwork for this survey was carried out between August to October 2010.

Within each sampling zone, individual households were randomly selected in designated sampling areas using software from ArcView 4 and ArcGIS 9, to represent the continuum. Each section was digitised on high resolution aerial maps (2006) by drawing polygons to demarcate each area (using ArcGIS 9). Features that fell into the polygon which were distinctly not households (such as open spaces, obvious industrial buildings and school grounds) were unmarked within the digitised zone. In ArcView 4, a 50 x 50 m grid was placed over each section and all grids which did not fall entirely into the polygon were excluded. Grids were then randomly selected as per required number of households per zone (e.g. 35 grids in the CBD). As both study sites had two peripheral townships, the sample size of 40 for the township zone was divided in half to accommodate both areas in each town. GPS coordinates were generated for each selected grid from its centre point. The household nearest to the GPS point was selected for the survey, and all other buildings/features excluded.

The interview schedule was in-depth and lengthy (between 30 – 90 minutes). A total of 135 respondents were interviewed in Queenstown and 137 in Phalaborwa (Table 1.1). The respondents preferably included the head of the household but, as this was not always possible, other adult household members could also be interviewed. The survey captured detailed information on a

household level, as well as information on any migratory movements of the household members and information on their surrounding environment.

Table 3.1: Number of respondents per town and zone

	CBD	Suburb	Townships	Rural
Queenstown	35	30	40	30
Phalaborwa	35	30	42	30

The focus of the interview was centred on natural capital that the household could access from their immediate environment and selected natural resources were a part of the schedule.

Broadly, the survey covered the following topics (Appendix 1):

- Household data
 - Household profile (age, gender, education)
 - Physical capital (including wealth proxies)
 - Social capital (including recent shocks)
 - Financial capital (rental, remittances, grants, pensions, employment)
- Natural resources/capital:
 - Crop production
 - Fruit production
 - Livestock production
 - Wild natural capital (firewood, wild fruits, wild vegetables, mushrooms, honey, insects, wild meat, wild fish, medicinal plants, brooms, plant fibres for weaving and roofing, wooden housing poles and wooden fencing poles)

Some problems experienced in the data collection phase of the survey included the lengthy and in-depth nature of the interview schedule, which resulted in a handful of respondents not completing the full interview due to lack of time or unwillingness to divulge private information. Whilst the household selection process was random, not all pre-selected GPS points led to suitable households to interview as some potential respondents were not at home or available. Such households were replaced with the next available household in the immediate vicinity.

3.2.4 Data analysis

Data analysis for the interview was divided into three basic steps. Firstly, data were collated, summarised and basic analysis performed in Microsoft Excel. The total, percentage, mean and standard deviation values for each relevant section were calculated and summarised. This provided a preliminary overview on respondent household characteristics and attributes across the rural-urban continuum.

Natural resources were divided into three categories in the interview, namely agriculture, livestock and wild resources. Agriculture refers to crop and fruit production, whether it is practiced at the homestead or in separate fields or both. For overall comparison, respondents involved in crop or fruit production or both activities were considered as agricultural users. Agriculture and livestock refer to the use of domesticated natural resources, whilst wild resources are obtained from surrounding natural areas and not actively cultivated, as depicted in Figure 3.1.

Secondly, the proportion of households engaged in particular livelihood activities was calculated for the following categories:

- Agriculture (crop and fruit production)
- Livestock keeping
- Wild resource use
- Remittances
- Rentals
- Pensions (private)
- Grants (government welfare)
- Self-employment
- Wage employment

For the analysis of household proportions engaged in certain livelihoods, a two-tailed two proportion z-test with equal variances was used. The z-test of proportions was used to test for differences between livelihood activities between the two towns, as well as within each category along the rural-urban continuum for Queenstown and Phalaborwa individually. This test was selected because only categorical data were used and distribution normality of the data did not need to be taken into consideration. Only significantly different results were discussed.

Thirdly, the contribution of different livelihood activities to household income (cash and non-cash) was measured through calculating the South African Rand (ZAR) value for each natural resource and

income stream (refer to section 3.2.4.1 for a detailed explanation). This resulted in livelihood portfolios for Queenstown and Phalaborwa which displayed the ZAR value contribution for the livelihood activities of agriculture, livestock, wild resources, remittances, rentals, pensions, grants, self-employment and wage employment. The portfolio was based on the gross annual income ZAR value for each livelihood activity, from which the percentage, mean and standard deviation values were calculated. The percentage value was calculated for the natural resource and income streams to determine the degree each activity contributed to the overall economic portfolio for each town. Livelihood portfolios were then analysed and interpreted using a Principle Components Analysis (PCA) (refer to section 3.2.4.2) and were spatially displayed along the continuum using ArcGIS 10 (see section 3.2.4.3). Finally, poverty levels were measured using the economic data from these portfolios by comparing household incomes against existing poverty indicators (section 3.2.4.4).

3.2.4.1 Creating livelihood portfolios

To establish the extent that natural resources contribute to livelihoods along the rural-urban continuum, environmental resources used by respondents were converted into monetary values. Different livelihood activities could thus be compared using their relative monetary values as there is a common ground for the analysis. Hadju (2006) does caution against using this approach for livelihood analysis, as it cannot measure intangible benefits such as peace of mind from safety nets provided by having access to a particular resource. However, it does provide a means to visualise the relative contribution of different livelihood activities to overall livelihood portfolios. Monetary values were calculated in South African Rand (ZAR), which averaged US\$1 = R7.03 (± 0.19) during the period of data collection (August 2010 – November 2010).

When determining the relative value of the natural resources, the „own reported values“ approach was used (Cavendish 2001). Respondents who used certain natural resources were asked to estimate how much they harvested, as well as the price of the resource in local trade. If the price of a resource was unknown by a respondent, an average was given from the overall estimates of that particular resource. If a resource has no trade value or none of the users knew its local price, the value was taken from current literature on the particular resource within a South African context. Only the direct-use value was taken into consideration when calculating the monetary value of natural resources, taking seasonality (summer or winter harvesting) into account. The resource values were then summed per category (agriculture, livestock and wild natural resource) for each respondent household.

For crop and fruit resources produced by respondents in town, the local market price at the time of the interview was usually quoted and hence applied to determine the values. As people in town were less likely to trade agricultural resources, this price estimate was seen as a fair representation of what

respondents would otherwise have to buy from the local shop. Respondents living in the township and rural areas were more likely to trade crop and fruit products within the communities, so the local trade price was applied to these resources. Respondents involved in agricultural practices were asked to estimate the amount of produce they grew in the last planting season, along with the local price so that the overall, annual monetary value could be determined. For measurements of crop and fruit produce that were not given in units compatible with local market price units (e.g. R/kg), the average weight of the respective natural resources was calculated from a local fruit and vegetable market and applied to convert estimates of (e.g.) 100 apples into compatible units of „x“ amount of (e.g.) kilograms.

The relative value of livestock was more difficult to determine. Livestock is not necessarily sold or consumed on a yearly basis, but still holds value as it is viewed as a safety-net or a means of savings with potential high returns (Shackleton *et al.* 2005; Hadju 2006). As the monetary values calculated for the livelihood portfolios were on a direct-use yearly basis, relative values for livestock had to reflect this value. The annual herd or poultry growth per household per annum was thus determined by calculating the percentage increase of the animals per year (total herd number vs. number of offspring), and working out the price of the percentage increase (in relation to the local monetary value of the animal). If domestic animals and poultry were consumed or sold within a year or produced other tangible benefits such as eggs, milk, manure, ploughing and transport services; these monetary values were also added.

The value of wild natural resources relied mainly on respondents using these resources, with average values substituted for unknown prices. Local prices which were unknown by respondents which utilised these resources included wild herbs, wild fruit, wooden fencing poles, wild fish and wild honey. These values were taken from literature by Shackleton *et al.* (2001), Shackleton (2003), Timmermans (2005) and Shackleton *et al.* (2007b). The values of the wild resources were calculated according to the amount the respondents claimed to collect per unit time multiplied by the local price of that given amount (according to the respondent). Many of the names of the wild resources were given in local languages, and different species for Queenstown and Phalaborwa were identified with assistance from the Schonland Herbarium in Grahamstown and Kruger National Park, respectively (Appendix 2).

The cash income streams were derived from the respondents by asking the amount they received from a particular income stream, as well as the frequency this amount was paid to allow calculation of per annum incomes. The survey divided up these potential cash income streams into rentals, remittances, welfare grants, pensions, self-employment/own trade and wage employment. As income information is sensitive, approximate amounts were given by respondents not willing to disclose their exact income amount (and over-time pay was also excluded). A few respondents were not willing to divulge

any information regarding their cash income and these households were excluded entirely from the livelihood portfolios. Consequently, the sample size for households analysed in the livelihood portfolio in Queenstown was 125 and 121 in Phalaborwa.

For the purpose of this study, a clear distinction was drawn between government welfare grants and pensions, as many respondents in the town areas received private pensions from previous employment and these pensions should not be confused with „pensions“ given by government to qualifying elderly people. Approximate amounts paid out by SASSA (South African Social Security Agency) for 2010 were as follows (SASSA 2011):

- Old persons grant (Old age pension): R1 080 per month
- Disability grant: R1 080 per month
- Child support grant: R250 per month
- Foster child grant: R710 per month

3.2.4.2 Analysing livelihood portfolios

To assess livelihood links between different income streams a Principle Components Analysis (PCA) was used to test associations between various livelihood strategies. Cash and non-cash income streams were based on the annual value (ZAR) each household received as per Figure 3.1. Household and wealth attributes were also included to test for any association between income streams and these attributes.

Household attributes consisted of the following:

- Land/house ownership status (private, communal, rent)
- Plot size (m²)
- Number of years each household had resided in the area at that time
- Gender of household head
- Age of household head (years)
- Education of household head (number of years in formal education)
- Household position on the rural-urban continuum

Wealth attributes consisted of:

- Number of assets each household could access (car, motorbike, bicycle, tractor, plough, fridge, television and cell phone)
- Monthly household expenditure (ZAR) on electricity

Regression analysis was used for any potentially interesting associations revealed by the PCA between income streams and household attributes for each town. All statistical tests for the PCA and any subsequent regression analysis were run through Statistica 10 and only significant results are discussed.

3.2.4.3 Spatialising livelihood strategies

Livelihood classes were created using economic data from the livelihood portfolios from the livelihoods survey. The concept of a livelihood class was based on a typology, where respondent households with similar characteristics relating to livelihood strategies used were grouped (Patton 2002). Livelihood strategies were based on the customised SLF (Figure 3.1), where different income streams were grouped into wage, independent and state-dependent income categories; whilst domestic and wild natural resource use categories represented monetary values for any natural resource use by respondent households. The percentage each strategy contributed to respondent households was then calculated.

These data were analysed using a k-clustering technique carried out in Statistica (version 10). The input data consisted of five variables which represented the livelihood strategies of the customised SLF from the merged data set of respondent households for Queenstown and Phalaborwa. These variables were analysed according to the percentage each potential livelihood strategy contributed to individual respondent households. Chi-squared analysis was used to test for significant differences between livelihood classes in Queenstown and Phalaborwa. Once the classes were created and assigned to each respondent household, the GPS points were mapped on the aerial images of Queenstown and Phalaborwa using ArcGIS 10 software. The distributions of different livelihood classes were then visually displayed and interpreted along the rural-urban continuum for each town.

3.2.4.4 Calculating poverty levels

Poverty incidence was measured for Queenstown and Phalaborwa through contrasting the total income of respondent households against a number of national and international poverty indicators. National poverty indicators included the South African poverty line from the National Treasury (2011) at R283 per person per month in 2008 and the OECD poverty line from Leibbrandt *et al.* (2010) at R515 per person per month in 2008. The indigence line from Stats SA was also used and valued at R30 240 per family of four per year in 2008 (Davenport *et al.* 2012). Global poverty indicators were measured according to „US\$1 per person per day“ and „US\$2 per person per day“ and calculated at US\$1 = 7.03 for 2010 (Stats SA 2007).

The poverty indicators were adjusted to represent monetary values for 2010 using the average inflation rate per annum. The inflation rate in South Africa was obtained from Stats SA (2011) and was 7.1 % for 2009 and 4.3 % in 2010. Once the incomes from livelihood portfolios were measured against the various poverty indicators, the proportion of poor households was calculated. Dominant livelihood class types were then determined for impoverished households. Chi-squared analysis was used to test for significant differences between poor and non-poor households across the continuum experiencing hunger in Queenstown and Phalaborwa.

3.3 Results

3.3.1 Household attributes along the continuum

In Queenstown and Phalaborwa, the majority of households in the town section owned their properties with title deeds (80.0 % in Queenstown and 63.3 % in Phalaborwa). Approximately 65.7 % of dwellings in the Queenstown CBD were owned by respondents and 94.3 % in Phalaborwa. The remainder of respondents in the town and CBD sections of the two towns rented their properties. The ownership status differed between the towns in the township areas, as 97.5 % of Queenstown respondents owned their homesteads with a title deed; however 71.4 % of township respondents in Phalaborwa owned their homesteads through customary means. All respondents in the Queenstown rural area owned their homesteads through customary law, whilst 76.7 % of Phalaborwa respondents owned their land through customary means and the remainder through private ownership (with a title deed).

Plot sizes varied across the continuum and were larger in Phalaborwa in all sections but rural areas. In Queenstown town, households had an average plot size of 1 363 ($\pm$ 194) m² compared to 1 574 ($\pm$ 543) m² in Phalaborwa. The CBD in Queenstown had an average plot size of 1 084 ($\pm$ 247) m² and Phalaborwa an average of 1 368 ($\pm$ 312) m². The townships had an average of 646 ($\pm$ 376) m² and 844 ($\pm$ 203) m² in Queenstown and Phalaborwa, respectively. Queenstown rural households had an average of 4 132 ($\pm$ 2 802) m², whilst rural plot sizes in Phalaborwa were an average of 2 098 ($\pm$ 1 073) m².

All respondents in the town and CBD areas of Queenstown and Phalaborwa had access to electricity and piped water within their homesteads. Similarly, all respondents in the townships of Phalaborwa had access to electricity and water on their properties. However, in Queenstown 12.5 % of respondent households in the township sections did not have access to electricity and 5.0 % did not have piped water at their homesteads. All rural respondents in Queenstown had access to electricity but 90.0 % of

households did not have piped water at their homestead. In rural areas of Phalaborwa, 96.7 % of respondents had access to electricity but 56.7 % did not have piped water on their properties.

Respondents gave a wide range of years they had resided in each respective area; however there was a trend of increasing permanence from the town centre outwards. On average, households in the town section had resided for 21.1 ($\pm$ 19.9) years in Queenstown and 12.4 ($\pm$ 12.4) years in Phalaborwa. In the CBD respondents had resided in Queenstown and Phalaborwa an average of 15.2 ($\pm$ 14.8) years and 18.4 ($\pm$ 12.4) years, respectively. Households in the townships had lived in the study towns an average of 22.6 ($\pm$ 14.9) years in Queenstown and 24.6 ($\pm$ 14.4) years in Phalaborwa. Respondent households in rural areas had lived in the Queenstown area for 31.5 ($\pm$ 15.2) years and 39.2 ($\pm$ 22.4) years in the Phalaborwa rural area.

The number of people residing in each respondent household varied across the continuum; however averages were fairly consistent. In the town of each study site, an average of 3.6 ($\pm$ 1.7) people lived in Queenstown respondent households and 3.7 ($\pm$ 1.4) people per household in Phalaborwa. An average of 4.1 ($\pm$ 1.5) and 4.0 ($\pm$ 1.4) people per household were found in the CBDs of Queenstown and Phalaborwa, respectively. The respondent households in the township sections had an average of 3.6 ($\pm$ 1.7) people per household in Queenstown and 4.4 ($\pm$ 1.9) in Phalaborwa. In the rural sections, the average respondent household had 3.4 ($\pm$ 1.8) and 4.4 ($\pm$ 1.8) people per household in Queenstown and Phalaborwa, respectively.

The majority of respondent households were male-headed (76.7 % in Queenstown and 83.3 % in Phalaborwa). In the CBD, 57.1 % and 68.6 % of households were male-headed in Queenstown and Phalaborwa, respectively. The majority (55.0 %) of households were female-headed in the Queenstown townships and conversely 57.1 % were male-headed in the Phalaborwa townships. The majority (63.3 %) of respondent households were male-headed in rural areas of Queenstown, whilst the Phalaborwa rural households were 50.0 % male- and 50.0 % female-headed.

The age of the household head in the towns was an average 52.0 ($\pm$ 12.0) years in Queenstown and 48.9 ($\pm$ 12.3) years in Phalaborwa. The average age in the CBD was 46.7 ($\pm$ 12.5) and 47.4 ($\pm$ 12.7) years in Queenstown and Phalaborwa, respectively. In the townships, the household head averaged at 50.5 ($\pm$ 16.3) years old in Queenstown and 49.7 ($\pm$ 13.6) in Phalaborwa. The average age in rural areas was 60.8 ($\pm$ 13.8) and 50.2 ($\pm$ 14.3) years in Queenstown and Phalaborwa, respectively. The education of the household head was measured in number of years and tended to decrease from the CBD outwards. Household heads in the towns received an average of 14.6 ($\pm$ 2.7) years of education in Queenstown and 13.4 ($\pm$ 2.1) in Phalaborwa. The household head in the CBD had an average of 13.3 ($\pm$ 3.4) and 13.4 ($\pm$ 2.9) years of education in Queenstown and Phalaborwa, respectively. The

Queenstown townships had an average of 7.7 ($\pm$ 4.3) years and Phalaborwa 10.4 ($\pm$ 3.5) years. Rural areas had an average of 5.8 ($\pm$ 4.8) and 7.4 ($\pm$ 4.4) years of education in Queenstown and Phalaborwa, respectively.

3.3.2 Natural resource use along the continuum

Overall, more households in Phalaborwa were engaged in natural resource use activities, with a significantly higher engagement in agriculture and wild resource utilisation (Table 3.2). There was no difference in the proportion of households with livestock between Queenstown and Phalaborwa. For each town there were no significant differences between agricultural, livestock and wild resource users and their position on the continuum.

Table 3.2: Proportion of households (%) engaged in natural resource use in Queenstown and Phalaborwa

	Queenstown % (n=135)	Phalaborwa % (n=137)	z-statistic	Significance
Agriculture	45.9	77.4	4.1	p < 0.05
Livestock	22.2	13.9	0.7	p > 0.05
Wild Resources	32.6	72.3	4.5	p < 0.05

3.3.2.1 Agriculture

There were higher proportions of households engaged in agriculture along the continuum in Phalaborwa when compared to Queenstown (Table 3.3). Over half of respondent households in Phalaborwa engaged in some form of crop and fruit production in all sites along the continuum, with the highest proportion (88.1 %) of cultivator households located in the townships. In contrast, only in town and the rural areas of Queenstown did more than half of the respondent households engage in agriculture, where the highest percentage (63.3 %) of users were found in rural sites. The lowest proportions of agricultural users along the continuum were situated in the town of Phalaborwa and the townships of Queenstown.

Table 3.3: Agricultural users across the continuum in Queenstown and Phalaborwa

	Queenstown (%)	Phalaborwa (%)
CBD	40.0	82.9
Town	56.7	56.7
Township	30.0	88.1
Rural	63.3	76.7

3.3.2.2 Livestock

Livestock keeping in Queenstown and Phalaborwa was not widely practiced and largely restricted to the rural sections in both towns (Table 3.4). Rural households in Queenstown (70.0 %) had a much higher proportion of livestock users when compared to Phalaborwa (46.7 %). The town and CBD sties in Queenstown and Phalaborwa had the lowest proportions of households using livestock.

Table 3.4: Livestock users across the continuum in Queenstown and Phalaborwa

	Queenstown (%)	Phalaborwa (%)
CBD	8.6	2.9
Town	6.7	3.3
Township	10.0	7.1
Rural	70.0	46.7

The most commonly kept livestock by the Queenstown rural respondents were cattle and chicken, followed by goats and sheep. The main reasons given for keeping livestock in rural Queenstown areas were for (i) household food purposes, (ii) cultural or ritual occasions, (iii) direct cash income and (iv) investment purposes. Commonly kept livestock within rural Phalaborwa sites were predominately restricted to chickens and goats. Rural respondents in Phalaborwa said they kept livestock for (i) household food purposes and (ii) investment purposes.

Township households in Queenstown commonly kept chickens and goats for household consumption purposes, but goats also fulfilled cultural requirements. In Phalaborwa, township households were restricted to poultry (used for household consumption), as larger livestock were not permitted in these areas by the local municipality. In town and CBD sites, households only kept poultry on their properties, whereas larger livestock were kept at homesteads owned by respondent households in rural areas.

3.3.2.3 Wild natural resources

Phalaborwa had a much higher proportion of households involved in the use of wild resources in comparison to Queenstown, and this trend was reflected in all zones along the rural-urban continuum (Table 3.5). The highest use of wild resources was concentrated in the rural areas for both towns, where all rural respondents in Phalaborwa used wild resources and 80.0 % in Queenstown. The townships in Phalaborwa also had a high usage of wild resources (88.1 %), but were substantially lower in the Queenstown townships at 30.0 %. In Queenstown, the CBD and town had the lowest

proportions of households using wild resources; however, surprisingly, the Phalaborwa CBD had a high wild resource use as well over half (74.2 %) of households in this site utilised these resources.

Table 3.5: Wild resource users across the continuum in Queenstown and Phalaborwa

	Queenstown (%)	Phalaborwa (%)
CBD	8.6	74.3
Town	16.7	20.0
Township	30.0	88.1
Rural	80.0	100.0

Phalaborwa also had a much wider variety of wild resources when compared to Queenstown (Table 3.6). Edible insects were the most commonly used wild resource amongst user households in Phalaborwa and this largely consisted of the mopane worm (larvae of the mopane moth *Imbrasia belina*). Firewood (predominately *Colophospermum mopane* and *Combretum apiculatum*), brooms (made from grasses and twigs) and wild fruits (such as *Sclerocarya birrea* subsp. *caffra* and *Ximenia americana*) were also widely utilised in Phalaborwa. Firewood (dominated by *Acacia karroo*) was the most commonly utilised resource by user households in Queenstown. Wild meat, such as grey duiker (*Sylvicapra grimmia*), black-backed jackal (*Canis mesomelas*) and hares (*Lepus saxatilis*), and wild vegetables (for example *Amaranthus hybridus*) were also fairly common amongst user households in Queenstown.

Table 3.6: Types of resources utilised by households engaged in wild resource use

	Queenstown (%)	Phalaborwa (%)
Firewood	93.2	59.6
Wild Meat	18.2	1.0
Wild Vegetables	9.1	19.2
Wild Fruit	6.8	23.2
Roofing	6.8	1.0
Brooms	4.5	44.4
Mushroom	2.3	0.0
Honey	2.3	2.0
Medicinal Plants	2.3	4.0
Weaving	2.3	9.1
Insects	0.0	65.7
Wild Fish	0.0	12.1
Housing Poles	0.0	0.0
Fencing Poles	0.0	4.0

The amount of wild resource types utilised per household was then determined for households engaged in this resource use for the two study sites. Overall, Queenstown had the least number of wild resources used per respondent household, where over half of these households (59.1 %) utilised only one wild resource (Figure 3.2). Households in Phalaborwa accessed a wide variety of wild resources (Table 3.6), and this is reflected in Figure 3.2 as up to eight resources were used per household in Phalaborwa. Wild resource use was far more limited in Queenstown and only up to three resources were utilised per household.

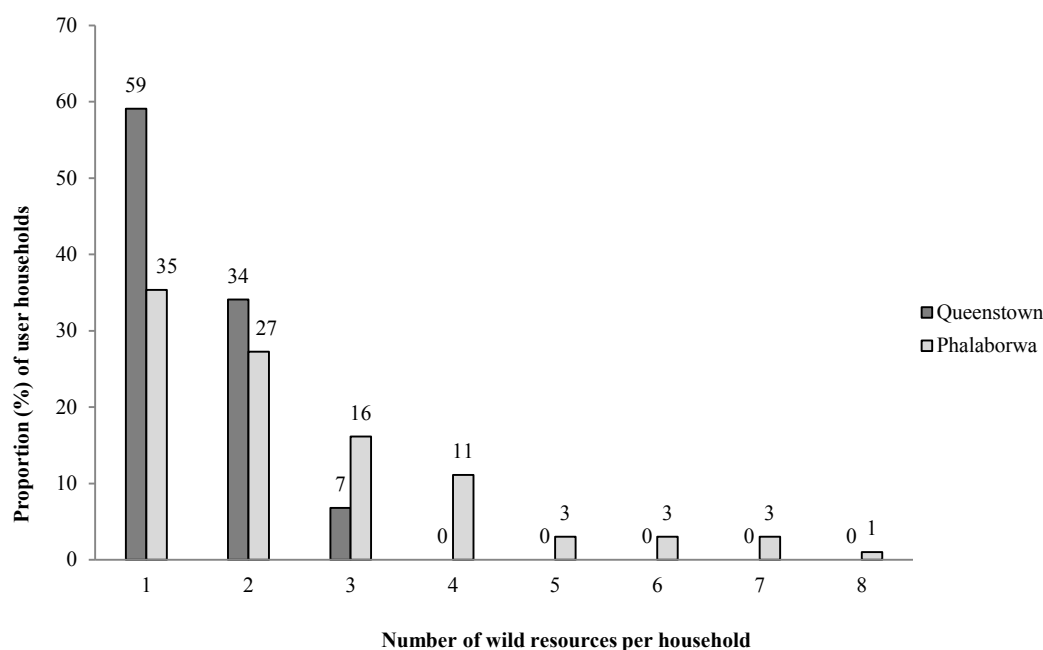


Figure 3.2: Proportion of households (%) using a combination of wild resources in Queenstown and Phalaborwa

3.3.3 Cash income streams along the continuum

Possible cash income streams were divided into remittances, rentals, pensions, grants, self-employment and wage employment. There were no significant differences between the proportion of households engaged in any given income stream and position on the continuum for Queenstown or Phalaborwa.

Overall, the majority of respondent households in Queenstown (60.7 %) and Phalaborwa (62.0%) relied on formal employment for cash income (Table 3.7). A fairly high proportion of households also derived cash income from state grants as 45.2 % and 37.2 % of households received some form of grant income in Queenstown and Phalaborwa, respectively. In both towns the lowest proportion of

households received cash income from rentals, with only 8.1 % in Queenstown and 6.6 % in Phalaborwa engaged in this income stream.

Table 3.7: Percentage of households with cash income streams in Queenstown and Phalaborwa

	Queenstown (%)	Phalaborwa (%)
Wage employment	60.7	62.0
Grants	45.2	37.2
Self-employment	17.8	31.4
Pensions	13.3	7.3
Remittances	10.4	13.1
Rentals	8.1	6.6

3.3.3.1 Queenstown

Across the continuum in Queenstown (Table 3.8), employment income streams made the highest contribution to households in the CBD (77.1 %) and town (73.3 %). State grants made the highest contribution to households in the townships (72.5 %) and rural (70.0 %) areas of Queenstown. Remittance income streams made the lowest contributions to households in the CBD (8.6 %) and town (3.3 %); whilst rentals contributed the least to households in the townships (5.0 %) and rural (0.0 %) areas.

Table 3.8: Income stream distribution (%) amongst households along the continuum in Queenstown

	CBD (%)	Town (%)	Township (%)	Rural (%)
Wage employment	77.1	73.3	52.5	40.0
State grants	22.9	10.0	72.5	70.0
Self-employment	17.1	40.0	7.5	10.0
Pensions	11.4	20.0	0.0	26.7
Remittances	8.6	3.3	10.0	20.0
Rentals	14.3	13.3	5.0	0.0

3.3.3.2 Phalaborwa

In Phalaborwa, wage employment income streams made the highest contributions to households in the CBD (82.9 %), town (76.7 %) and townships (57.1 %) (Table 3.9). The majority (76.7 %) of households in the rural areas were reliant on state grants for cash income. In the CBD and town state grants made the lowest contribution to these households, with only 11.4 % in the CBD and 3.3 % in

town engaged in this income stream. Rentals made the lowest contribution to households in the townships (0.0 %); whilst both rentals and pensions made the lowest contribution to households in the rural areas (both 0.0 %).

Table 3.9: Income stream distribution (%) amongst households along the continuum in Phalaborwa

	CBD (%)	Town (%)	Township (%)	Rural (%)
Wage employment	82.9	76.7	57.1	30.0
State grants	11.4	3.3	54.8	76.7
Self-employment	37.1	26.7	35.7	23.3
Pensions	11.4	16.7	2.4	0.0
Remittances	17.1	3.3	19.0	10.0
Rentals	17.1	10.0	0.0	0.0

3.3.4 Relative contribution of natural resources to livelihood portfolios

Table 3.10 illustrates the overall mean annual contributions cash income streams and natural resources made to livelihood portfolios in Queenstown and Phalaborwa. In both towns, wage employment activities made the largest mean annual ZAR contribution to livelihood portfolios with R111 540 ($\pm$ R176 250) in Queenstown and R117 633 ($\pm$ R192 434) in Phalaborwa. Grants contributed a similar mean annual value of R4 759 ($\pm$ R6 683) and R4 371 ($\pm$ R6 963) in Queenstown and Phalaborwa, respectively. The contribution from remittances was the lowest in both towns within the cash income streams, as it contributed an average of R763 ($\pm$ R2 690) in Queenstown and R1 063 ($\pm$ R3 766) in Phalaborwa per annum.

The mean annual contribution of wild resources was low in Queenstown at R869 ($\pm$ R2 175) in comparison to Phalaborwa where it was R6 881 ($\pm$ R19 593). In Queenstown, firewood had the highest mean annual ZAR value of R676 ($\pm$ R1 575) along the continuum, followed by wild meat at R165 ($\pm$ R1 364) and honey at R14 ($\pm$ R155). In Phalaborwa, firewood made the largest mean annual contribution at R2 496 ($\pm$ R7 542), followed by edible insects at R2 216 ($\pm$ R6 748) and wild vegetables at R1 857 ($\pm$ R15 235) across the continuum.

Overall, agriculture made the lowest mean annual contribution to livelihood portfolios in Queenstown at R342 ($\pm$ R861). However, the agricultural contribution was considerably higher in Phalaborwa at R3 557 ($\pm$ R15 618). In Queenstown crops made a larger contribution across the continuum of an annual average of R185 ($\pm$ R677) in comparison to fruits of R158 ($\pm$ R489). In Phalaborwa fruits

made the largest mean annual contribution across the Phalaborwa continuum at R2 037 ($\pm$ R13 608) in comparison to crops at R1 521 ($\pm$ R8 032).

Table 3.10: Mean annual livelihood income (ZAR) per household contributions in Queenstown and Phalaborwa

	Queenstown (ZAR)		Phalaborwa (ZAR)	
	Mean	Standard deviation	Mean	Standard deviation
Wage employment	111 540	176 250	117 633	192 434
Self-employment	10 910	57 836	10 688	28 843
State grants	4 759	6 683	4 371	6 963
Pensions	8 167	27 357	6 268	24 819
Rentals	1 598	7 059	1 795	8 343
Remittances	763	2 690	1 063	3 766
Wild resources	869	2 175	6 881	19 593
Livestock	2 401	6 729	2 674	28 175
Agriculture	342	861	3 557	15 618

3.3.4.1 Queenstown

Wage employment activities made the highest contribution to livelihood portfolios in all sections across the continuum for Queenstown (Table 3.11). Wage employment made the highest contributions to households in the CBD (88.7 %) and town (76.4 %). Whilst formal employment activities contributed the most to township households at 67.1 %, government grants also made an important contribution of 21.3 % to the township livelihood portfolio. The rural economic portfolio drew on a number of potential income categories, with the majority of contributions still derived from formal employment activities (35.3 %). Grants contributed 18.9 % to the rural economic portfolio, followed by livestock at 17.5 % and pensions at 11.6 %.

The contribution of wild resources remained low in Queenstown, where the highest contribution was found in the rural section at 7.2 %. The wild resources with the highest mean annual contribution in the rural section were firewood at R2 052 ($\pm$ R2 528), wild meat at R670 ($\pm$ R2 756) and wild vegetables at R26 ($\pm$ R99). Agriculture made a minimal contribution along the continuum in Queenstown, with the highest contribution once again in the rural section (1.8 %). Crops made the highest mean annual contribution in the rural section at R647 ($\pm$ R1 274), whilst fruits only contributed R44 ($\pm$ R228) in this area.

Table 3.11: Mean annual percentage (ZAR) contributions per household of livelihood incomes in Queenstown

	CBD (%)	Town (%)	Township (%)	Rural (%)
Wage employment	88.7	76.4	67.1	35.3
Self-employment	3.6	13.9	7.3	3.1
State grants	0.7	0.4	21.3	18.9
Pensions	4.5	7.6	0.0	11.6
Rentals	1.3	1.2	0.7	0.0
Remittances	0.2	0.0	1.6	4.6
Wild resources	0.0	0.0	1.6	7.2
Livestock	0.8	0.4	0.4	17.5
Agriculture	0.1	0.2	0.0	1.8

3.3.4.2 Phalaborwa

Similarly to livelihood portfolios in Queenstown, formal wage employment activities made the largest contribution in the CBD (80.3 %), town (84.3 %) and townships (75.0 %) of Phalaborwa (Table 3.12). Self-employment activities also made important contributions to households in the CBD (8.0 %) and town (6.7 %); whilst social grants remained important in the townships (7.9 %) and rural (15.7 %) areas. The rural section of Phalaborwa had a unique portfolio as formal employment activities did not make the highest contribution to rural households. Instead, wild resources made the highest contribution in the rural (48.0 %), and some resources included firewood at a mean annual amount of R9 931 ($\pm$ R13 688), wild vegetables/spinach at R8 454 ($\pm$ R32 490) and edible insects at R6 487 ($\pm$ R10 475).

Agriculture also made a fairly substantial contribution to rural households (14.4 %), with crops giving a higher mean annual contribution of R6 810 ($\pm$ R16 507) in comparison to fruits at R1 030 ($\pm$ R3 559). Township households also received a relatively high contribution from agriculture at 5.9 %; from which fruit production gave a higher mean annual contribution of R5 104 ($\pm$ R24 364) than crops at R114 ($\pm$ R214) in this area. The contribution from livestock remained low across the continuum in Phalaborwa; however the CBD derived the highest contribution at 4.4 %. This is not necessarily a fair representation of all respondents in the CBD as only one respondent used livestock as a cash income stream; however due to the large number of cattle, it made a sizable contribution of R310 000 per annum to his livelihood portfolio.

Table 3.12: Mean annual percentage (ZAR) contributions per household of livelihood incomes in Phalaborwa

	CBD (%)	Town (%)	Township (%)	Rural (%)
Wage employment	80.3	84.3	75.0	15.1
Self-employment	8.0	6.7	5.9	5.0
State grants	0.5	0.2	7.9	15.7
Pensions	3.4	7.0	0.9	0.0
Rentals	1.6	1.5	0.0	0.0
Remittances	0.6	0.3	1.7	1.1
Wild resources	0.9	0.0	2.5	48.0
Livestock	4.4	0.0	0.1	0.8
Agriculture	0.4	0.1	5.9	14.4

3.3.5 Livelihood relationships along the continuum

3.3.5.1 Queenstown

In Queenstown, there was a strong association between employment income and household attributes of electricity, assets and education (Figure 3.3). Conversely, there was also a strong association between position on the continuum, wild resource income and years lived in Queenstown and age of the household head. These associations imply that wealthier urban households, as indexed by number of assets and electricity expenditure, tend to have high income-earning jobs. This is also correlated with high education. These wealthier households are mostly located in the CBD and town areas. Grant incomes had a weak negative association with household characteristics associated with wealth and were more common in rural than urban settings.

Households which are situated on the other end of the continuum (in rural areas) are more closely associated with income streams generated from wild resource use ($r^2 = 0.2$; $p < 0.01$). Rural households also tend to have resided in their dwellings for longer periods and their household heads tend to be older than their urban counterparts ($r^2 = 0.1$; $p < 0.01$). Ownership status had a negative association with plot size and livestock, whilst livestock and gender were also weakly negatively associated (i.e. female-headed households had fewer livestock). Livestock and agricultural income had a weak association with plot size, implying that male-headed households tended to own livestock and activities associated with livestock keeping and agriculture were more likely to take place on larger plots (predominately by rural households). Income from self-employment, pensions, remittances and rentals did not have any strong correlations between other income streams and household attributes.

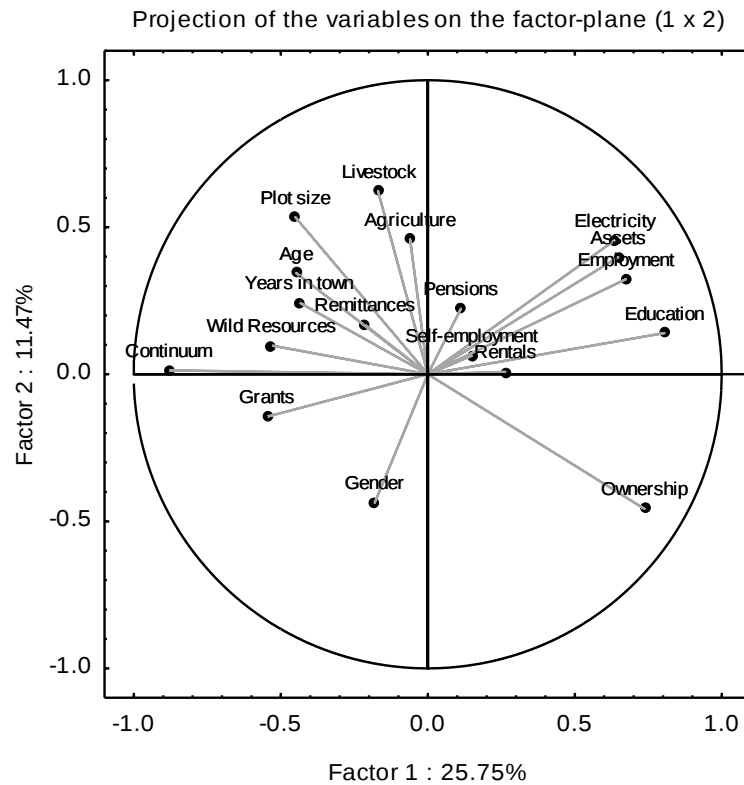


Figure 3.3: Principle Components Analysis reflecting association between different income streams and household attributes in Queenstown

3.3.5.2 Phalaborwa

In Phalaborwa, there was a strong association between income streams from formal employment and household wealth attributes and ownership (Figure 3.4), implying that households with formal jobs tend to have good access to electricity, assets and private land ownership (title deed). There was a negative association between position on the continuum and household characteristics associated with wealth, indicating that households in rural areas were generally poorer ($r^2 = 0.4$; $p < 0.01$). There was a positive association between grants and the number of years a respondent spent living in the Phalaborwa area ($r^2 = 0.2$; $p < 0.01$), indicating that the longer respondents had lived in the area, the more likely they received government grants. As the majority of respondents had resided on average for longer in the township and rural sections, these households were most reliant on grant income sources.

There was an association between the age of the household head and wild resource income streams, implying that families of older household heads engaged more in the collection of wild resources than younger households. Income from self-employment, pensions, remittances, rentals, livestock and

agriculture did not have any strong associations between other income streams and household attributes.

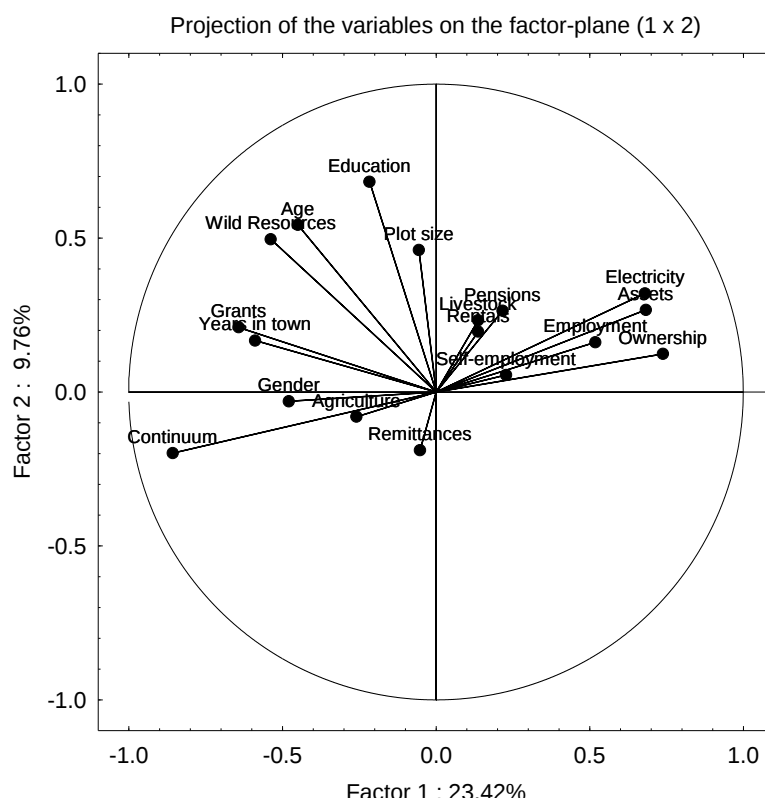


Figure 3.4: Principle Components Analysis reflecting the association between different income streams and household attributes in Phalaborwa

3.3.6 Livelihood classes along the continuum

The cluster analysis of the livelihood portfolios resulted in the formation of four livelihood classes, namely:

- Wage-dependent income
- State-dependent income
- Independent income
- Mixed income

Table 3.13 outlines the average contributions (%) made by each possible livelihood strategy within the four livelihood classes pursued by households in Queenstown and Phalaborwa (n = 245). The majority (61.2 %) of households in both sites were classified within the wage-dependent class, which was predominately reliant on income from formal employment, self-employment or own trade activities to procure a living. The state-dependent livelihood class consisted of contributions from government sources in the form of various grants was also important as this represented the second

highest proportion (18.8 %) of households. The mixed income class made up 10.2 % of households in both sites and consisted of a diversity of strategies with an emphasis on the contribution of natural resources in the form of domestic and wild resource use. The remaining 9.8 % of households were classified under the independent income class which relied predominately on income sources from private pensions, rentals and remittances.

Table 3.13: The percentage contribution of different sources for each livelihood class from Queenstown and Phalaborwa combined (n = 245)

Dominant source of income	Livelihood Class			
	Wage-dependent Income (%)	State-dependent Income (%)	Independent Income (%)	Mixed Income (%)
Domestic natural resource use	1.5	5.5	6.3	24.1
Wild natural resource use	1.4	6.9	3.7	46.4
Independent income	3.0	2.9	76.4	2.9
State-dependent income	1.8	75.6	5.9	16.4
Wages	92.3	9.2	7.7	10.2

There was a significant difference between Queenstown and Phalaborwa in terms of the proportion of households which made up the four different livelihood classes ($\chi^2 = 24.6$; $p < 0.001$). The majority of households in both towns are classified as wage income, where Phalaborwa had a higher proportion (63.3 %) of wage income households compared to Queenstown (59.2 %) (Figure 3.5). More households in Queenstown were classified into the grant and independent income groups, with almost twice (24.0 %) as many households reliant on state income in Queenstown in comparison to Phalaborwa (13.3 %). Conversely, more than twice (16.7 %) as many households in Phalaborwa were classified as the mixed income group in comparison to Queenstown (4.0 %).

These livelihood classes were then graphically displayed along the rural-urban continuum in Queenstown and Phalaborwa to depict possible community clusters which were spatially bound (Figures 3.6 and 3.7).

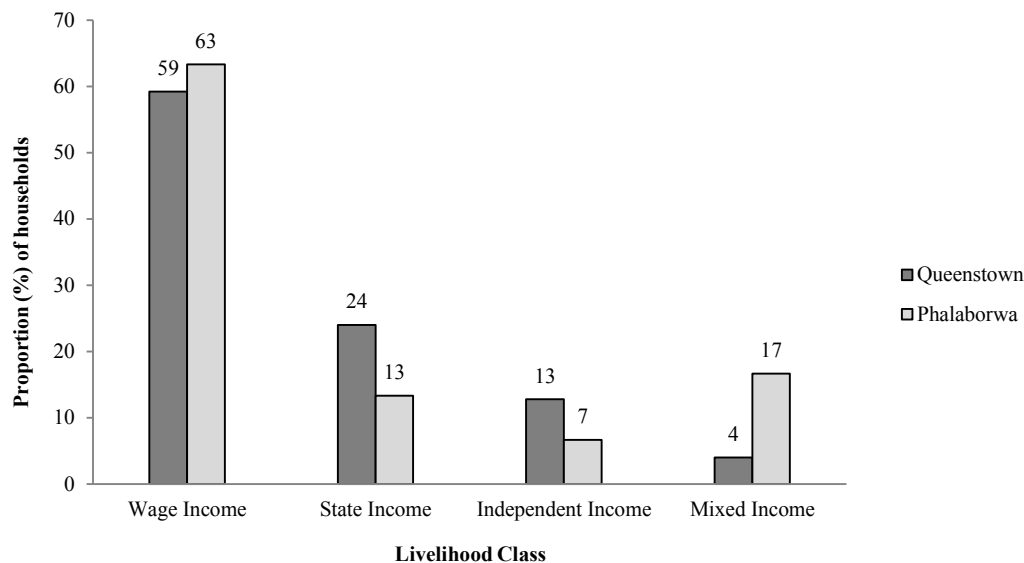


Figure 3.5: Proportion of households (%) in Queenstown and Phalaborwa in different livelihood classes

3.3.6.1 Queenstown

In the CBD and town of Queenstown, the majority of respondent households were classified in wage and independent income classes (Figure 3.6). None of the CBD and town households fell into state or mixed income classes for either town. In the Queenstown townships, the majority of households were classified in the state-dependent class and with a few in the wage income class. In the rural areas of Queenstown, household classes were more diverse and all four class types were located in this area; however the majority were still classified as the wage income class. The highest proportions of households classified as the mixed income class were located in the rural areas for Queenstown, indicating that rural livelihoods relied heavily on the natural resource base.

3.3.6.2 Phalaborwa

In Phalaborwa, the distribution pattern of livelihood classes along the rural-urban continuum is similar to Queenstown (Figure 3.7). Respondent households in the CBD and town were largely classified under wage or independent income classes, whilst the townships had a mix of predominately wage and state income classes. The rural areas in Phalaborwa differed from Queenstown in that the majority of respondent households fell into the mixed income class, with a few households classified as wage and state-dependent. The reliance on natural resources as a livelihood strategy was high in Phalaborwa and natural resource use combined with other livelihood strategies was common in the rural areas.

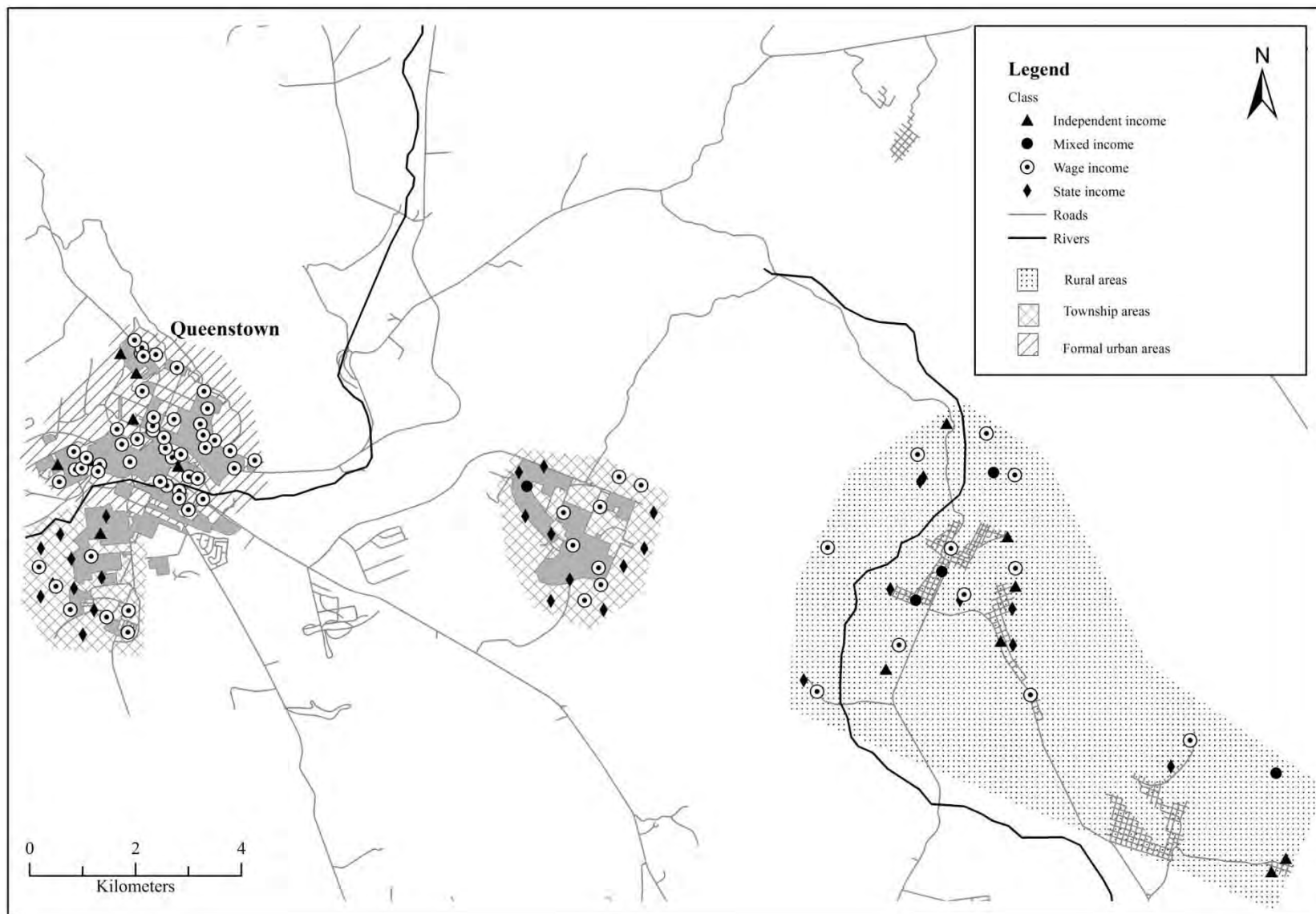


Figure 3.6: Location of livelihood classes in Queenstown



Figure 3.7: Location of livelihood classes in Phalaborwa

3.3.7 Livelihoods and poverty

On average, Queenstown had higher levels of poverty (19.0 %) across the continuum compared to Phalaborwa (10.2 %) (Table 3.14). Poverty levels increased by 1.0 % in Queenstown and 6.8 % in Phalaborwa when only wild natural resources were excluded from livelihood portfolios. Similarly, when all natural resource incomes were excluded from livelihood portfolios, the poverty levels in both towns increased to 23.7 % and 20.5 % in Queenstown and Phalaborwa, respectively.

Table 3.14: Proportion of households (%) under the poverty line in terms of their total income with and without wild and/or domestic natural resource use income

Benchmark	Value (ZAR)	Proportion (%) of households considered poor					
		Queenstown			Phalaborwa		
		Total income	Wild NR excluded	NR excluded	Total income	Wild NR excluded	NR excluded
Poverty line (National Treasury) 2008	R 316 ppm *	11.2	13.6	15.2	5.0	10.8	14.2
Poverty line (OECD) 2008	R 576 ppm*	22.4	22.4	29.6	15.0	22.5	27.5
Global poverty indicator US\$1 pppd	R 211 ppm	8.8	9.6	9.6	2.5	6.7	10.8
Global poverty indicator US\$2 pppd	R 422 ppm	15.2	16.8	20.8	10.0	18.3	20.0
Indigence line (StatsSA) 2008	R 33 780 phpa*	37.6	37.6	43.2	18.3	26.7	30.0
Mean		19.0	20.0	23.7	10.2	17.0	20.5
Standard deviation		11.6	10.9	13.2	6.6	8.2	8.3

Note: * Dated poverty lines adjusted to 7.1 % (2009) and 4.3 % (2010) average inflation; US\$1 = 7.03; pppd = per person per day; ppm = per person per month; phpa = per household per annum; NR = Natural resource

The overwhelming majority of households which fell below poverty levels were located in the townships and rural areas. When taking into consideration all income streams in Queenstown, an average of 48.2 ($\pm$ 20.9) % of township households were living in poverty, whilst coincidentally the same marginal increase to 49.7 ($\pm$ 20.0) % was observed when only wild resource and all natural resource incomes were excluded. In the Phalaborwa townships, 21.1 ($\pm$ 12.8) % of households fell under the poverty line, which was increased to 22.8 ($\pm$ 13.7) % when wild resources were excluded and, when all natural resource use was omitted, the average poverty incidence increased to 25.6 ($\pm$

12.6) %. An average of 15.3 ($\pm$ 19.8) % rural households in Queenstown were living in poverty and this increased to 17.3 ($\pm$ 18.5) % when wild resources were omitted; however when all natural resources were excluded poverty levels rose to 32.0 ($\pm$ 26.4) %. In Phalaborwa, an average of 17.7 ($\pm$ 12.9) % rural households fell under the mean poverty line, which increased to 46.9 ($\pm$ 19.5) % when wild resource revenues were omitted and, when all natural resource incomes were excluded, poverty levels increased to 59.2 ($\pm$ 21.0) %.

Respondent households which were considered poor were more likely to be classified as state-dependent households (Table 3.15). In Queenstown, 63.0 % of poor households were state-dependent, whilst in Phalaborwa 56.0 % were classed as state-dependent. Poor households were least likely to fall into the mixed income class in Queenstown; whilst in Phalaborwa independent income households had low poverty levels.

Table 3.15: The representation of livelihood classes (%) amongst poor households in Queenstown and Phalaborwa

Livelihood Class	Proportion (%) of poor households	
	Queenstown	Phalaborwa
Wage-dependent income	17.4	20.0
State-dependent income	63.0	56.0
Independent income	15.2	8.0
Mixed income	4.3	16.0

In Queenstown 27.1 % of households living under the poverty line went hungry at times, which was significantly higher than the 2.6 % households above the poverty line that experienced hunger periodically ($\chi^2 = 22.6$; $p < 0.001$). Approximately 20.0 % of poor households in Phalaborwa went to bed hungry at times, which was also significantly higher than the 6.3 % households above the poverty line that experienced hunger at times ($\chi^2 = 8.7$; $p < 0.005$). In Queenstown, poor households experienced hunger more frequently as these households went to bed hungry on average once every two weeks (16.0 ± 16.0 days), whilst in Phalaborwa poor households were more likely to go hungry once every three months (96.6 ± 124.0 days). The majority (61.5 %) of poor households experiencing hunger resided in the townships of Queenstown, whilst all poor households experiencing hunger resided in the rural areas of Phalaborwa. In Queenstown, the majority (61.5 %) of poor households experiencing hunger were classified as state-dependent, whilst in Phalaborwa the majority (60.0 %) were classified as mixed income classes.

3.4 Discussion

Urbanisation is becoming an increasingly important trend throughout the world as it restructures traditional notions of what is perceived as “urban” and “rural” (Tacoli 2006). Smaller urban centres are emerging as prominent players as they house over half of the world’s urban population (World Bank 2009), but have received scant attention in the consequences of this emerging phenomenon (Nel *et al.* 2011). Rural-urban links have played an important role in stimulating and supporting livelihoods as urbanisation trends have reshaped the rural-urban continuum, particularly in sub-Saharan Africa (Tacoli 2006). As such, natural resources are well known for the important role they play in rural livelihoods; however, little is known about the role natural resources (particularly wild resources) play along the rural-urban continuum, and even less is known about the contribution of these resources within an urban context (Slater & Twyman 2003). This study encompasses a broad range of household attributes, natural resources and income streams in order to examine livelihoods along the rural-urban continuum in smaller urban centres, and also to add insights to the limitations mentioned.

3.4.1 Household attributes along the rural-urban continuum

Household characteristics changed along the rural-urban continuum as urban areas offered different opportunities and constraints in comparison to rural areas. People living in urbanised areas tended to own their properties with private title deeds, whilst rural residents accessed their land through customary law. As rural sites were chosen in former homeland areas this is to be expected, as these areas still fall under local tribal authorities and hence are under customary law. Township residents have substantially smaller properties than people living in the formal urban areas, largely due to low-income housing or informal dwellings (McConnachie & Shackleton 2010). The rural areas had the largest homestead plot size, as expected. Families living in rural and township areas tended to live in these areas the longest in comparison to people living in the formal urban complex.

Service delivery was substantially better in the urban areas compared to rural areas, with on-site piped water the most prominent lacking service in the rural areas. In general, urban areas are considered to provide better access to a variety of basic services such as water supply, sanitation and waste management in comparison to rural areas (UNPD 2008). This can be attributed to economies of scale as it is easier to provide these services to geographically concentrated populations rather than their rural counterparts which are widely scattered (UNPD 2008). It is noted, however, by the UNPD (2008) that service access tends to be better in larger cities than in smaller towns.

People living in urban areas are also considered to benefit as average urban cash incomes are generally higher than those in rural areas (UNPD 2008). In general, urban dwellers tend to have better access to social services such as education and health care (UNPD 2008). Household heads residing in the formal urban areas of Queenstown and Phalaborwa tended to have the highest levels of education, whilst rural household heads had the lowest levels of education. The majority of households along the continuum were male-headed, with the exception of the Queenstown township area. On average, the household head tended to be in their late 40s to early 50s. The number of people per household did not differ substantially across the continuum with an average of four people residing in each household.

3.4.2 Natural resource use

Generally, households in Phalaborwa had a higher use of natural resources than those in Queenstown. Phalaborwa households had a significantly higher proportion of respondents engaged in agricultural activities and the utilisation of wild natural resources in comparison to Queenstown. This could be attributed to the surrounding environment of Phalaborwa – as it is situated in Mopani Bushveld with a subtropical climate. The subtropical climate provides ideal conditions for the growth of fruit trees such as mango, whilst the Mopani Bushveld offers an array of wild natural resources which were harvested by local people.

In comparison to Phalaborwa, a higher proportion of respondents kept livestock in Queenstown, particularly in the rural section and this could be attributed to cultural preferences (Lahiff 2003). The use of agriculture, livestock and wild resources did not differ significantly across the continuum in terms of the proportion of respondents engaged in natural resource use; however this could be attributed to low counts of users for each resource category.

3.4.2.1 Agriculture

Agricultural practices differed along the sampled continuum in each town, as well as between towns. The proportion of respondents engaged in agriculture was significantly higher in Phalaborwa in comparison to Queenstown. This was also reflected in the mean annual contribution agriculture made to households in each town, as it was substantially higher in Phalaborwa at R3 557 compared to Queenstown at R342. Respondents in the Queenstown rural section were most actively involved in agriculture in comparison to the urban area of the town. In Phalaborwa, this differed as the highest proportion of respondents were situated in the urban areas of the CBD and townships.

Research carried out in three small towns in the Eastern Cape found that home gardens contributed an annual average of R173 to municipal commonage user households (Davenport *et al.* 2012). While restricted to urban (township) areas, Davenport's *et al.* (2012) findings are comparable to results from agriculture in Queenstown of R342, indicating that in general Eastern Cape households do not derive a high contribution from agricultural practices. Agricultural activities in the Queenstown township areas made almost no contribution to people's livelihoods and was the lowest along the rural-urban continuum. Similar work done by Thornton (2008) found that home gardening activities undertaken in Grahamstown township areas contributed on average less than R100 per month. Thornton (2008) concluded that peri-urban agriculture did not make a significant contribution to food security in Eastern Cape towns and attributed this to the reliance of poorer households on government grants, small garden plots and negative attitudes of the youth towards agriculture. This is comparable to the Queenstown townships, as grants made the second highest contribution to township livelihoods after formal employment.

Agricultural practices in the Queenstown rural areas made the highest contributions to livelihoods in relation to other sections along the rural-urban continuum; however this was still relatively low in comparison to other income-generating activities within the rural section. Hadju (2006) found that agriculture (crop and fruit production) did not make a high contribution as agriculture only made up 3 % of average rural livelihood composition, with other income-generating strategies such as formal employment and grants making the highest contributions. This is comparable to Queenstown rural findings, as formal employment and grants were the top two contributors and agriculture only contributed 1.8 % to rural livelihoods. Hebinck & Lent (2007) plot the steady demise of agriculture over a long period in two villages in the Eastern Cape province.

Comparable research on the relative contribution of agriculture to livelihoods in small to medium towns is limited in the Limpopo Province; however related studies have been conducted in Limpopo villages. Dovie *et al.* (2005) carried out research in the rural village of Thorndale in the Limpopo Province looking at rural livelihood composition through monetary valuation. Crop production was found to contribute a net annual value of R2 723 to rural households, representing 15.4 % of total household income (Dovie *et al.* 2005). This figure is comparable to the overall agricultural contribution in Phalaborwa of R3 557. Within rural livelihood portfolios in Phalaborwa, agriculture represented 14.4 % of the total rural livelihood composition which is comparable to findings by Dovie *et al.* (2005). Township areas in Phalaborwa differed from Queenstown in that agriculture made the second highest contribution to livelihoods across the continuum at 5.9 %.

3.4.2.2 Livestock

Livestock husbandry was not widely practiced in the two towns and mainly restricted to rural areas. The overall contribution of livestock in Queenstown was an annual average of R2 401 per household. Work done by Davenport *et al.* (2012) indicated that livestock made an average annual contribution of R964 to municipal commonage user households across three towns in the Eastern Cape. Shackleton *et al.* (2005) indicated in a study that the mean annual value of livestock to rural households was R1 431 per annum, which included non-owning livestock households. Livestock practices made the highest contribution to rural households along the continuum and were the third highest contributor to rural livelihoods at 17.5 %, which was substantially higher than agriculture at 1.8 %. In rural Eastern Cape villages, work done by Hadju (2006) also pointed to livestock keeping making up a higher percentage of rural livelihood compositions at 6 % in comparison to agriculture at 3 %.

In Phalaborwa, livestock keeping made a mean annual contribution of R2 674, which was slightly higher than Queenstown. However, a higher proportion of respondents were involved in livestock practices in Queenstown and results in Phalaborwa were possibly skewed by one atypical respondent in the CBD section. The highest contribution from livestock keeping along the Phalaborwa continuum was found in the CBD section; however this was due to one respondent, who derived his livelihood by keeping cattle in the rural areas of Phalaborwa, and is not a fair representation of the overall sample. The rural areas in Phalaborwa had a considerably low contribution from livestock husbandry at 0.8 % compared to Queenstown at 17.5 % and these results are also not typical with other research conducted in rural villages in the Limpopo Province. Dovie *et al.* (2006) found that livestock contributed 22.7 % to rural livelihood portfolios, which accounted for the mean annual value of R4 029 in the Limpopo village of Thorndale. The incidence of livestock keeping was very low in the township areas of Phalaborwa; which perhaps could be attributed to different local government management strategies as the Phalaborwa municipality did not allow residents in urban areas to keep livestock other than poultry.

Types of livestock differed between the two towns and livestock owners in Phalaborwa tended to keep smaller animals such as goats and poultry. Reasons for keeping livestock in the Phalaborwa area was primarily for household consumption and investment purposes; however larger livestock owned by people in the formal urban area was used for direct cash income. Work done by Dovie *et al.* (2006) also showed that livestock in the rural Limpopo Province were kept for household consumption and savings/purchasing mechanisms. There were no important socio-cultural links associated with livestock keeping (Dovie *et al.* 2006).

Queenstown offered a more diverse array of livestock such as cattle, goats, sheep and poultry. In Queenstown and Phalaborwa, people living in formal urban areas did not keep larger types of livestock such as cattle, goats and sheep on their homesteads but rather in surrounding rural areas. Research carried out by Thornton (2008) indicated that urban livestock farmers in Grahamstown township areas kept an array of domesticated animals at home from poultry to cattle, goats and pigs. Similarly, livestock owners in Queenstown's townships also kept their animals on their homesteads; however the livestock types were restricted to smaller animals like goats and chickens. Livestock in rural areas were predominately used for subsistence purposes such as milk or meat for household consumption in Queenstown. However, as found by Hadju (2006) in rural villages in the Eastern Cape, domestic animals (particularly cattle) across the Queenstown continuum also fulfilled important ceremonial and cultural purposes, for example bridewealth or rite of passage for young men (Ainslie 2005; Hadju 2006). Even in the more urbanised areas of Queenstown, livestock owned by urban dwellers often had a cultural value, and this was also found by work done in Grahamstown township areas by Thornton (2008).

3.4.2.3 Wild natural resources

There was a significantly higher proportion of people using wild natural resources in Phalaborwa in comparison to Queenstown, which could possibly be attributed to the surrounding natural environment. Communities situated in northern provinces such as Limpopo tend to use multiple wild natural resource species, which have been found to include up to 300 different plant species (Shackleton & Shackleton 2004). Phalaborwa falls within the Mopani Bushveld and therefore has unique access to an abundance of resources not found in the Queenstown area. Wild natural resources such as mopane worms and marula fruits from *Sclerocarya birrea* subsp. *caffra* were commonly used in Phalaborwa across the rural-urban continuum. By comparison, wild natural resource use across the continuum in Queenstown was limited and other research indicates that fewer wild natural resources are used in the Eastern Cape province, which has been attributed to lower species diversity particularly in terms of woody plant species (Shackleton & Shackleton 2004; Paumgarten *et al.* 2005). Other factors which could contribute to the low use of wild resources in Queenstown are high land degradation rates due to heavy grazing practices in communal areas in the Eastern Cape (CSIR 2004).

The differences in wild natural resource use between Queenstown and Phalaborwa were reflected in the mean annual contribution these resources made to livelihood portfolios. Overall, Queenstown households received only R869 per annum from wild natural resources whilst Phalaborwa households received approximately R6 881 per annum. Davenport *et al.* (2012) found that wild resources across three Eastern Cape towns contributed a mean annual direct-use value of R2 373 for commonage users. Work by Twine *et al.* (2003) in rural villages of Limpopo found that wild natural resources

contributed an overall mean annual direct use value of R3 959 per household. Whilst this figure is lower than the overall value for wild resource use in Phalaborwa, the total annual value per household in the Twine *et al.* (2003) study ranged from R3 280 to R5 019 according to village sites. Shackleton & Shackleton (2004) compared 14 South African studies (with examples from the Eastern Cape, Limpopo and Kwa-Zulu Natal provinces) examining the rural use of wild resources and found that the mean direct-use value attached to savanna products was R3 854. This is comparable to the average of the overall mean annual values of wild resources in Queenstown and Phalaborwa at R3 889 ($\pm$ R4 232).

Firewood was one of the most commonly used wild natural resource in both Queenstown and Phalaborwa. Firewood is considered to be the primary source of energy for over 85 % of rural households in southern African countries (Makhado *et al.* 2009). Studies conducted by Makhado *et al.* (2009) in rural villages of Limpopo showed that although electricity, paraffin and gas were available in the area the majority of rural households made use of firewood as a cheaper, accessible alternative. The highest proportion of firewood users were situated in the townships and rural areas of Queenstown and Phalaborwa, even though the majority of respondent households had access to electricity. Phalaborwa had the highest usage of firewood as 93.3 % of rural households and 54.8 % of township households used this resource, which could be attributed to the surrounding Mopani Bushveld. One of the most commonly used tree species in Phalaborwa was *Colophospermum mopane* which occurs in this woodland biome. Makhado *et al.* (2009) showed that *Colophospermum mopane* was deemed highly valuable as fuelwood due to its ability to make long lasting coals. Edible insects were also widely used by households in Phalaborwa, which extended along the continuum with the highest proportion of users in the rural areas (83.3 %), followed by the townships (57.1 %) and CBD (37.1 %). The most commonly used insect was the mopane worm, which is also linked exclusively to the Mopani Bushveld and tree species *Colophospermum mopane*. Mopane worms have high nutritional value as they are rich in protein and fats, and also create seasonal employment opportunities due to the high demand for these lucrative resources (Makhado *et al.* 2009).

Roles that wild natural resources play in rural livelihoods have been well documented in South Africa (Twine *et al.* 2003; Shackleton & Shackleton 2004; Makhado *et al.* 2009). Evidence from such studies suggest that wild natural resources make an important contribution to rural livelihoods as food for direct household consumption, to generate income and act as safety nets in times of hardship (Shackleton & Shackleton 2004; Shackleton 2005). Households in rural areas were highly dependent on wild natural resources in both Queenstown and Phalaborwa as between 80 to 100 % of people in these areas made use of these resources. In Queenstown, wild natural resources contributed 7.2 % to rural livelihood portfolios. This figure is comparable to work done by Hadju (2006) as the combined value of wild resource use in rural Eastern Cape villages contributed 5.5 % which is subject to

accessibility and availability of the surrounding natural environment. Research carried out by Dovie *et al.* (2005) showed wild natural resources in rural Limpopo contributed 19.7 % to households in comparison to other agricultural, livestock and cash income strategies. Rural livelihoods in Phalaborwa derived the highest contribution from wild natural resources at 48.0 % in comparison to other livelihood strategies. Wild resources contributed marginally to people living in the township areas of the two sites, and barely made a contribution to people living in the CBD and town.

3.4.3 Cash income streams

It has been recognised that urban households are more reliant on the cash economy in comparison to their rural counterparts, as rural households tend to rely on a combination of subsistence and cash income strategies (Slater & Twyman 2003). Ellis (1999) noted that 30 % to 50 % of rural households in sub-Saharan Africa rely on non-farm income, whilst Davenport *et al.* (2012) found that cash income streams could contribute up to 80 % to urban households in the Eastern Cape. Urban areas tend to have more employment opportunities in comparison to rural areas, thus rely more on the household's ability to earn cash income and are subjected to economic drivers such as food market prices (Alemu 2010; Ruel *et al.* 2010; Davenport *et al.* 2012). Rural households are more likely to have better access to natural resource reserves to provide food or generate income; however it is not uncommon for these households to engage in non-farm opportunities to their optimise or diversify livelihoods (Baiphethi & Jacobs 2009).

Cash incomes made high contributions to livelihood portfolios in Queenstown and Phalaborwa as many households were dependent on one (or more) primary cash income stream, particularly in the more urbanised areas. There were no significant differences along the rural-urban continuum for each individual income stream, but once again this could be attributed to low counts of particular user households in each income category. The most common cash income strategy employed by households in Queenstown and Phalaborwa was formal employment, where formal employment activities made the highest mean annual contribution overall to households. The majority of households that engaged in formal activities were situated in the CBD and town, which could be attributed to more employment opportunities available in urban settings (Davenport *et al.* 2012). State grants were also a common cash income strategy used by households, but predominately in rural areas and the townships.

3.4.4 Livelihood portfolios along the continuum

Limited studies in sub-Saharan Africa assess all household incomes in relation to natural resource use, particularly along a rural-urban continuum in smaller urban centres. Urban studies have tended to focus on cash income and few have explored the potential contribution a variety of land-based incomes can make to urban households (Slater & Twyman 2003; Davenport *et al.* 2011). This thesis gives unique insight to livelihood strategies undertaken by a cross-section of households along the rural-urban continuum in two small urban centres. Information from household attributes, natural resource use and cash incomes can be pooled together to give a holistic picture of livelihoods (with their similarities and differences) along the rural-urban continuum to gain valuable insights on urbanisation processes in South African towns.

In both Queenstown and Phalaborwa, households with high income earning jobs had a good asset base, access to services such as electricity, reasonable education levels and owned their homesteads. Wealthier households tended to be in CDB and town rather than in rural areas. This could be partly attributed to the type of rural areas which were surveyed, as former homeland areas are known for their marginalised subsistence farmers and resultant problems associated with high poverty rates (CSIR 2004; Limpopo DFED 2004). Households relying on state grants tended to be poorer, with less employment and assets. Households in rural and township areas were more likely to have primary income streams from government grants, and hence households residing in these areas could be considered to have a lower wealth status than people living in the CBD and town. This corresponds with work done by Davenport *et al.* (2012) and Thornton (2008) who indicated that there was a high dependence on social grants amongst poorer urban households in small towns.

In Queenstown, homesteads with larger plots were more likely to engage in agricultural and livestock keeping activities. Space is often viewed as important resource when engaging in agricultural and livestock keeping practices (Lee-Smith 2010) and rural homestead plots tended to be large, which could be seen as a contributing factor as to whether households engaged in these practices. Households keeping livestock were also more likely to be male-headed and this is echoed in work carried out in other small towns in the Eastern Cape regarding livestock use (Bennett & Lent 2007; Davenport & Gambiza 2009). Rural households also had the highest proportion of wild natural resource users and in general rural livelihoods tended to adopt a mix of land-based and cash generating strategies, in comparison to urban settings. Shackleton *et al.* (2001) highlighted the importance of land-based strategies, such as the utilisation of wild natural resources, in rural livelihoods for income, direct provisioning services and rural safety nets.

In Phalaborwa, households headed by older people were more likely to engage in wild resource use; however these user households were not restricted to any particular section of the continuum. Paumgarten (2005) noted that age does affect the amount of wild resources used as there are few entry barriers and that these resources can contribute significantly to livelihoods of the elderly as they can harvest wild resources opportunistically. In Phalaborwa, a significantly higher proportion of households used wild resources in comparison to Queenstown, with the majority of residents in the CBD, townships and rural areas of Phalaborwa utilising these resources. The abundance of wild natural resources in the Phalaborwa area due to the surrounding Mopani Bushveld allows for a higher usage of these resources, even in more urbanised environments.

3.4.5 Spatialising livelihood strategies

King (2011) argued that livelihoods are inherently spatial as they depend on the movement of labour and capital, social network integration and (in some instances) the collection of resources. South Africa is unique in that there are complex relationships between space and livelihoods which can be attributed to the historical regimes such as apartheid, as well as contemporary economic dualisms between formal (rich) and informal (poor) economies (Naude *et al.* 2008; King 2011). Households in Queenstown and Phalaborwa drew on a number of strategies to construct their livelihoods, which were grouped to form generic classes to highlight primary strategies utilised along the rural-urban continuum. Rural, peri-urban and urban environs frequently interact along a continuum and this creates intricate spatial linkages as people, goods, money and information flow along this continuum (Iaquinta & Drescher 2000; Tacoli 2006).

Strategies relating to income generation through wage earning opportunities were most commonly utilised in both sites, particularly in urban areas. Households in the CBD and town of both sites were predominately classed as wage-dependent livelihoods, with some falling into the independent income class. These households tended to secure high income streams from the wage or independent income strategies and were considered wealthy as indicated by diverse assets and electricity consumption, high education levels and privately owned homesteads.

Livelihood strategies in the townships of Queenstown and Phalaborwa also predominately drew on cash generating strategies; however strategies differed from formal urban areas in that there was a high occurrence of state-dependent class households in the townships. The South African government provides a social welfare grant scheme to assist the poor or formally disadvantaged, thus allowing poor households to participate in the economy as consumers (SASSA 2011). Researchers such as Thornton (2008) have raised concerns over this scheme suggesting that it creates a culture of dependence and often does not necessarily lead to widespread poverty alleviation. Households relying

on grant incomes tended to have poor access to wealth-associated attributes such as high-income earning jobs or a good asset base. Under the racial segregation of the former apartheid government, urban areas were divided into separate different race groups and this led to the marginalisation of black people into peripheral, impoverished and over-crowded neighbourhoods (Kok & Collinson 2006).

The rural areas of Queenstown and Phalaborwa offered a diverse mix of different livelihood classes, which often combined land-based and income generating strategies to secure a living. Generally, rural households across the African continent do not specialise exclusively in the use of one natural resource activity (such as crop production or livestock keeping), but rather diversify their productive activities to incorporate a range of natural resource strategies, as well as other income generating activities (Hussein & Nelson 1998). In Queenstown and Phalaborwa, rural livelihoods were linked to the cash economy of the adjacent urban areas in the case of wage-dependent class households, whilst state welfare payments also played an important role in supporting many livelihoods in rural areas. Rural households which relied primarily on state grant income tended to have poor access to wealth-associated attributes and these areas are generally perceived to have a lower wealth status. In Phalaborwa, domestic and wild natural resources played a crucial role in rural livelihoods as the majority of households were classed as mixed income. The diversity of rural livelihoods, particularly in relation to the use of natural resources has been extensively studied (Cousins 1999; Shackleton *et al.* 2001).

The distribution of livelihood classes in Queenstown and Phalaborwa illustrate spatial patterns of distinct clusters along the rural-urban continuum that are linked to household histories and demographics. Similar research carried out by King (2011) in a rural community of Mpumalanga found that spatialising livelihoods revealed meaningful historical and contemporary processes that shaped livelihood diversification, resource access and social networking. The apartheid legacy of South Africa has resulted in a high proportion of the population that are still residing in high density peripheral areas in both rural and urban settings, which are often described as peripheral spatial poverty traps (Naude *et al.* 2008). Natural resources form an integral part of rural livelihood strategies in Queenstown and Phalaborwa which is echoed in similar work by Shackleton *et al.* (2001); however one should not discount their contribution to urban livelihoods. Davenport *et al.* (2012) demonstrate that natural resource use plays an important part in the survival of the urban poor and the diversification of livelihood strategies enable livelihoods to be more robust.

3.4.6 Livelihoods, poverty and natural resources

Poverty is a widespread phenomenon in South Africa and historical inequalities, which resulted in discriminatory settlement patterns, have perpetuated long lasting ill effects on the affected population (Aliber 2003; Kok & Collinson 2006). Former homeland and metropolitan areas are loci for impoverished communities and increasing population pressures have added to the burden (South African Risk and Vulnerability Atlas 2010). Poverty is concentrated in low-income and informal settlements in urban areas of South Africa and challenges facing the urban poor include limited access to economic opportunities, secure housing, basic services and social services (van Averbeké 2007; South African Risk and Vulnerability Atlas 2010). Poverty alleviation has become an important topic within the international development agenda and possible solutions to poverty have explored the inclusion of natural resource based activities (Shackleton *et al.* 2007a; Shackleton *et al.* 2008).

Along the rural-urban continuum, Queenstown households experienced a higher incidence of poverty (19.0 %) than Phalaborwa (10.2 %); however both towns had lower poverty levels than the national estimate of the proportion of the population living below the poverty line (22 % in 2008) (National Treasury 2011). It is surmised that the Eastern Cape is the poorest province in the country and this corresponds with the higher poverty levels occurring in Queenstown (CSIR 2004). Approximately a quarter of poor households in both towns suffered from sporadic hunger, with the majority of these households located in the townships of Queenstown and rural areas of Phalaborwa. According to Leibbrandt *et al.* (2010), poverty in urban areas has increased since 1993 and this is reflected to some extent in the results. Households situated in the CBD and town of Queenstown and Phalaborwa were generally associated with a high wealth status and negligible poverty. However, the highest proportions of households experiencing poverty were situated in the townships of both sites, where 48.2 % of these households in Queenstown and 21.1 % in Phalaborwa were considered impoverished.

The majority of households across the continuum which fell below the mean poverty level in both towns were classified as state-dependent, meaning that their primary income strategy was based on government assistance schemes. These results correspond with findings from Thornton (2008), where the majority of poor urban households in the Eastern Cape subsisting on social grants was either below or slightly above the national poverty line. Despite the majority of households relying on state grants, the diversification of livelihoods is common practice amongst the rural poor and has even been noted amongst the urban poor (particularly in terms of cash generating strategies) (Rakodi & Lloyds-Jones 2002). It has been documented that natural resources can make significant contributions towards poor livelihoods in both rural and urban areas, even if they are not the dominant strategy pursued by poor households (Slater & Twyman 2003; Shackleton *et al.* 2008; Davenport *et al.* 2012).

This is reflected to some extent along the rural-urban continuum, where mean poverty levels increase by 4.7 % in Queenstown and 10.3 % in Phalaborwa when the contributions from all natural resource streams were excluded from livelihood portfolios.

Contributions to local livelihoods derived from natural resources, particularly wild resources from the surrounding environment, are often not given enough consideration in rural and urban poverty contexts (Slater & Twyman 2003; Shackleton *et al.* 2007a). Phalaborwa had a significantly higher proportion of households engaged in the use of wild natural resources, and as such households along this continuum were more reliant on wild resources than in Queenstown. In Phalaborwa, poverty levels along the continuum rose by 6.8 % if wild resources were excluded from livelihood portfolios; whereas in Queenstown it only increased by a marginal 1.0 %. Biodiversity and natural products can make significant contributions to rural livelihoods, particularly to survivalist strategies utilised by poor rural households (Shackleton *et al.* 2007a; Shackleton *et al.* 2008). Shackleton *et al.* (2008) reported that the trade of natural resources in rural villages of the Limpopo province lifted poor households into a higher income bracket, thus performing an income equalising role and made a significant contribution to the majority of these livelihoods (Shackleton *et al.* 2008). The removal of wild resources from rural livelihood portfolios had a high impact on rural poverty levels, which increased by 29.2 % in Phalaborwa and 2.0 % in Queenstown with the exclusion of these resources.

The contribution of wild resources within urban contexts is less certain; however Davenport *et al.* (2012) found that the exclusion of commonage contributions from township households resulted in an increase of 11 % to 13 % in poverty levels in small towns of the Eastern Cape. This high increase was not observed in the townships of Queenstown or Phalaborwa; however poverty levels did increase by 1.5 % and 1.7 % (in Queenstown and Phalaborwa, respectively) when wild resource contributions were excluded.

The contribution of natural resources within urban livelihoods is highly variable across southern Africa and can be influenced by factors such as availability, location, seasonality, class and gender (Slater & Tywman 2003). However, the role that natural resources play in urban households should not be discounted, as these „hidden“ strategies might only make a small contribution to overall livelihoods, but could enable the urban poor to construct diversified and more secure livelihood portfolios (Slater & Tywman 2003; Davenport *et al.* 2012) or be crucial in times of shock or stress (such as after retrenchment). Poor households in Phalaborwa were particularly reliant on natural resources and it can be construed that the prevalence of poverty would be much higher along the rural-urban continuum if the natural resource base was not available.

Chapter Four

Home gardening along the rural-urban continuum in two South African towns

4.1 Introduction

Food is an intrinsic basic human need that is necessary for survival, health and general well-being (Schönfeldt *et al.* 2010). Humans cannot enjoy a sustainable livelihood without an adequate supply of food (Schönfeldt *et al.* 2010). Throughout the world it is estimated that one billion people do not have adequate access to sufficient food and sub-Saharan Africa is the most affected by food insecurity (Barrett 2010; Schönfeldt *et al.* 2010). Within sub-Saharan Africa, food insecurity tends to impact the urban poor severely as they are dependent on markets and so affected by the household's ability to earn cash income, as well as fluctuating global food prices (Alemu 2010; Ruel *et al.* 2010). South Africa has been recognised as a food secure nation in terms of aggregate food availability; however food insecurity remains widespread due to the uneven distribution of wealth (Alemu 2010; Schönfeldt *et al.* 2010; Faber *et al.* 2011). Within poorer urban South African households people tend to adopt unvaried diets to cope with poverty and the majority of their income tends to be spent on food (Schönfeldt *et al.* 2010; Faber *et al.* 2011).

Household characteristics, composition, decision making and social networks influence livelihood strategies, and households drawing on a variety of strategies (from cash income to land-based strategies) is viewed as the key to procuring a sustainable and healthy living (Barrett *et al.* 2001; Dovie *et al.* 2003). Agricultural activities are viewed as important contributors to rural livelihood strategies, as well as rural economies (Dovie *et al.* 2003; Hajdu 2006; Diao *et al.* 2010). Homestead gardening and other small-scale agricultural activities have been receiving interest as a means to enhance food security and livelihood well-being, particularly within impoverished or disadvantaged communities. There is a growing body of evidence in South Africa that demonstrates how home-grown food can be a feasible strategy for food and nutrition security amongst the rural poor (Dovie *et al.* 2003; Faber *et al.* 2011). Urban agriculture has also been acknowledged for its great potential to improve livelihoods of urban citizens, particularly impoverished households (May & Rogerson 1995; Bryld 2003; WinklerPrins & de Souza 2005; Reuther & Dewar 2007).

For a number of years the contribution of urban agriculture towards food security of poor households has been recognised in African contexts (Crush *et al.* 2010). Whilst urban agriculture has been found

to relieve severe food insecurity amongst the urban poor, Crush *et al.* (2010) note that urban agriculture rarely relieves the urban poor of the burden of food insecurity. Thornton (2008) observed that urban agriculture appears to be a limited practice in poor urban households within South Africa, despite high poverty levels. Other authors have cautioned against viewing urban agriculture solely as a strategy for the urban poor, as well-placed urban dwellers from wealthy households tend to benefit from urban agriculture due to better access to land and resources (Lee-Smith 2010; Mkwambisi *et al.* 2011). Alternatively, agricultural practices can be restrictive for low-income households as they are marginalised in terms of access to land and water and by the cost of seed, fertilizer and chemicals; as well as facing problems of theft and government intervention due to regulations against this practice in public or vacant urban land (Bryld 2003; Mkwambisi *et al.* 2011).

Increased population pressures from rapid urbanisation in South Africa have resulted in numerous urban challenges. The role of home-based gardening as a successful food production strategy has been recognised in poor rural areas (High & Shackleton 2000); however it is less obvious where this strategy fits into urban areas (Webb 2011). Whilst urban agriculture will not entirely replace agricultural produce from rural areas, it has numerous benefits to urban centres and in many cases complements its rural counterpart (Mougeot 2000; Shackleton *et al.* 2009a). Despite there being limited use of extensive and productive urban agriculture amongst impoverished urban dwellers of South Africa, it is a strategy that deserves attention as a means to improving food security within developing urban contexts. In other regions of sub-Saharan Africa urban agriculture has been given increasing attention as a valuable food resource and has been found to contribute to markets and employment, livelihoods and poverty alleviation strategies (Cofie *et al.* 2003; Shackleton *et al.* 2009c).

This chapter examines Key Question 2 “to what extent does home gardening contribute to livelihoods and how does this change along the rural-urban continuum?”. It focuses exclusively on crop and fruit production from the home space. Agriculture in this chapter therefore exclusively refers to the (small-scale) production of cultivated plants which consist of edible crops and fruits, while production of domestic animals is referred to as „livestock“ (separate from agriculture).

4.2 Methods

4.2.1 Approach

Two sources of data were used. First was the agriculture section of the livelihoods survey (refer to Chapter 3). The second, a structured interview schedule (Appendix 3), was largely modelled on a previous study carried out by High & Shackleton (2000). All interviews were conducted in the

preferred language of the respondent and adhered to the Rhodes University code of ethics for research.

4.2.2 Data collection

Data collected using the livelihoods interview schedule was used to determine the extent of agriculture practiced along the rural-urban continuum. The sampling approach used to determine which households were interviewed was random, so the extent and change of agricultural practices in each study area is considered unbiased (as no specific type of household was targeted). Therefore, the proportion of cultivators along the continuum could be measured against non-cultivating households.

In addition to the data obtained from the livelihoods survey discussed in Chapter 3, an additional structured interview was conducted in the same zones in Queenstown and Phalaborwa. The second survey (Appendix 3), otherwise known as the „cultivation“ survey, targeted people engaged in agricultural activities in the home space to add greater insight to these practices along the rural-urban continuum. Home space refers exclusively to cultivated land around the homestead in the residential area of the town or village. Data for this survey was collected in November 2010 for Queenstown and March 2011 for Phalaborwa, once both areas had experienced some rainfall. A pilot survey was run in Queenstown where three interviews were tested on people practicing agriculture in their home space before fieldwork commenced.

The cultivation interview schedule was composed of the following sections (Appendix 3):

- Land use and farming practices
- The range of plant species cultivated and their associated values/products
- Basic socio-economic profile of the household

The number of plants grown in each home space, their approximate yield and value was deduced for each household. The local selling price of the produce was used to estimate the direct-use value of the edible plants produced at the homestead. Fruiting, young non-fruiting and barren trees were identified and only the fruiting trees taken into consideration for this survey. The plants were identified by the respondents (usually by their local name) and samples were collected to identify individual species. The Schonland Herbarium in Grahamstown was used to identify unknown plants from the Queenstown site, and the rangers at the Phalaborwa Gate of Kruger National Park assisted in identifying plant species from Phalaborwa. Categories of cultivated crops and fruits that have a wide range of species (such as wild fruits) were grouped together to avoid multiple results of small quantities.

The socio-economic profile of the households were determined through the following indicators:

- Gender of cultivator
- Household size (number of people living in the house)
- Physical capital (plot size, tenure, water access)
- Formal employment (number of household members with jobs)
- Private pensions (number of household members with pensions)
- Government social grants (number of household members on state welfare)
- Number of bedrooms (wealth indicator)
- Number of cars owned by the household (wealth indicator)
- Number and kind of livestock owned by the household

The areas sampled for the cultivation survey were the same as the zones used in the livelihoods survey. Only individuals engaged in agricultural practices from the homestead were interviewed and individual households were identified using a snowball sampling technique (High & Shackleton 2000). This technique consisted of identifying and surveying one or two agriculturalists in each zone of the respective towns, after which they were asked to identify other residents engaged in similar activities for prospective respondents and this was repeated in every interview. The respondents to the cultivation survey were therefore different to households interviewed for the livelihoods survey. In both Queenstown and Phalaborwa, the continuum was kept within the same areas with only the CBD and formal suburbs merging into one category (now termed „urban“ or „formal urban“) as there were not enough respondents located in each section. As there were two townships per town, 30 interviews were conducted in each location (making a total of 60 respondents). A total of 110 interviews were conducted in Queenstown and 100 interviews in Phalaborwa for the cultivation survey (Table 4.1).

Table 4.1: Number of respondents per zone and town

	Urban (CBD + town)	Townships	Rural
Queenstown	20	60	30
Phalaborwa	10	60	30

Problems associated with the cultivation survey included difficulty in identifying and finding potential urban agriculturalists to interview. Particularly in the formal town areas of Queenstown and Phalaborwa, people engaged in growing edible crops and fruits were few and scattered, with many people unavailable or gardens were hidden behind high walls and large dogs.

4.2.3 Data analysis

Data analysis was divided into three main sections. Categorical and descriptive data from the LUNA Livelihoods interview and cultivation survey were collated, summarised and displayed through basic descriptive statistics such as percentages and means (using Microsoft Excel).

The first section dealt with the data from the livelihoods survey and focused on the change of crop and fruit production along the rural-urban continuum in Queenstown and Phalaborwa. The change of agriculture along the rural-urban continuum was determined using two-tailed two proportion z-tests with equal variances to determine significant differences between the two towns, continuum sections and crop versus fruit production in relation to agricultural practices. Descriptive data looking at reasons why respondents did or did not engage in agricultural activities were summarised and only commonly occurring reasons were discussed. Where the cultivation survey overlapped with similar questions (such as why respondents engage in crop or fruit production) to the livelihoods survey, the descriptive data sets were combined and discussed together.

The second section looked specifically at the range of crop and fruit types grown along the continuum in each town from the cultivation survey. To determine if cultivators in a particular part of the continuum specialised in growing specific crops or fruits, these data were subjected to hierarchical cluster analysis using the „R function hclust“ (using the Vegan package in R version 2.12.1 (R Development Core Team 2010)). Data on fruits and crops grown by households were analysed separately and the average clustering strategy was used as recommended by Oksanen (2011). Individual crop and fruit types were then compared along the rural-urban continuum and differences were tested using the z-test of proportions. As crop and fruit types in Queenstown and Phalaborwa were similar from the livelihoods and cultivation surveys, these categories were combined for purposes of the z-tests. All z-tests were carried out manually using Microsoft Excel and significant z-statistic results are displayed in Appendix 4.

The third section dealt exclusively with data from the cultivation survey and focused on respondents engaged in crop and fruit cultivation from the home space. Data were summarised through basic percentage and mean values for comparative purposes and displayed using graphs and tables. The contribution of crop and fruit production was measured through determining the overall Rand (ZAR) value that crops and fruits contributed per annum to respondent households. This was done in a similar fashion to economic portfolios created in Chapter Three, where respondents were asked to determine the amount of produce they got per season and the local value of this produce. From this information, economic portfolios for home-based cultivators were created by multiplying the amount of produce by the local price to gauge the contribution in ZAR value of crops and fruits. A wealth

index was created from the cultivation surveys to determine the wealth status of respondent households along the continuum in Queenstown and Phalaborwa (refer to section 5.2.3.1). Individual household wealth indices were then contrasted with the annual amount (ZAR) received from combined crop and fruit produce to see if there was any relationship between wealth and crop or fruit cultivation using a regression analysis.

4.2.3.1 Creating and analysing a wealth index

A wealth index for individual respondent households was created from the cultivation surveys. The wealth index was created using the following attributes:

- Formal employment (number of household members with jobs)
- Private pensions (number of household members with pensions)
- Government social grants (number of household members on state welfare)
- Number of cars owned by the household
- Number of cattle owned by the household

The raw data for each attribute ranged between 0-5 for all attributes other than the number of cattle. The number of cattle was scaled to 0-5 to avoid dominating any additive index. Consequently, households with 21-25 cattle received a score of 5; 16-20 cattle scored 4; 11-15 scored 3; 6-10 scored 2; 1-5 scored 1 and 0 received zero. A household wealth index was then determined using Equation 1. This follows previous literature using objective and community participatory wealth ranking approaches which consistently highlight the number of jobs, state grants, livestock and assets as robust and reliable indicators of *relative* household wealth (Shackleton & Shackleton 2006).

$$\text{Wealth Index} = \frac{[(\text{pensions (number)} + \text{grants (number)} + \text{jobs (number)} + \text{cars (number)} + \text{cattle score})]}{\text{people per household (number)}}$$

.... Equation 1

Scatter plots of the wealth index were drawn for Queenstown and Phalaborwa and direct-use agricultural values (ZAR) used to assess potential relationships. All outliers (respondents with very high agricultural values) were excluded from the data set in Queenstown (n = 109) and Phalaborwa (n = 97), and the remaining data was subject to a linear regression analysis using Statistica 10 (only significant results were discussed).

4.3 Results

4.3.1 Extent of agriculture practiced along the continuum

Overall, there were a significantly higher proportion of respondents engaged in agricultural practices in Phalaborwa (77.4 %) when compared to Queenstown (45.9 %) ($z = 4.1$; $p < 0.05$). The highest proportion (88.1 %) of users were located in the townships of Phalaborwa, whilst the lowest proportion of households engaged in agriculture was found in the townships of Queenstown (30.0 %) (Figure 4.1). There were no significant differences in the proportion of households participating in agriculture along the rural-urban continuum in either Queenstown or Phalaborwa.

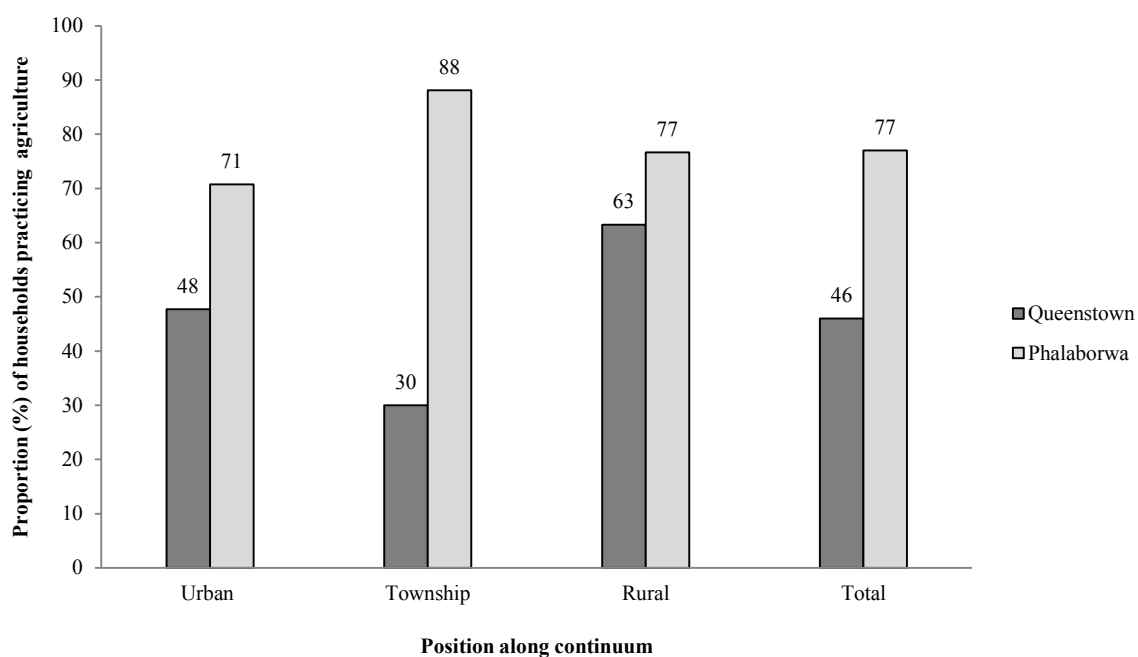


Figure 4.1: Proportion of respondent households (%) engaged in agricultural activities in Queenstown and Phalaborwa

Households which did not grow any crops and fruits gave similar reasons in Queenstown and Phalaborwa (Table 4.2). Unsuitable weather conditions were cited in both towns by respondents, but were case specific for each town. At the time of data collection, Queenstown was experiencing drought conditions due to a lack of adequate seasonal rain and therefore the municipality had implemented water restrictions. Phalaborwa experiences very hot conditions and was also having a prolonged dry spell during data collection, although it was well into the rainy season.

Households in the urbanised setting primarily cited no space, no time and unsuitable weather conditions as primary reasons for not engaging in agricultural practices. Township and rural areas also stressed that a lack of fenced properties that led to the damage of crops or fruits by livestock or theft.

Rural households cited insufficient access to water as a key reason for not growing crops and fruits, as many properties did not have working piped water points for irrigation (particularly under harsh weather conditions).

Table 4.2: Top five reasons why households do not engage in agricultural activities in Queenstown and Phalaborwa

	Queenstown	Phalaborwa
Reasons	% responses	% responses
No space	25.0	11.3
No time	16.1	17.0
Unsuitable weather conditions	14.3	15.1
No water	9.8	7.5
No need/buy at shops	7.1	-
No interest	-	9.4

4.3.1.1 Queenstown

Overall, 45.9 % (n = 135) of respondent households across the continuum engaged in agriculture in Queenstown and this figure was dominated by the rural areas. Rural areas had the highest proportion of households engaged in mixed crop and fruit production (20.0 %), as well as crop only production (30.0 %) as seen in Table 4.3. Fruit trees were most commonly grown in formal areas as 21.5 % of respondent households in this section grew fruit trees only. In general agricultural practices remained limited in the townships.

Table 4.3: Proportion of respondent households (%) engaged in crop and fruit production in Queenstown

	Crop & Fruit (%)	Crop only (%)	Fruit only (%)
Urban (n = 65)	16.9	9.2	21.5
Township (n = 40)	7.5	7.5	15.0
Rural (n = 30)	20.0	30.0	13.3

Crop and fruit production was then examined as two separate categories in each section across the continuum in Queenstown. There were no significant differences in the incidence of crop and fruit production in any of the continuum sections (Table 4.4).

Table 4.4: Significance levels between crop and fruit production in Queenstown

		Crop	Fruit	z-statistic	Significance
Queenstown Urban (n = 65)	Count	18	25	1.3	p > 0.05
	% within Urban	27.7	38.5		
Queenstown Township (n = 40)	Count	6	9	0.9	p > 0.05
	% within Township	15.0	22.5		
Queenstown Rural (n = 30)	Count	15	10	1.3	p > 0.05
	% within Rural	50.0	33.3		

Top reasons for respondents engaging in agricultural activities differed across the continuum in Queenstown and were as follows (in descending order of most frequently stated): providing food (32.8 %), enjoyment (26.2 %), health reasons (9.8 %), save money (8.2 %) and plant already on property (mainly for fruit trees) (7.1 %).

Households in formal urban areas grew their own food primarily for enjoyment and health reasons, whilst township households engaged in crop and fruit production to provide food and fight poverty. Some rural households grew food for enjoyment; however others cited it as a strategy to combat poverty. Some respondents in the town used their cultivated produce in local restaurants and bed and breakfast businesses that they owned. A few respondents (15 cultivators) in the township and rural sections sold their produce on a small scale (predominately through hawking) to supplement the cash flow for the household.

Common disadvantages associated with crop and fruit production mentioned in Queenstown were pests and drought conditions. Both urban and rural cultivators viewed pests as the greatest disadvantage which ranged from insects, worms and birds to roaming livestock. Drought conditions in this region resulted in high water tariffs and stringent water restrictions and many cultivators struggled to irrigate their plants under harsh weather conditions.

4.3.1.2 Phalaborwa

In Phalaborwa, 77.4 % (n = 137) of respondent households engaged in agriculture but, unlike Queenstown, the majority of cultivators were not confined to rural areas (Table 4.5). The highest proportion of respondents cultivating crops and fruits were located in the township (40.5 %), whilst formal urban areas had the highest proportion of respondents growing fruit trees only (46.2 %). Urban cultivators were less likely to engage specifically in crop production only.

Table 4.5: Proportion of respondent households (%) engaged in crop and fruit production in Phalaborwa

	Crop & Fruit (%)	Crop only (%)	Fruit only (%)
Urban (n = 65)	21.5	3.1	46.2
Township (n = 42)	40.5	4.8	42.9
Rural (n = 30)	36.7	26.7	13.3

There were no significant differences in the proportion of crop or fruit cultivation in the rural areas of Phalaborwa (Table 4.6). However, fruit cultivation was significantly higher than crop cultivation in the formal urban areas and the townships.

Respondents engaged in agriculture gave a wide variety of reasons why they grew their own crops and fruits and the top most commonly cited reasons were (in descending order of most frequently stated): food source (63.3 %), enjoyment (12.6 %), health reasons (10.1 %), save money (5.5 %) and lifestyle (2.0 %).

Table 4.6: Significance levels between crop and fruit production in Phalaborwa

		Crop	Fruit	z-statistic	Significance
Phalaborwa Urban (n = 65)	Count	16	44	4.9	p < 0.05
	% within Urban	24.6	67.7		
Phalaborwa Township (n = 42)	Count	19	35	3.6	p < 0.05
	% within Township	45.2	83.3		
Phalaborwa Rural (n = 30)	Count	19	15	1.0	p > 0.05
	% within Rural	63.3	50.0		

Urban and rural cultivators primarily grew their own crops and fruits for enjoyment and health reasons, as well as a source of food. Some respondents in the townships and rural areas specifically grew food to save money. As fruit trees tended to produce large amounts of fruits in the Phalaborwa area, respondents (15 cultivators) in the township and rural areas often sold their fruits to local juice companies for extra household income.

As in Queenstown, pests and harsh climatic conditions were viewed as the primary disadvantages to crop and fruit production by households along the continuum of Phalaborwa. Pests were seen to be the biggest disadvantage by urban and rural cultivators alike, followed by concerns over harsh climatic conditions which lead to extreme heat and limited water availability.

4.3.2 Profile of home cultivators

4.3.2.1 Queenstown

Across the continuum in Queenstown, just over half of the respondents (56.4 %) involved in crop and fruit cultivation from the home space were female. There was an average of 2.9 (± 1.6), 5.5 (± 2.6) and 5.9 (± 2.7) people per household in the urban, township and rural sections respectively. The majority of respondent households (95.0 %) in the urban section privately owned their homesteads with a title deed, and the remaining 5 % rented their properties. In the township, section 96.7 % of respondent households owned their property with a title deed, and the remainder rented. All households interviewed in the rural section owned their homesteads through customary means. Homesteads of cultivators had the average plot size of 1 391 (± 672) m² in formal urban sections, 684 (± 281) m² in the townships and 3 318 (± 884) m² in rural areas.

The majority (80.0 %) of respondent households in the urban section were formally employed with an average of 1.8 (± 0.6) members of these households holding jobs. In the township section, 35.0 % of respondent households were employed and an average of 1.3 (± 0.5) members of employed households had jobs. In the rural section, only 30.0 % of respondent households had employment and of these households 2.6 (± 1.5) members held jobs. In terms of pensions (not affiliated with government welfare), the highest proportion of pensioners were situated in the urban section as 35.0 % of households had pensions, followed by the rural section (20.0 %) and then the township section (3.3 %). Approximately 90.0 % of rural households depended on grant income, followed by 83.3 % in the township section and 10.0 % in the urban section.

The average size of the production area for crop and fruit cultivation on the homestead was 28 (± 14) m² in urban areas, 30 (± 20) m² in the townships and 371 (± 192) m² in rural areas. In terms of preparatory activities for crop and fruit growth, homestead cultivators spent an average of R38 ($\pm R66$) per season in formal urban areas, R13 ($\pm R103$) in the townships and R86 ($\pm R130$) in the rural areas. This equates to highly variable annual input costs per square metre cultivated of R1.3 in urban, R0.4 in township and R0.2 in rural areas.

All urban cultivators watered their crops and fruit trees and the majority of formal urban households had access to their own borehole or rainwater tank, whilst others used taps or grey water. In the rural areas, 76.7 % of respondents watered their crops and fruit trees through the use of borehole or spring water. Rural cultivators who did not actively water their crops and fruit trees relied on rainfall for irrigation. The majority (between 70 to 80 %) of cultivators across the continuum fertilised their crops or fruit trees of which manure was the most commonly used fertiliser type.

4.3.2.2 Phalaborwa

Similar to Queenstown, the majority of cultivators (62.0 %) in Phalaborwa across the continuum were female. There was an average of 3.8 ($\pm$ 2.0), 4.9 ($\pm$ 1.7) and 6.3 ($\pm$ 2.9) people per household in the urban, township and rural sections, respectively. All respondent households in the urban section owned their properties privately with a title deed. In the townships 88.3 % of respondent households were privately owned, 6.7 % rented the property and 5.0 % owned their homestead through customary law. In the rural section all respondent households owned their properties through customary means. On average the homestead plot size for the urban section was 1 380 ($\pm$ 162) m², the townships had 724 ($\pm$ 231) m² and rural areas had an average plot size of 2 598 ($\pm$ 1190) m².

The majority (90.0 %) of respondent households in the urban section were formally employed where an average of 1.7 ($\pm$ 1.0) members of these households had jobs. In the township section 80.0 % of households were employed and an average of 1.5 ($\pm$ 0.6) members of these household held jobs. In the rural section 63.3 % of households had employed members, where an average of 1.1 ($\pm$ 0.2) members of these households had jobs. In terms of pensions, the highest proportion of pensioners were located in the urban section as 20.0 % of households had pensions, followed by the township section (16.7 %) and the rural section (10.0 %). The highest proportion (73.3 %) of households using state grants was situated in the rural areas of Phalaborwa, followed by 53.3 % in the townships and 10.0 % in the urban section.

On average, cultivators in the formal urban areas had a production plot size of 29 ($\pm$ 23) m², in the townships it was 30 ($\pm$ 27) m² and in rural areas it was 273 ($\pm$ 161) m². In terms of preparatory activities for crop and fruit growth, homestead cultivators spent an average per season of R31 ($\pm$ R53) in formal urban areas and R55 ($\pm$ R128) in the rural areas. Cultivators situated in the townships claimed not to incur any costs associated with preparatory activities. Costs per square metre cultivated equated to R1.1 in urban and R0.2 in rural areas, and these costs were similar to Queenstown (aside from the townships).

All cultivators in the formal urban areas watered their crops or fruit trees through tap water. The majority (83.3 %) of cultivators watered their plants, whilst in the rural areas just over half (56.7 %) watered their plants using a tap water source. Cultivators who did not actively water their crops and fruit trees relied on rain fed irrigation. Unlike cultivators in Queenstown, the majority of agricultural respondents in Phalaborwa did not use fertiliser. Approximately 50.0 %, 18.3 % and 26.7 % of cultivator homesteads used fertilizer in the urban, township and rural areas, respectively. In formal urban areas, manure and chemical fertilizers were purchased from local shops, whilst township and rural areas relied on livestock manure from their own or neighbouring kraals.

4.3.3 Range of crops and fruits across the continuum

Respondent households engaged in home gardening practices grew a wide variety of crops and fruits. In Queenstown, a total of 25 crop types and 18 fruit types were grown by respondents engaged in home gardening. In Phalaborwa, a total of 20 crop types and 24 fruit types were grown by respondents. The majority of these edible plants were domesticated and usually exotic, with only a few indigenous fruit trees cultivated in Phalaborwa.

4.3.3.1 Queenstown crops

The most commonly grown crops along the continuum in Queenstown were spinach, cabbages, onions, carrots and potatoes. In the urban areas, cultivators planted 24 types of crops, averaging 7.5 ($\pm$ 3.1) crop types per household. In the townships, 20 types of crops were grown and cultivators grew an average of 4.6 ($\pm$ 1.9) different crops per household. In rural areas, cultivators grew 14 different crop types, averaging at 5.0 ($\pm$ 1.4) crop types per household. Patterns according to different crop types grown along the rural-urban continuum were then assessed (Figure 4.2).

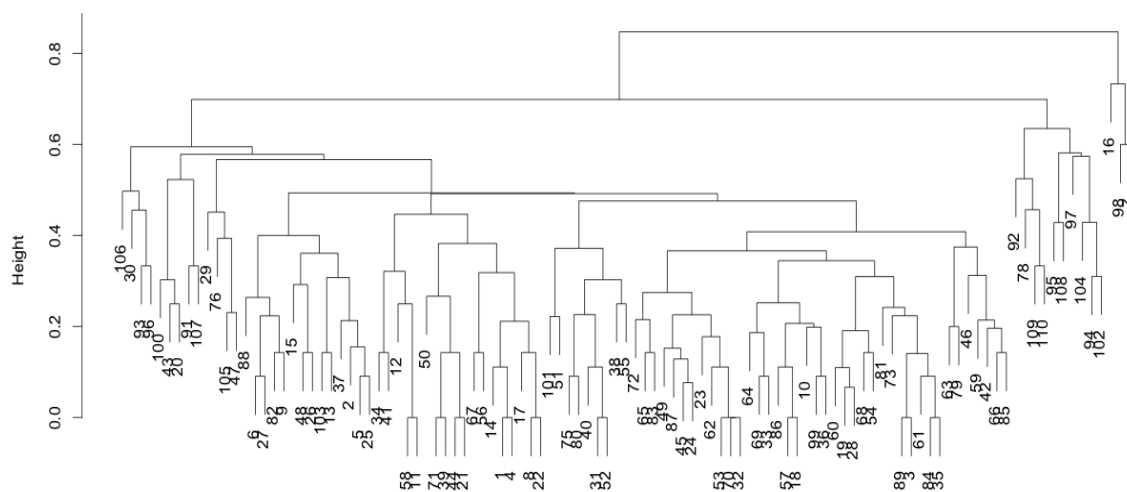


Figure 4.2: Clustered dendrogram of households in Queenstown growing crops with no clear patterns emerging along the continuum

There were no clear patterns along the continuum in Queenstown and cultivators appeared to be individually specialised according to the types of crops they grew, rather than area specific (Figure 4.2).

Within the urban section, the proportion of respondents cultivating tomatoes, green beans and lettuces was significantly higher than other sections along the continuum (Table 4.7). The proportion of

township respondents cultivating onions, spinach, potatoes, cabbages and carrots was significantly higher in comparison to other areas along the continuum. Within the rural areas the proportion of respondents cultivating pumpkins, maize, cabbages and potatoes was significantly higher than other sections along the continuum.

Table 4.7: Differences in the proportion of households (%) growing selected crops and fruits in Queenstown

Crop/fruit	Urban (%)	Township (%)	Rural (%)
Tomato	20.0 ^a	9.0 ^b	11.7 ^{ab}
Spinach	40.0 ^a	56.0 ^b	48.3 ^{ab}
Onion	16.5 ^a	45.0 ^b	21.7 ^a
Beetroot	16.5 ^a	27.0 ^b	16.7 ^{ab}
Green beans	18.8 ^a	4.0 ^b	8.3 ^{ab}
Pumpkin	5.9 ^a	8.0 ^a	23.3 ^b
Maize	8.2 ^a	7.0 ^a	53.3 ^b
Cabbage	17.6 ^a	41.0 ^b	53.3 ^b
Watermelon	0.0	1.0 ^a	8.3 ^b
Carrot	17.6 ^a	32.0 ^b	26.7 ^{ab}
Peppers	15.3 ^a	15.0 ^a	8.3 ^a
Lettuce	12.9 ^a	5.0 ^b	1.7 ^b
Potato	9.4 ^a	28.0 ^b	36.7 ^b
Mulberry	3.5 ^a	0.0	1.7 ^b
Lemon	16.5 ^a	1.0 ^b	0.0
Fig	9.4 ^a	7.0 ^a	8.3 ^a
Apricot	14.1 ^a	25.0 ^b	21.7 ^{ab}
Plum	16.5 ^a	8.0 ^b	3.3 ^b
Naartjie	2.4 ^a	0.0	1.7 ^a
Orange	7.1 ^a	3.0 ^a	1.7 ^a
Peach	31.8 ^a	45.0 ^b	55.0 ^b
Apple	3.5 ^a	11.0 ^b	25.0 ^c

*Level of significance tested via z-tests; unlike superscripts indicate significance with at least 0.05 level

4.3.3.2 Queenstown fruits

The most commonly grown fruit by respondents in Queenstown were peaches, apricots, apples, plums and figs. In urban areas home gardeners planted 17 different fruit types and averaged at 3.0 ($\pm$ 2.5) fruit types per household. In the townships nine fruit types were observed and cultivators grew an

average of 1.5 ($\pm$ 1.5) fruit types per household. In the rural areas, 13 different fruit types were grown and individual cultivators grew an average of 2.2 ($\pm$ 1.5) different fruit trees. Households were then assessed for patterns along the continuum according to the fruit types they grew (Figure 4.3).

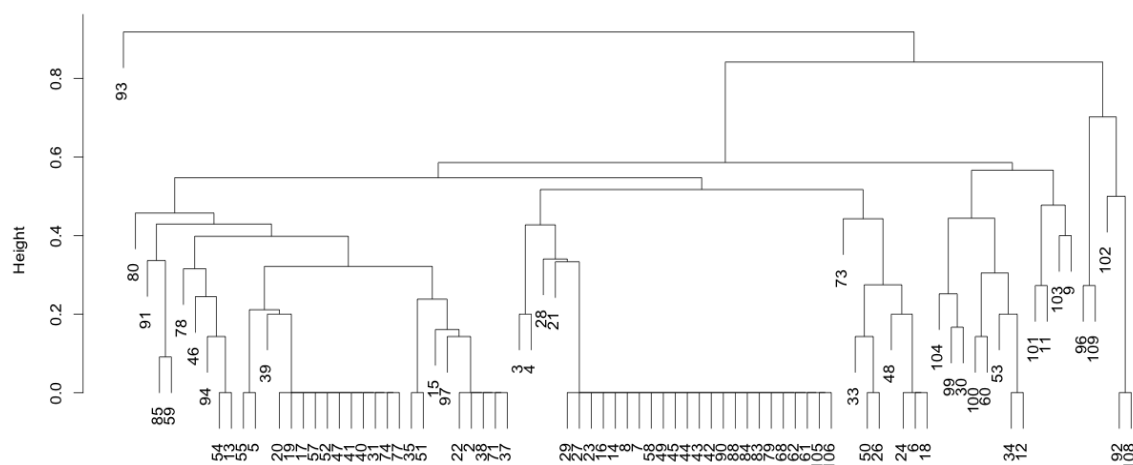


Figure 4.3: Clustered dendrogram of households in Queenstown growing fruits with no clear patterns emerging along the continuum

Similarly to crops grown along the continuum, there were no defining patterns which emerged in Queenstown and cultivators appeared to be individually specialised (Figure 4.3).

In the urban section there was a significantly higher proportion of respondents growing lemon and plum trees compared to other sections along the continuum (Table 4.7). There were no significant differences between fruit types grown in the townships. In the rural areas of Queenstown there was a significantly higher proportion of respondents growing peach and apple trees compared to other sections.

4.3.3.3 Phalaborwa crops

The most commonly grown crops amongst cultivators in Phalaborwa were maize, pumpkins, beans, spinach and tomatoes. In urban areas 16 different crop types were observed and cultivators grew an average of 3.5 ($\pm$ 3.0) crop types per household. In the townships a total of 16 crop types were also observed and households grew an average of 2.5 ($\pm$ 1.7) different crops in township home gardens. In the rural areas 13 different crops were observed and cultivators grew an average of 3.3 ($\pm$ 1.5) different crops per household. Patterns along the continuum were then assessed according to different crops grown by households (Figure 4.4).

No clear trends were shown according to what types of crops cultivators grew along the continuum (Figure 4.4). Household clusters were not grouped specifically to any one part of the continuum but tended to be individually specialised according to crop types, which was similar to trends observed in Queenstown (Figure 4.2 and Figure 4.3).

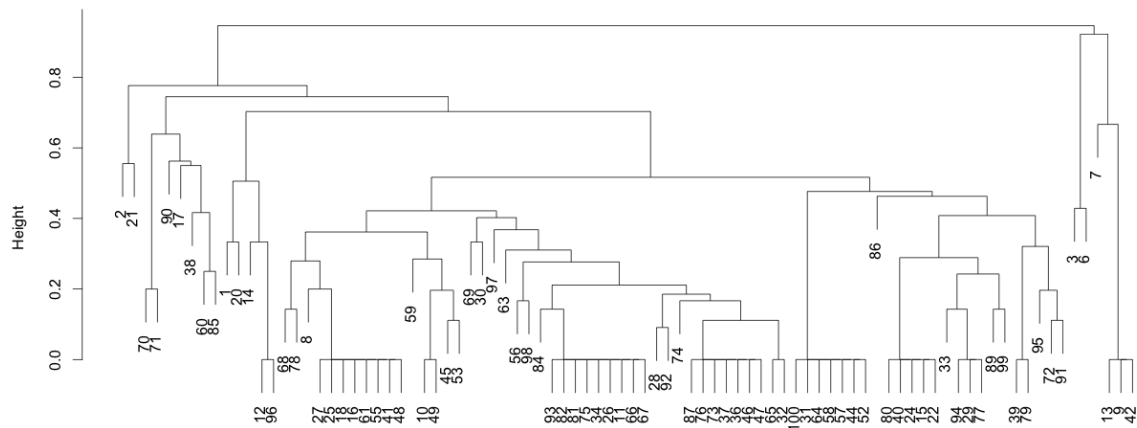


Figure 4.4: Clustered dendrogram of households in Phalaborwa growing crops with no clear patterns emerging along the continuum

In the urban section, a significantly higher proportion of respondents grew tomatoes and spinach compared to other sections along the continuum (Table 4.8). The townships had a significantly higher proportion of respondents who grew spinach, onions, beetroots, beans, pumpkins, maize, cabbages and peanuts compared to other sections along the continuum. In the rural areas of Phalaborwa there was a significantly higher proportion of respondents growing beans, pumpkins, maize, peanuts and watermelons.

Table 4.8: Differences in the proportion of households (%) growing crops and fruits in Phalaborwa

Crop/fruit	Urban (%)	Township (%)	Rural (%)
Tomato	22.7 ^a	13.7 ^{ab}	8.3 ^b
Spinach	20.0 ^a	21.6 ^a	5.0 ^b
Onion	9.3 ^{ab}	14.7 ^b	3.3 ^a
Beetroot	6.7 ^a	8.8 ^a	1.7 ^a
Beans	8.0 ^a	18.6 ^b	38.3 ^c
Pumpkin	9.3 ^a	36.3 ^b	40.0 ^b
Maize	6.7 ^a	48.0 ^b	56.7 ^b
Cabbage	2.7 ^a	10.8 ^b	5.0 ^{ab}
Peanuts	1.3 ^a	15.7 ^b	26.7 ^c
Watermelon	1.3 ^a	2.0 ^a	31.7 ^b
Carrot	5.3 ^a	2.0 ^a	1.7 ^a
Peppers	4.0 ^a	2.0 ^a	1.7 ^a
Lettuce	5.3 ^a	2.0 ^b	0.0 ^{ab}
Potato	2.7 ^a	3.9 ^a	5.0 ^a
Mango	57.3 ^a	87.3 ^b	60.0 ^a
Wild fruit	1.3 ^a	11.8 ^b	40.0 ^c
Pawpaw	13.3 ^a	14.7 ^a	21.7 ^b
Avocado	14.7 ^a	12.7 ^a	13.3 ^a
Banana	9.3 ^{ab}	3.9 ^a	16.7 ^b
Guava	10.7 ^a	19.6 ^{ab}	21.7 ^b
Mulberry	1.3 ^a	4.9 ^a	20.0 ^b
Lemon	30.7 ^a	16.7 ^b	10.0 ^b
Naartjie	5.3 ^a	12.7 ^b	6.7 ^{ab}
Orange	12.0 ^a	18.6 ^a	16.7 ^a
Peach	1.3 ^a	4.9 ^a	5.0 ^a
Apple	1.3 ^a	2.0 ^a	8.3 ^b

*Level of significance tested via z-tests; unlike superscripts indicate significance with at least 0.05 level

4.3.3.4 Phalaborwa fruits

The most commonly grown fruits by cultivators were mangoes, lemons, guavas, pawpaws and oranges along the continuum in Phalaborwa. In urban areas a total of 12 fruit types were observed, with households growing an average of 2.8 ($\pm$ 2.2) different fruit types per home garden. In the townships 16 different fruit trees were found and cultivators grew an average of 2.8 ($\pm$ 1.6) different fruit trees per household. In the rural areas a total of 18 fruit trees were observed, with cultivators

growing on average $4.0 (\pm 2.3)$ different fruit trees per household. No clear patterns of households growing similar fruits were defined along the continuum (Figure 4.5).

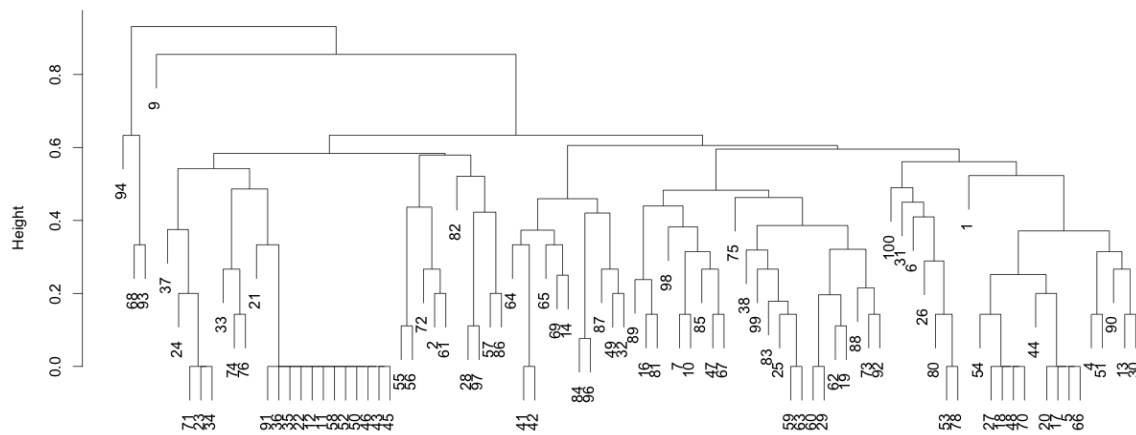


Figure 4.5: Clustered dendrogram of households in Phalaborwa growing different fruit types with no clear patterns emerging along the continuum

As reflected in Queenstown and along the continuum in Phalaborwa in terms of crop types (Figure 4.4), fruit types did not fall into any distinct clusters of households as per area (Figure 4.5). Once again, the fruit types grown by cultivators along the continuum in Phalaborwa were more individually specialised.

In the urban section there were a significantly higher proportion of respondents cultivating lemon trees than any other section along the continuum (Table 4.8). A significantly higher proportion of township cultivators grew mango and wild fruit trees compared other sections along the continuum. In rural areas there was a significantly higher proportion of respondents who grew wild fruit, banana, mulberry and apple trees than other sections along the continuum.

Wild fruits were a mix of indigenous and exotic species, which were usually not actively cultivated but rather left on plots as desirable trees. Wild fruits consisted of marula (*Sclerocarya birrea* subsp. *caffra*), *Eriobotrya japonica*, *Murraya koenigii*, *Moringa oleifera*, *Annona cf. cherimola*, *Syzygium cuminii* (Jambolan), *Berchemia discolor*, *Diospyros mespiliformis*, *Vangueria infausta* and *Trichelia emetica*.

4.3.4 Contribution of home gardening along the continuum

Generally cultivators in Phalaborwa derived higher income contributions from home gardening compared to Queenstown (Figure 4.6). This could be partly attributed to the high contribution fruits made to livelihoods in Phalaborwa as the subtropical climate in this region was conducive to the high production of (for example) mangoes.

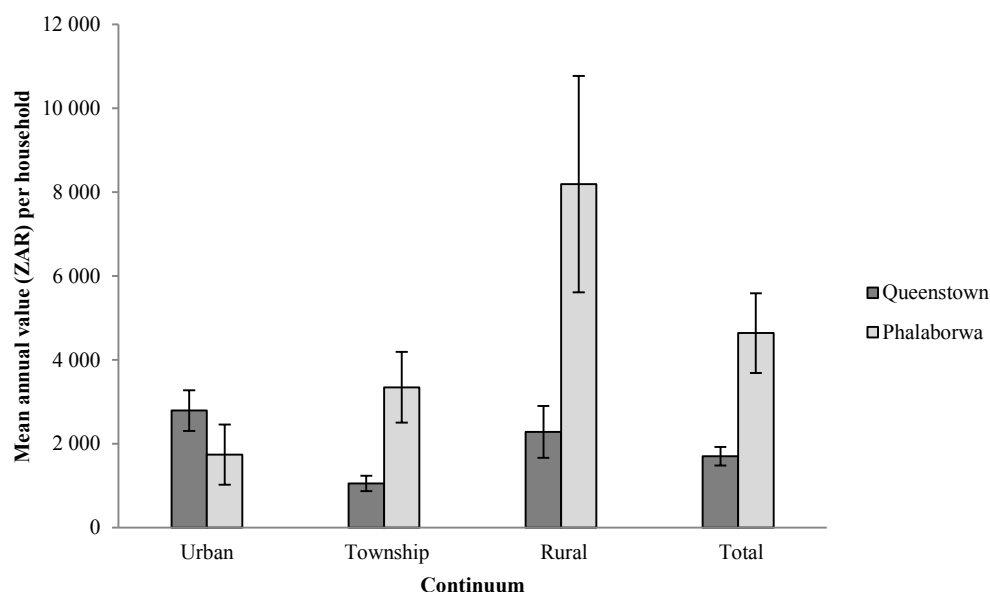


Figure 4.6: The combined contribution of crops and fruits in terms of their gross mean annual value (ZAR) per household in Queenstown and Phalaborwa

Overall, crop and fruit production made the highest annual contribution in Phalaborwa with an average of R4 638 ($\pm$ R9 479) per annum, compared to Queenstown at R1 704 ($\pm$ R2 347) (Figure 4.6). The highest annual contribution of agriculture in Phalaborwa was derived from rural areas with an average of R8 189 ($\pm$ R14 114). Surprisingly, the opposite was found in Queenstown, where the highest annual contribution of R2 790 ($\pm$ R2 165) was in the urban area. The lowest contribution in Phalaborwa was R1 741 ($\pm$ R2 276) in the formal urban section. Agriculture made a noticeably low contribution in the townships in Queenstown at R1 052 ($\pm$ R1 406).

4.3.4.1 Queenstown

In Queenstown, crops generally made the highest income contributions to cultivator livelihoods. In total, crop production made the highest mean annual contribution in Queenstown at R1 230 ($\pm$ R2 019) in comparison to fruit production at R473 ($\pm$ R948) (Figure 4.7). Crops made the highest contribution within rural areas at R1 950 ($\pm$ R3 164), whilst fruit production made the highest

contribution in formal urban areas at R1 331 ($\pm$ R1 772). The townships received the lowest income contribution, as crops contributed only R794 ($\pm$ R1 300) and fruits R333 ($\pm$ R514).

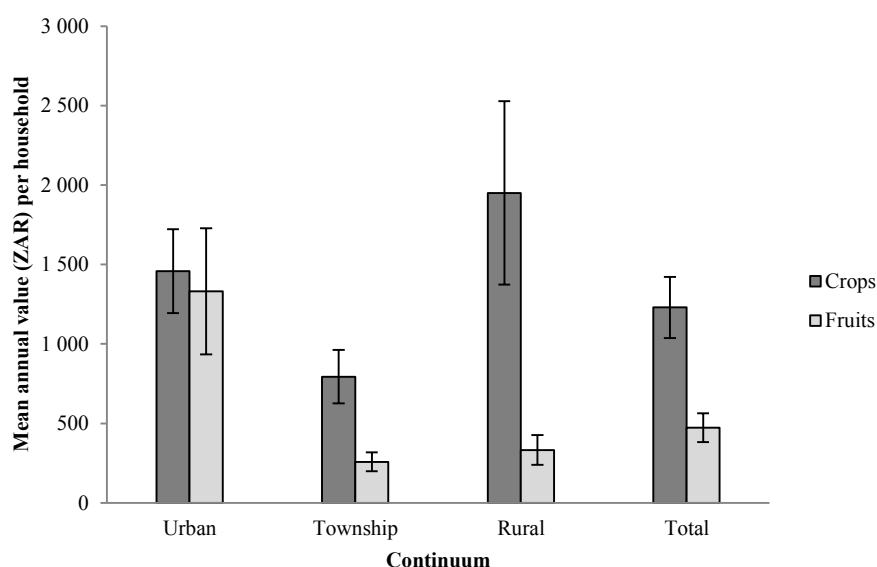


Figure 4.7: The mean annual value (ZAR) per household of crops and fruits in Queenstown

The majority of respondents in Queenstown used their crop and fruit produce for household consumption, with only 17 % of respondents along the continuum selling some of their produce. The sale of crops had the highest mean annual contribution in the rural areas (R109 $\pm$ R312); whilst the fruit sales made the highest contribution to formal urban areas (R10 $\pm$ R45) (Table 4.9).

Table 4.9: Mean direct use and sale annual values (ZAR) per household for crops and fruits in Queenstown

	Crop direct use (ZAR)	Crop sale (ZAR)	Fruit direct use (ZAR)	Fruit sale (ZAR)
Urban	1 459 $\pm$ 1 180	0	1 391 $\pm$ 1 787	10 $\pm$ 45
Township	742 $\pm$ 1 196	76 $\pm$ 414	325 $\pm$ 501	3 $\pm$ 26
Rural	1 842 $\pm$ 3 128	109 $\pm$ 312	434 $\pm$ 550	0
Total	1 180 $\pm$ 1 975	71 $\pm$ 346	581 $\pm$ 1 021	4 $\pm$ 27

4.3.4.2 Phalaborwa

In general, values associated with crop and fruit production in Phalaborwa were much higher than Queenstown for all areas along the continuum (Figure 4.8).

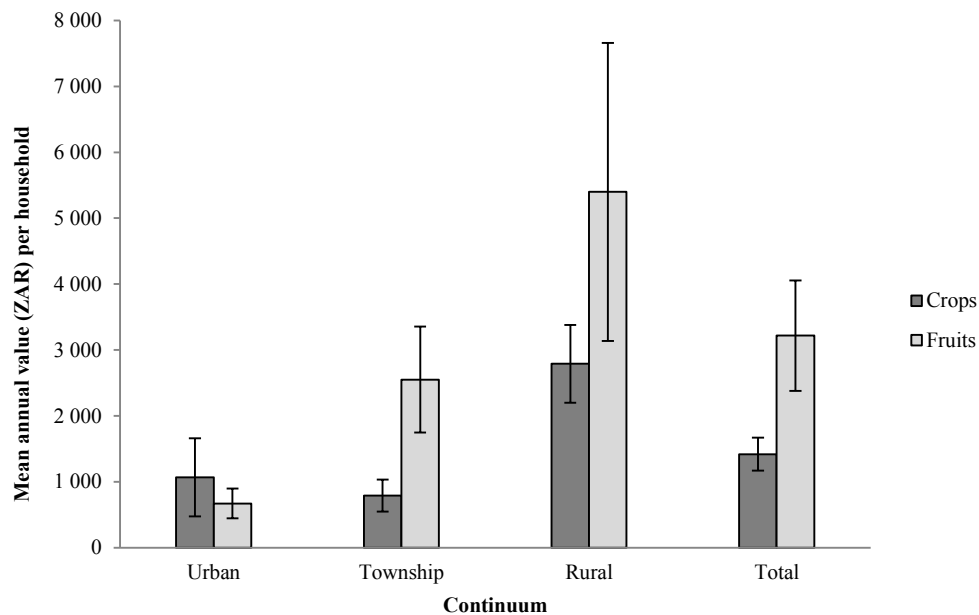


Figure 4.8: The mean annual value (ZAR) per household of crops and fruits in Phalaborwa

In contrast to Queenstown, fruit production made the highest contribution along the continuum in Phalaborwa (Figure 4.8). Total fruit production made the mean annual contribution of R3 218 ($\pm$ R8 393) to cultivating households in Phalaborwa, whilst crops contributed R1 420 ($\pm$ R2 513). Agriculture had the highest values in rural areas, where crops contributed R2 791 ($\pm$ R3 227) and fruits R5 398 ($\pm$ R12 373). Formal urban sections derived the lowest value from fruit production at R671 ($\pm$ R715) in comparison to other categories.

Similar to Queenstown, the majority of respondents in Phalaborwa used their crop and fruit produce for household consumption purposes and only 15 % sold any produce. The sale of fruits had the highest mean annual value in the rural section at R261 ($\pm$ R694), whilst crop sales had the highest mean annual value in the township section at R198 ($\pm$ R1 350) (Table 4.10).

Table 4.10: Mean direct use and sale annual values (ZAR) per household for crops and fruits in Phalaborwa

	Crop direct use (ZAR)	Crop sale (ZAR)	Fruit direct use (ZAR)	Fruit sale (ZAR)
Urban	1 070 $\pm$ 1 873	0	671 $\pm$ 715	0
Township	595 $\pm$ 964	198 $\pm$ 1 350	2 544 $\pm$ 6 240	8 $\pm$ 61
Rural	2 773 $\pm$ 3 073	110 $\pm$ 345	5 137 $\pm$ 12 442	261 $\pm$ 694
Town	1 281 $\pm$ 2 129	152 $\pm$ 1 060	3 135 $\pm$ 8 405	83 $\pm$ 396

4.3.5 Agricultural contribution in relation to wealth

A wealth index was created for Queenstown and Phalaborwa, where the minimum value was 0.0 in Queenstown and 0.1 in Phalaborwa. The maximum wealth index value in Queenstown was 4.7 and 2.0 in Phalaborwa. The highest average wealth indicators were located in the formal urban sections of Queenstown (1.9 ± 0.9) and Phalaborwa (1.3 ± 0.6) (Table 4.11). The lowest wealth indicators were situated in the townships of Queenstown (0.5 ± 0.3) and rural areas of Phalaborwa (0.5 ± 0.3), mirroring the results in Chapter 3 (section 3.3.7).

Table 4.11: Average household wealth index along the continuum in Queenstown and Phalaborwa

	Queenstown	Phalaborwa
Urban	1.9 ± 0.9	1.3 ± 0.6
Township	0.5 ± 0.3	0.6 ± 0.4
Rural	0.8 ± 0.3	0.5 ± 0.3

The annual contribution of agriculture to households was measured against the wealth index. There was no significant relationship in Phalaborwa between respondent wealth status and the annual contribution of home gardens ($r^2 = 0.01$; $p > 0.05$).

There was a weak positive significant relationship in Queenstown between respondent wealth status and their annual home garden production value ($r^2 = 0.1$; $p < 0.01$), where increasing wealth was associated with increased value of homestead cultivation. In Queenstown, formal urban areas had the highest mean annual contribution from home gardening (R2 790 $\pm$ R2 165) and the highest mean wealth index (1.9 ± 0.9). Conversely, townships had the lowest wealth index (0.5 ± 0.3) which was also associated with the lowest mean annual contribution from agriculture (R1 052 $\pm$ R1 406). Rural areas fell in the middle, with an average wealth index of 0.8 (± 0.3) and a mean annual contribution value of R1 741 ($\pm$ R1 686).

4.4 Discussion

4.4.1 Extent of agricultural practices

There is a growing body of literature pertaining to urban agricultural practices. However, little research examines the extent of urban food production with fruit production particularly overlooked (Lee-Smith 2010). Work done in the 1980s and 1990s in East African cities indicated that there were relatively high proportions (17 % to 36 %) of urban households taking part in agriculture to some degree (Lee-Smith 2010). Studies carried out along a continuum in Kampala (Uganda) showed that

agriculture was practiced to some measure everywhere along the continuum; however the gradient indicated that the incidence of urban farming increased towards the periphery of the city (Prain *et al.* 2010; Lee-Smith 2010). Crush *et al.* (2010) examining southern African cities found that approximately 22 % of households grew some or all of their own food. Whilst cities such as Harare (Zimbabwe) had a 60 % participation in urban farming, poorer areas in South African cities such as Cape Town and Johannesburg only had 5 % to 9 % (Crush *et al.* 2010). It is however noted that participation in urban farming might be higher in South Africa's smaller urban centres in poorer provinces (Crush *et al.* 2010).

Overall, general participation in agriculture was higher in Queenstown and Phalaborwa in comparison to the regional average (22 %) of urban households engaged in agriculture in southern African cities (Crush *et al.* 2010). There was a significantly higher proportion of people engaged in agricultural practices along the rural-urban continuum in Phalaborwa (77.4 %) in comparison to Queenstown (45.9 %). The surrounding natural environment could play a role in this difference, as the subtropical climate of Phalaborwa is very suitable for the growth of exotic fruit trees such as mango and avocado, which were widely grown by people in this area. The common occurrence of domestic fruit trees (particularly mango) which made considerable contributions to rural livelihoods was also noted in a study conducted in a rural Limpopo village by High & Shackleton (2000). Paumgarten *et al.* (2005) contrasted tree growing by rural homesteads in the Eastern Cape and Limpopo Provinces and reported that fruit tree growth was noticeably lower amongst Eastern Cape households.

The reasons for a lack of investment in fruit trees in the Eastern Cape are uncertain; however Paumgarten *et al.* (2005) offer some tentative explanations such as a shift of rural livelihoods strategies away from agricultural practices in favour of the formal economy, as well as possible differences in the so called „culture of tree planting“ between Eastern Cape and Limpopo inhabitants. Whilst both towns experienced limited rainfall, Queenstown was experiencing a particularly bad drought spell in 2010 during which the local municipality had to impose strict water restriction measures from 2007 (Fengu 2010; Cezula 2010). It should be noted that the Limpopo Province also experienced a harsh summer season from 2009 to 2010 (Department of Agriculture 2011). This could possibly have affected agricultural activities, especially in terms of small scale, subsistence home gardeners who did not have adequate access or could not afford water to maintain their cultivation activities in drought conditions.

Agricultural practices relating to crop and fruit production varied across the rural-urban continuum in Queenstown and Phalaborwa; however there were no significant differences between sections in this production along the continuum in each town, which could be attributed to low counts. In Queenstown and Phalaborwa, more than half of rural households engaged in fruit and crop

cultivation. When considering crop and fruit production combined, the highest proportion of user households was located in Phalaborwa with 88.1 % of users in the township sections, 76.7 % in the rural section and 70.8 % in the formal urban areas. Studies carried out in east Africa suggest that there is an increase in urban farming towards the periphery of the city (Prain *et al.* 2010) and this complements findings from Phalaborwa as the townships are located on the periphery of the formal urban complex.

Queenstown had a lower proportion of households engaged in crop and fruit production with 63.3 % of users in the rural section, 47.7 % in the formal urban complex and 30.0 % in the township sections. While these findings agree with sentiments from Crush *et al.* (2010) in that urban agriculture participation would likely to be higher in smaller urban centres in comparison to Cape Town (5 %) and Johannesburg (9 %), the Queenstown findings indicate that a higher proportion of practitioners are situated in the formal urban complex, rather than the poorer township areas. Crush *et al.* (2010) speculate that urban farming might be more widely practiced in poor, small urban centres in provinces such as the Eastern Cape as it is a last resort in the face of insufficient income to purchase food. This is not necessarily the case in Queenstown, as wealthier formal urban areas have higher proportions of urban cultivators than poorer township areas. Thornton (2008) commented on the low incidence of agriculture in poor urban areas of the Eastern Cape where poor households in this study were found to rely heavily on state assistance, rendering the contribution of agriculture negligible (less than R100 per month per household) in many instances.

4.4.2 Cultivator profiles

Across the continuum in Queenstown and Phalaborwa the overall majority of people engaged or responsible for crop and fruit cultivation from the homestead were female. In sub-Saharan Africa women are traditionally associated with agricultural practices that are primarily subsistence related rather than for commercial purposes (Hovorka & Lee-Smith 2006). Nugent (2000) noted that Africa tended to have the largest proportion of females involved in urban agriculture and this was further illustrated in work carried out by Jacobi *et al.* (2000) in Tanzania as they stated that “women are traditionally responsible for feeding the family and also for home gardening” (Jacobi *et al.* 2000: 264). However, studies have noted that some gender roles and divisions are highly variable between countries and even different towns within countries (Shackleton *et al.* 2009c).

The majority of cultivator households in the formal urban and township areas owned their homesteads through private title deeds, whilst rural households fell under tribal authority and thus owned their homesteads through customary law. Jacobi *et al.* (2000) found that urban home gardens in Dar es

Salaam were mainly located on residential plots and cultivated by members of the resident household, which is reflected to some extent amongst urban cultivators in Queenstown and Phalaborwa.

Formal urban areas in Queenstown and Phalaborwa in comparison to township and rural areas had a higher wealth status and so tended to have better access to formal employment activities and pensions (Chapter 3). Township and rural households tended to have a lower wealth status and thus a high dependence on state grant schemes (Chapter 3). There is a widespread notion that agricultural activities tend to be confined within the urban poor as these can contribute towards strategies regarding food security (May & Rogerson 1995; Crush *et al.* 2010). However, in Queenstown and Phalaborwa urban cultivators are not necessarily confined to one particular class and this is reiterated by Jacobi *et al.* (2000), where research in Dar es Salaam found that home gardening was not confined to a single income group and scattered throughout the city.

Reasons for why people engaged in homestead gardening generally differed according to household needs or desires in both towns. In wealthier formal urban areas households engaged in agriculture for enjoyment and health awareness reasons. Cultivators in the poorer township sections predominantly grew crops and fruits as a supplementary food source and to save money. Reasons for engaging in cultivation within more urban settings of Queenstown and Phalaborwa were reflected to some extent in work by Nugent (2000), where urban cultivators give reasons such as home consumption, income enhancement, economic crisis, high prices of market food and income diversification for engaging in agricultural activities. In the communal rural areas, households engaged in agriculture to provide food (mainly for immediate household consumption) and also for enjoyment reasons. Agricultural activities in larger fields are well-known for the important contributions they make to rural livelihoods in terms of contributing to subsistence needs, particularly within former homeland or communal areas in South Africa (Shackleton *et al.* 2001; Dovie *et al.* 2003).

In both Queenstown and Phalaborwa, pests and harsh weather conditions were cited as the primary challenges for households engaged in crop and fruit cultivation. Pests such as insects and birds were common problems along the continuum, with roaming livestock (goats and cattle) an added concern to households residing in township and rural areas. Expensive water tariffs were a dominant concern for urban dwellers, whilst rural sections cited limited or no water access as most disadvantageous for their areas. Paumgarten *et al.* (2005) found similar constraints experienced by rural households in terms of tree production. Some of the dominant constraints from this study included livestock damage (due to a lack of fencing) and limited water availability which impacted on the ability to cultivate fruit trees (Paumgarten *et al.* 2005).

4.4.3 Range of crops and fruits

In both Queenstown and Phalaborwa, the presence of fruit trees was higher in comparison to crops along the continuum; with a high proportion of households in the formal urban and township areas cultivating fruit trees, whilst crop cultivation was more evident in rural areas. This could be explained through a household needs basis as rural livelihoods are more dependent on subsistence farming so require more staple foods to be self-grown, whilst more urbanised households rely more heavily on markets to purchase food (Slater & Twyman 2003). Trees are also easier to maintain and require less space for cultivation so could be better suited to smaller urban plots and livelihoods that are linked to the working economy (less time to spend tending garden homesteads). In both Queenstown and Phalaborwa, there were no clear clusters of cultivating households which specifically specialised in certain crops or fruits in any part of the continuum. Cultivators tended to grow crops and fruits according to individual tastes or needs, rather than being bound by location or community.

Within the formal urban section of Queenstown a significantly higher proportion of cultivators grew tomato, green beans and lettuce in comparison to other sections. Cultivators in Queenstown townships tended to prefer onion, spinach, potato, cabbage and carrot. These findings correlate with work carried out in three urban centres in the Eastern Cape indicating that spinach, onion, potato, carrot and tomato were the top five crops grown (Webb 1998). In rural areas of Queenstown cultivators tended to invest in pumpkin, maize, cabbage and potato. These findings correlated with research by Hadju (2006) in rural villages in the former Transkei, who also found that maize was one of the most commonly grown crop types along with pumpkin and potato.

Fruit trees were not as widely cultivated along the continuum in Queenstown as opposed to Phalaborwa, and this observation was also noted by Paumgarten *et al.* (2005) where they stated that „villagers in the Eastern Cape do not have as obvious a preference for fruit trees as do the villagers in Limpopo Province” (Paumgarten *et al.* 2005: 372). Webb (1998) also found that the cultivation of fruit trees was limited in urban areas of the Eastern Cape. While indicating a potential to create income-generating opportunities for urban households, Webb (1998) found that the urban households engaged in fruit sales did not actively cultivate their fruit trees but simply benefited from pre-existing trees on the plot. Urban cultivators grew a limited range of lemon and plum trees in formal urban areas of Queenstown, whilst fruit cultivation was extremely limited in the townships. Tree cultivation was higher in rural areas of Queenstown, which is comparable to work done by Hadju (2006) where more than half of rural homesteads in the Eastern Cape contained predominately exotic fruit trees. Paumgarten *et al.* (2005) found that peach was one of the most commonly grown fruit species in Eastern Cape villages, which corresponds with findings from Queenstown as rural cultivators invested in peach and apple trees.

Urban cultivators in Phalaborwa grew similar crops to Queenstown, indicating that urban dwellers probably engaged in agriculture to supplement food purchased from markets, as well provide in dietary diversity. Cultivators located in formal urban areas of Phalaborwa tended to invest in tomato and spinach, whilst in the townships spinach, onion, beetroot, beans, pumpkin, maize, cabbage and peanuts were predominately grown. Work carried out in a rural village in Limpopo indicated that households predominately grew staple foods such as maize, watermelon, peanuts, beans and pumpkin (Dovie *et al.* 2003). This is similar to findings in the rural areas of Phalaborwa as rural cultivators tended to grow beans, pumpkin, maize, peanuts and watermelon.

Cultivators in Phalaborwa made large investments in fruit production, which was particularly reflected in urban settings as fruit production was significantly higher than crop production. Across the continuum, 50 % to 80 % of cultivators engaged in fruit production and this corresponded with work done in Limpopo by High & Shackleton (2000), where the majority of surveyed households grew domestic fruit trees. The most commonly grown fruit tree in Phalaborwa was mango and this was also mirrored in High & Shackleton's (2000) findings as they noted "a few households have a very large number of productive trees, usually mangoes" (High & Shackleton 2000: 149). In formal urban areas of Phalaborwa, cultivators mainly invested in lemon trees, whilst in the townships mango and wild fruit trees were highly valued. Rural cultivators tended to invest in wild fruit, banana, mulberry and apple trees. Fruit production in Phalaborwa differed from Queenstown in that cultivators actively invested in wild fruit trees, while in Queenstown there was a dominant focus on common domesticated species. These differences echo the findings of Paumgarten *et al.* (2005), who noted that Eastern Cape villages made use of predominately exotic fruit tree species such as peaches, whilst Limpopo villages were more likely to use indigenous fruit species (for example *Sclerocarya birrea* subsp. *caffra*).

Cultivator households situated in the rural areas of Queenstown and Phalaborwa generally made higher investments in terms of preparatory activities for crop and fruit cultivation per season than urban or township cultivators. This was as they often cultivated large areas on the homestead which required larger livestock or tractor assistance. Cultivators in the townships made the lowest investments in preparatory activities for cultivation, which could be attributed to limited access to resources and capital. However, on a per unit area basis, input costs were lowest in rural areas and highest in the urban areas. The majority of cultivator households in the formal urban and township areas of Queenstown and Phalaborwa actively watered their crop or fruit trees, whilst rural cultivators relied on a mix of water sources and rain fed irrigation. Previous research in Africa has indicated that cultivators with better access to resources tend to benefit more from agricultural activities than poorer households which have limited access to such resources (Lee-Smith 2010; Mkwambisi *et al.* 2011).

4.4.4 The contribution of agriculture along the continuum

The estimated annual contribution of crops and fruits in Phalaborwa was higher than previous work carried out in the Limpopo Province. High & Shackleton (2000) found the mean annual value of domestic plants was R1 173 per household in rural villages, whilst similar findings were reflected by Dovie *et al.* (2003) where the mean annual value of crops was R1 087 per household. Overall, crop and fruit production made a mean annual contribution of R4 638 per household in Phalaborwa, which is approximately double the value from similar studies in Limpopo Province after adjusting for inflation (High & Shackleton 2000; Dovie *et al.* 2003). There are similarities between the overall mean value of crops in Phalaborwa (R1 420) and crop values estimated by Dovie *et al.* (2003) in Thorndale (R1 087). High & Shackleton (2000) also included the contribution of fruits which was an average value of R392 per household, which was substantially lower than the estimated R3 218 contribution made by fruits along the rural-urban continuum in Phalaborwa. High & Shackleton (2000) did note, however, that there was a high variation between large numbers of productive trees and the highest value observed in their study was R4 244 as the household had a large number of productive mango trees.

The overall contribution received from home gardens in Queenstown was approximately four times higher in comparison to research carried out in three small towns in the Eastern Cape by Davenport *et al.* (2012). Whilst crop and fruit production made a mean annual contribution of R1 704 per household across the continuum in Queenstown, Davenport *et al.* (2012) found that only households engaged in home gardening received an average of R445 ($\pm$ 523) per year based on extrapolating m² returns from work in Cape Town. Interestingly, crop and fruit production made the highest contribution to cultivator livelihoods in the formal urban areas of Queenstown, which questions the notion that urban agriculture is viewed as an important coping strategy amongst the poorest urban households for food security or income-generating strategies. The formal urban cultivators tended to have a higher wealth status and better access to resources such as space (land), water and soil fertility methods in comparison to cultivators located in the townships. Mkwambisi *et al.* (2011) working in Malawi also found that high-income households had higher contributions from home garden harvests in comparison to poorer cultivators.

The townships in Queenstown received the lowest contribution from cultivation activities, even in comparison to other sections along the continuum in Phalaborwa. Similar work carried out in the townships of Grahamstown (Eastern Cape) by Thornton (2008) found that on average home gardening activities saved cultivator households less than R100 per month. Thornton (2008) indicated that despite high unemployment in the townships, poor urban households did not fully make use of their home gardens to generate food but rather relied on social grants. A similar trend is reflected in the

Queenstown townships, where only 35 % of cultivator households were employed but over 80 % of these households relied on social grants, yet received the lowest mean annual income from home gardens.

In both Queenstown and Phalaborwa the majority of crop and fruit produce from home gardens was directly consumed by households, with only 15 % to 17 % of total cultivating households involved in the sale of their produce. Jacobi *et al.* (2000) noted that the prevailing objective for home gardening was direct consumption purposes, which agrees with findings from Queenstown and Phalaborwa in that few urban cultivators sold their surplus produce (but only on a local, small scale). Crush *et al.* (2010) observed in their survey of 22 % households engaged in urban agriculture across cities in southern Africa, only 3 % sold any of their produce.

In Queenstown and Phalaborwa, rural cultivators were more actively involved in the sale of their produce as 27 % to 33 % of rural cultivators engaged in sales, whilst less than 13 % of urban cultivators did so. It is understandable that rural households generally derived higher contributions from homestead gardening, as this often forms an important part of rural livelihood strategies to secure household food (Shackleton *et al.* 2001). The majority of households in the urban areas usually only sold surplus produce from their home gardens which did not form major income-generating strategies; however there was a higher percentage of urban cultivators in Queenstown and Phalaborwa engaged in produce sales in the poorer townships (between 8 % to 13 %) in comparison to the wealthier formal urban areas (5 %). May & Rogerson (1995) found that incomes derived from urban agriculture were an area of uncertainty as produce from these activities was difficult to evaluate.

Our findings from Queenstown suggested that the wealthier households (situated in the formal urban section) had better access to space (land) and capital for the upkeep of their gardens (such as hired labour, soil fertility enhancements, fences/protection measures) in comparison to their poorer urban counterparts (which agrees with work done by Mkwambisi *et al.* (2011) and Thornton 2008). The contribution of home gardens to wealthier urban households was therefore higher as they could invest more resources into the cultivation of crops and fruits. The large majority of urban cultivators situated in the formal urban areas of Queenstown also had access to private boreholes, which gave them a further advantage due to expensive and limited supply of water over this period due to drought conditions. There was no significant relationship between the contributions made by home gardens in relation to the wealth status of cultivator households in Phalaborwa, indicating that high- and low-income households alike engaged in agricultural practices with no disproportionate benefits according to individual household wealth.

The potential of urban agriculture has been advocated in larger city centres of South Africa, for example Shackleton *et al.* (2010) suggest that agriculture does play a role in the urban poor's livelihoods; however evidence from Queenstown suggests that the role of home gardening as a poverty alleviation strategy needs to be re-evaluated. Maxwell *et al.* (1998) and Webb (1998) noted that urban agriculture alone does not stand as a single solution to improve food security amongst the urban poor as not everyone can have access to resources to farm in urban centres. But, then again, there probably is no single solution and a diversity of approaches and strategies will be required, building on current local practices and removing regulatory constraints.

Chapter Five

General discussion and conclusions

5.1 Introduction

Smaller urban centres in South Africa are often viewed as unique in terms of processes occurring within them (Nel *et al.* 2011). These towns “reflect the economic loss experienced in countries such as the USA and Australia, as well as developing world characteristics of persistent population growth in conjunction with entrenched poverty” (Nel *et al.* 2011: 396). Despite the more prominent role that smaller urban centres play within the context of global urbanisation, their inclusion in research and policy is often overlooked in favour of larger city centres (Drakakis-Smith 1995; Thornton 2008; Nel *et al.* 2011). The omission in urban studies has resulted in knowledge gaps within many research areas, including the potential contribution of natural resources to urban livelihoods (Slater & Twyman 2003; Stoian 2005; Davenport *et al.* 2011). Such knowledge gaps include the uncertain roles of natural resource strategies in poverty alleviation and food security within poor urban contexts, which often result in high levels of risk for poor urban households drawing on such strategies (Slater & Twyman 2003; UNFPA 2007; Webb 2011).

The research described in this thesis examined livelihoods through a number of household attributes, natural resource and income streams to holistically evaluate transformation along the rural-urban continuum of smaller urban centres. The contribution of natural resources to livelihoods has previously been restricted to rural settings (Cavendish 2001; Campbell *et al.* 2002; Dovie *et al.* 2003) and, as such, has been neglected within urban livelihoods, urban poverty alleviation and food security contexts in current literature. The aim of this study was to address this research gap by analysing the impact of urbanisation on livelihoods in smaller urban centres and to unconventionally encompass a broad range of livelihood strategies, thus evaluating the contribution of natural resources to households within a comparative base. The contribution of home gardening to local livelihoods was also examined along the rural-urban continuum. In order to capture the complexity of household assets and livelihood strategies, the SLF was tailored to focus on household dynamics associated with natural resource use.

5.2 Livelihoods along the rural-urban continuum

Rural and urban areas are not entirely separate entities and thus often display spatial linkages along the continuum in terms of the flow of people and goods (Agergaard & Birch-Thomsen 2006; Tacoli 2006). Consequently, as urbanisation increases the complexity of rural and urban dynamics, livelihood strategies are also transforming according to opportunities and constraints presented by the changing dynamics of the rural-urban continuum (Iaquinta & Drescher 2000; IFPRI 2005). In Chapter 3, Key Question 1 examined how livelihoods change along the rural-urban continuum, with an emphasis on natural resource use. Satterthwaite (2006) observed that rural households can exhibit urban characteristics when they rely on non-agricultural employment opportunities to diversify land-based livelihoods. Similarly, urban areas can adopt rural characteristics related to land-based strategies, particularly in the case of low-income urban households (Satterthwaite 2006). The middle of this continuum, where rural and urban characteristics converge, is often found in small urban towns in developing countries and peri-urban locations around cities, and also needs to be taken into consideration (Satterthwaite & Tacoli 2003; Satterthwaite 2006).

Understanding the dynamics of livelihoods along the rural-urban continuum in relation to natural resource use is complex and influenced by internal and external factors. As discussed in Chapter 1, the SFL is a useful analytical framework to capture the complexity of households inherent to the rural-urban continuum and their available assets within multi-scale variables. Livelihood opportunities differ according to what is available either in rural, peri-urban or urban situations and therefore, households tend to optimize and diversify strategies according to their relative position along the continuum (Meikle *et al.* 2001; Farrington *et al.* 2002). However, links clearly exist between urban, rural and peri-urban areas which can form an important part of livelihood strategies, particularly within poverty contexts (Farrington *et al.* 2002). In this thesis, the SLF provided a suitable conceptual approach to examine whether or not natural resources fit into livelihood strategies of households along the rural-urban continuum.

Using the SLF as a model, four livelihood classes emerged from this study which represented primary livelihood strategies used by households in both towns of Queenstown and Phalaborwa. These livelihood classes, namely wage-dependent, state-dependent, independent and mixed income, allowed for a clear understanding on how livelihood strategies evolved along the rural-urban continuum, with specialisation of certain classes in particular parts of the continuum depending on opportunities or constraints experienced according to their relative position. This study revealed that, in general, the majority of households relied on wage employment as their primary livelihood strategy and this was not necessarily restricted to urbanised positions along the continuum. Through the use of GIS as a tool to visually display households according to their livelihood class, a spatial dimension was added to

this research by illustrating how livelihood strategies formed distinctive clusters along the continuum depending on position, relative wealth, access to the natural environment and historical events.

In the new democratic South Africa, livelihoods and space are influenced by historical events and modern pressures (such as population increase) of a contemporary society which can lead to distinct demographic clusters along the rural-urban continuum (Kok & Collinson 2006; King 2011), and this was reflected to some extent in this study. Livelihoods in Queenstown and Phalaborwa were found to be spatially bound where historical and contemporary urbanisation patterns formed community clusters, which generally shaped livelihood possibilities. Communities living in former homeland areas and temporary „black“ urban areas under the apartheid regime were marginalised and these past inequalities have resulted in discriminatory settlement patterns and poor living conditions, which are still visible today (Kok & Collinson 2006; South African Risk and Vulnerability Atlas 2010). Rural community clusters residing in these former homeland areas tend to be poorer and, in this study, similar findings were observed in the townships of Queenstown and Phalaborwa.

The observation by Satterthwaite (2006) on the incorporation of perceived „urban“ strategies into rural livelihoods and vice versa is, to some extent, reflected along the continuum in both Queenstown and Phalaborwa. However, typical „urban“ characteristics such as a reliance on the cash economy, still often define livelihood strategies in both rural and urban areas (Satterthwaite 2006). In Queenstown and Phalaborwa, households in the CBD and town predominantly relied on cash incomes from wage employment and private pensions. Households situated in the CBD and town also tended to be associated with higher incomes and were considered wealthy as indicated by diverse assets and electricity consumption, reasonable education levels and privately owned homesteads. As such, poverty levels were negligible in the CBD and town for both sites. Township households also predominately drew on cash generating strategies, while income strategies were dominated by state grant assistance. Households relying on state grants were poorer, with limited access to high income employment or a diverse asset base. Nel *et al.* (2011) noted that poverty levels in small towns were generally higher and more persistent than in cities. Along the continuum in both towns, households in the townships experienced the highest levels of poverty, where 48.2 % and 21.1 % of households were considered impoverished in Queenstown and Phalaborwa, respectively.

Whilst it is recognised that cash income strategies are often preferred livelihood pursuits in urban areas, natural resources can play a role as „hidden“ livelihood contributors, particularly in livelihoods of the urban poor (Slater & Twyman 2003; Shackleton *et al.* 2009c; Davenport *et al.* 2012). In poorer urban areas such as townships, natural resources (agriculture, livestock and wild resources) contributed 2.0 % to the total income portfolios (ZAR) of these livelihoods in Queenstown, which was higher than other urban sections as natural resources contributed 0.9 % and 0.6 % to the CBD and

town, respectively. In Phalaborwa, the total contribution natural resources made to township households was 8.5 %, which was higher than the CBD (5.7 %) and town (0.1 %). When impoverished households in the townships were taken into account, the exclusion of natural resources resulted in an increase in the incidence of poverty by 1.5 % in Queenstown and 4.5 % in Phalaborwa.

Since the creation of the homeland areas in South Africa, rural inhabitants have been able to obtain only part of their livelihoods from agriculture and other land-based strategies (Lahiff 2003; Agergaard & Birch-Thomsen 2006). Agergaard & Birch-Thomsen (2006) observed that urban income through rural-urban links was an important means to develop sustainable livelihoods for farming in former homelands. Previous studies have indicated that small urban centres can play an important role in rural development through the provision of services and urban cash flows, while rural hinterlands can provide resources such as food and labour which can positively influence small town economic and social functions (Baker 1990; Satterthwaite & Tacoli 2003). Rural areas in Queenstown and Phalaborwa offered a diverse mix of livelihood strategies to secure a living, either relying on cash incomes such as wage employment and state grants, or on a combination of land-based or income generating strategies. In Phalaborwa, rural livelihood strategies were more dependent on agriculture and wild resources compared to Queenstown, thus emphasising the spatial differences between sites arising from local resources endowments, cultures and opportunities, and optimisation of assets at their disposal.

Rural areas were generally associated with a lower wealth status, where rural households which relied primarily on state grants tended to have poor access to wealth-associated attributes. Poverty levels in rural areas ranged from 15.3 % to 17.7 %, which were increased dramatically by 16.7 % in Queenstown and 41.5 % in Phalaborwa if all natural resource incomes were excluded. The contribution from wild resources is often the hidden element of both rural and urban livelihoods, and its exclusion resulted in Queenstown poverty levels increasing by 2 % and. Thus, this could be attributed to the limited use of wild resources in this area. However, if wild natural resource contributions were excluded from rural livelihoods in Phalaborwa, poverty levels would increase by 29.2 %, thus demonstrating the vital importance of natural resources within poor livelihoods (Stoian 2005; Shackleton *et al.* 2008).

5.3 Livelihoods and natural resource use

Rural-urban interactions are generally influenced by geographical and ecological characteristics; social, cultural and historical aspects; and local political structures (Tacoli 2003). As noted by Twine *et al.* (2003), factors that influence the local use of (wild) natural resources include environmental conditions, resource availability, socio-economic characteristics, as well as access to alternatives. To

some extent these trends were observed in the results obtained in this study, where natural resource use differed between Queenstown and Phalaborwa, and along the rural-urban continuum in each town. Practices and contributions associated with agriculture and wild natural resource use were significantly higher in Phalaborwa than Queenstown, which could be attributed to favourable environmental conditions and good access to wild natural resources in Phalaborwa.

The subtropical climate of Phalaborwa allowed households to invest in agriculture, since fruit trees (for example mangoes) flourished in this area, whilst the surrounding Mopani Bushveld provided a diverse assortment of wild resources such as firewood, edible insects and wild fruits which were extensively harvested by local people. By comparison, agricultural practices in Queenstown appear to be in decline along the continuum, with more households investing in wage employment or state grant schemes. Wild natural resource use and diversity was limited across the continuum in Queenstown, which could be attributed to lower plant species diversity in the Eastern Cape and high land degradation rates associated with heavy grazing practices in communal areas (CSIR 2004; Shackleton & Shackleton 2004; Paumgarten *et al.* 2005). Livestock husbandry was generally restricted in both towns, with a higher proportion of households in Queenstown investing in a more diverse set of domesticated animals, which can be attributed to cultural preferences (Lahiff 2003).

The extent of natural resource use along the continuum varied between Queenstown and Phalaborwa but, generally speaking, natural resources made the highest contributions to rural livelihoods and the lowest in the CBD and town areas. Traditionally, natural resources have played an essential role in rural livelihoods, particularly wild resources in poorer rural areas (Shackleton *et al.* 2001; Twine *et al.* 2003; Belcher *et al.* 2005). Urban livelihoods are usually associated with cash incomes as primary livelihood strategies due to a higher reliance on market economies (Meikle *et al.* 2001; Slater & Twyman 2003). Contributions of natural resources in the townships of Queenstown and Phalaborwa were mixed and land-based activities such as agriculture and wild resources made higher contributions to Phalaborwa townships (albeit not as high as formal cash income streams) compared to Queenstown. Similarly, Stoian (2005) found that resources such as NTFPs played an important role in marginalised urban and peri-urban households in the Bolivian Amazon.

The broad scope of livelihoods highlighted in Chapter 3 encapsulated the use of a variety of natural resources within households along the rural-urban continuum, which painted a comprehensive picture of how these livelihoods evolved according to opportunities and constraints within local contexts. Focus was then narrowed in Chapter 4, when we examined one activity relating to natural resource use, namely home gardening, to build onto existing knowledge around natural resource use within local livelihoods along the continuum. Thus, this thesis not only contributes to the general

understanding of livelihoods and natural resource use along the continuum, but also gives an in-depth perspective of the inner workings of one particular natural resource activity within livelihoods.

5.4 The role of home gardens in urbanising livelihoods

Traditionally, the cultivation of food for subsistence purposes has been assumed to be largely restricted to homesteads in rural settings and it has been widely accepted that land-based strategies form important components within rural livelihoods (Shackleton *et al.* 2001; Slater & Twyman 2003). Urban and rural areas are often viewed as separate entities, both defined individually in terms of their functions and characteristics – urban areas are associated with industry and technology and rural areas are associated with primary production such as agriculture (Tacoli 2006). However, the increase of urban transformation over the last century has resulted in the emergence of complex settlement systems, blurring the distinction between urban and rural areas (Cohen 2004; Agergaard & Birch-Thomsen 2006). The increasing global human population has exerted immense pressure on the environment and natural resources, particularly as most people migrate to urban centres in search of livelihood opportunities (Drakakis-Smith 1995). The added pressures of population frequently affect resources such as food supply and inflate global market prices, from which the urban poor will experience the greatest hardships (Ambrose-Oji 2009).

South Africa's population is growing at almost 2 % per annum and this will bring many challenges to national and local food provision, particularly as the majority of the population resides in urban areas (Goldblatt 2010). Food production or imports will need to double in the next 20 years to keep up with the demand of the expanding South African population, using already declining natural resources such as arable land and water (Goldblatt 2010). The emphasis on food security has shifted away from merely looking at availability of food and has focused on individual and household access to healthy food. Within poorer South African households, particularly in urban settings, people tend to adopt unvaried diets consisting of starch staples and a few affordable or collected vegetables to cope with high food prices (Schönfeldt *et al.* 2010; Faber *et al.* 2011). Investing in fruit trees and leafy vegetables for household consumption within urban areas could improve the nutritional status of households; however, crop and fruit types need to be suitable to the local climate as highlighted in our research findings in Queenstown and Phalaborwa (Chapter 4).

Homestead gardening and other small-scale agricultural activities have been receiving interest as a means to enhance food security and livelihood well-being, particularly within impoverished or disadvantaged communities (Gordon *et al.* 2000; Bryld 2003; Shackleton *et al.* 2009c). In Chapter 4, Key Question 2 looked at what extent home gardening contributes to livelihoods and how this changes along the rural-urban continuum. In East African cities, 17 % to 36 % of urban households

engage in agriculture and other research indicates that up to 22 % of households in Southern African cities grow their own food (Crush *et al.* 2010; Lee-Smith 2010). However, the role of home gardening in South Africa remains vague and examples in the Eastern Cape indicate that urban agriculture practices are limited amongst the urban poor and do not play a significant role in enhancing food security (Thornton 2008; Webb 2011), which the study described in this thesis corroborates.

Overall, general participation in agriculture was higher in Queenstown and Phalaborwa compared to the regional average of urban households engaged in agriculture in southern African cities (Crush *et al.* 2010). Phalaborwa had a significantly higher proportion of households engaged in home gardening activities along the continuum, with the highest concentrations of cultivators located in the townships. Conversely, the lowest proportion of cultivators in Queenstown was found in the townships and the highest in rural areas. Despite advocating urban agriculture as a poverty alleviation strategy (May & Rogerson 1995), the findings on home gardening in Queenstown discussed in Chapter 4 of this study observed that wealthier households with greater access to capital, land and water resources tended to reap greater benefits from home gardening initiatives than their poorer urban counterparts. Similar findings have also been highlighted in other case studies by Lee-Smith (2010) and Mkwambisi *et al.* (2011). The role of home gardening within the context of Queenstown changed from a mere necessity to produce food to enhancing urban lifestyles through associated health and mental benefits, as well as increased environmental awareness amongst the wealthy.

Since in this study, we have noticed that home gardening is more beneficial to the rich, the suitability of urban agriculture in terms of enhancing food security for the urban poor is then called into question, particularly in the light of increasing poverty and climatic variability which leads to harsh conditions and water scarcity (OECD 2006; UNFPA 2007; Goldblatt 2010). As noted by Webb (2011: 206), “without clarity on the benefits and significance of urban agriculture, current and potential cultivators face high levels of uncertainty and risk” especially amongst the urban poor. Additionally, Thornton (2008) criticises high dependencies of the urban poor in South Africa on the social welfare system, as it appears to hinder the engagement of the urban poor in self-help livelihood strategies such as urban agriculture, and is deemed unsustainable. In Queenstown and Phalaborwa, home gardening mainly fulfilled a role of supplementing households with additional crop and fruit produce for consumption, with limited contributions derived from sales of home-grown produce.

However, small-scale agricultural activities such as home gardening should not be discounted within the South African context, as cultivators across the wealth spectrum can enjoy substantial benefits (Mougeot 2005; WinklerPrins & de Souza 2005; Foeken & Owuor 2008; Crush *et al.* 2010). For example, Spiaggi (2005) noted that urban agriculture enabled urban households with limited resources to engage in local development processes in Rosario, Argentina. Perez-Vazquez *et al.* (2005) found

that urban agriculture through allotment gardening was viewed as an essential part of urban settings and a means to improve quality of life in cities of England. As discussed in Chapter 1, Drescher (2001) suggests that the idea of allotments can be incorporated into southern African urban centres in order to reduce poverty and food insecurity. Phalaborwa provides an example of how households engaged in home gardening activities across the rural-urban continuum could reap substantial benefits from crop and fruit produce, which was not restricted to any wealth status class or part of the rural-urban continuum. Notably, households that exclusively engaged in home gardening along the continuum derived high contributions from their crop and fruit produce, even in comparison to other literature on similar studies (High & Shackleton 2000; Dovie *et al.* 2003; Davenport *et al.* 2011). The dominance of fruit trees, which included both domestic and wild species, could potentially contribute to urban planning policy for this particular region of the Limpopo Province as benefits include enhancing local food production and urban greening (Paumgarten *et al.* 2005).

5.5 Conclusions

Until now, few studies have attempted to integrate natural resource use into calculations of urban livelihood portfolios and, as such, there are significant knowledge gaps in the changing role of natural resources use along the rural-urban continuum, particularly in terms of poverty alleviation and food security strategies in smaller urban centres. Therefore, livelihood systems need to be examined in a holistic manner and contributions of various strategies should not be limited to cash income, but should also rather include the use of various land-based strategies, even in a consumption or savings capacity (Shackleton *et al.* 2001). The rural-urban continuum in Queenstown and Phalaborwa was not static and the dynamics of natural resource use (for example firewood and mopane worms) were fluid along this continuum depending on availability, demand and social preferences within local contexts. Most small urban centres in low to middle income countries are associated with a mix of urban and rural characteristics, where interactions along the rural-urban continuum are dynamic and transformative (Jaquinta & Drescher 2000; Satterthwaite 2006), as seen in our findings from Queenstown and Phalaborwa summarised in Table 5.1. Generally, natural resource use was more prevalent along the rural-urban continuum in Phalaborwa compared to Queenstown, and this stresses the importance of local context in terms of environmental conditions, resource availability and socio-cultural preferences.

Not surprisingly, rural livelihoods along the continuum in Queenstown and Phalaborwa were more reliant on natural resources compared to urban centres in order to maintain their livelihoods (Table 5.1). Shackleton *et al.* (2001) noted that rural livelihoods in South Africa comprised of “complex interconnections between the multiple components of such systems, including local interconnections and also the strong linkages between rural areas and the urban economy, as well as the crucial role of

state welfare payments” (Shackleton *et al.* 2001: 593). Similarly, in Queenstown and Phalaborwa, we observed that rural livelihoods were generally diverse, drawing on a number of land-based and urban income generating strategies, with a high reliance on state grant incomes and natural resources. Conversely, urban households tended to rely predominantly on cash income strategies relating to wage employment, private pensions and state grants.

Table 5.1: Generalised differences along the rural-urban continuum in Queenstown and Phalaborwa

Rural	Township	Urban
Land tenure based on communal tribal systems	Land tenure a mix of privately owned, rent, communal and squatting	Land tenure based on private title deeds or rent
Basic service delivery and local governance is limited and disjointed	Basic service delivery and local governance is limited but generally better than rural areas	Basic service delivery and local governance good
Diverse livelihoods drawn from land-based activities and cash income strategies	Livelihoods primarily dependent on cash income primarily in the form of state assistance	Livelihoods primarily dependent on cash income from employment
In general, a lower wealth status with widespread dependence on social grants and natural resources	In general, a lower wealth status with widespread dependence on social grants with 'hidden' contributions from natural resources	In general, a higher wealth status with greater access to high income opportunities
15 % to 17 % of households below the poverty line	21 % to 48 % of households below the poverty line	Poverty levels negligible
Greater reliance on subsistence farming and wild collection to obtain food	Mix of subsistence farming and cash markets to obtain food depending on access to cash or environmental traits (e.g. land, wild resources)	Greater reliance on cash markets to obtain food

However, natural resources did play a subtle role in urban centres and their contribution to urban livelihoods should not be discarded (Slater & Twyman 2003; Davenport *et al.* 2011). Particularly in the light of prevailing poverty levels in the townships, the exclusion of natural resources saw a potential increase of impoverished households by up to 2 % to 5 %. Poorer urban households in Queenstown incorporated agriculture and livestock as their „hidden“ livelihood strategies, whilst simultaneously drawing predominantly on cash income strategies (Table 5.1). These hidden livelihood strategies were more prevalent in poor households in Phalaborwa, which could be attributed to the abundance of wild resources and fruit trees. Firewood from local surrounding environments was one of the most commonly used resources in rural and township areas of Queenstown and Phalaborwa, in spite of the fact that most houses having access to electricity. Mopane worms, which are highly valued for their nutritional benefits, were also widely used in Phalaborwa and the use of this wild resource extended from rural and township areas into the wealthier CBD.

Whilst urban agriculture will never replace agricultural produce from rural areas, it has numerous benefits to urban centres and, in many cases, complements its rural counterpart (Mougeot 2000; Shackleton *et al.* 2009a). Home gardening in Phalaborwa was practised by a wide range of households along the continuum and was not restricted to one particular income group. Shackleton *et al.* (2010) suggested that agriculture does play a role in the livelihoods of the urban and peri-urban poor in South Africa and therefore should be recognised as an important contributor towards developing sustainable cities. On an international scale, Asia-Pacific regions offer examples where homestead food production has been successful in improving participants' dietary needs and contributing towards household income flows (to name a few) (HKI 2010). However, in Queenstown it was noted that access to resources such as land (adequate space), water, fertilizer and labour did increase the yield of produce, hence increasing the benefits sustained from home gardening. As such, wealthier households tended to derive the highest benefits from home gardening. The role of home gardening is therefore once again questioned in terms of enhancing food security, as it is not possible for all poor urban households to access the same resources as the rich, and is rather a supplementary strategy within a suite of possibilities to combat food insecurity (Maxwell *et al.* 1998). "Thus, even while support for urban agriculture should be advocated, there is a need for local authorities, the research establishment, and development agencies to work with the urban poor to understand and develop other urban food and livelihood security strategies" (Maxwell *et al.* 1998: 423).

Generally, the lack of case studies concerning urban natural resources results in examples and policy recommendations to be confined to particular regions (Slater & Twyman 2003). However, this thesis demonstrated that while dominant trends of livelihood activities conform to stereotypical findings in the literature, such as rural households rely on land-based strategies and urban households draw on cash income streams; so called „hidden“ strategies still persist and it is "the rural-urban nexus underlying these strategies that explains their flexibility, adaptability, and viability" (Stoian 2005: 1485). Research needs to push the boundaries against such stereotypes so that policy development is robust and does not reduce the importance of hidden livelihood strategies. As noted by Slater & Twyman (2003), research needs to be sensitive as to when policy intervention might be more harmful to communities making use of hidden resources, as the enhancement of benefits could cause competition and negatively impact on dependent livelihoods.

This thesis also pointed out clear differences between the two towns in South Africa, Queenstown and Phalaborwa, in terms of natural resource use within and between the towns, which could be partly attributed to local environmental and social conditions. Therefore, research also needs to inform a better understanding on natural resource use within localised contexts of small South African towns, as findings cannot be generalised. Local livelihoods, particularly in the case of the poor, need to incorporate a diversity of strategies to secure a healthy lifestyle and this was indeed observed in the

case of home gardening in this study. The use of natural resource activities, such as agriculture, should not be presumed to singularly solve issues such as food insecurity in impoverished communities, as it largely plays an auxiliary role within both wealthy and poor livelihoods. Therefore, research cannot focus only on one aspect of natural resource use, but should address numerous aspects around cultivation and collection of these resources, as well as their contribution within local livelihood contexts.

Urbanisation processes have become global drivers of change that affect traditional strategies which households use to secure a living. Household assets and diversification will ultimately shift as people will either intensify strategies available to them or rely more on single livelihood strategies. Research will have to question whether urbanisation is increasing poverty levels or if the intensification of people into urban areas will instead shift the incidence of rural poverty to urban domains. Irrespectively, it is essential to understand urbanisation processes as people „vote with their feet“ in search of better livelihood opportunities, even in the face of increased adversity and risk. It is important not to only understand the processes of urbanisation and how this affects livelihood decisions, but also where these processes are occurring and how unique situations cause variation between locations. The importance of smaller urban centres within urbanisation trends is best noted by Satterthwaite & Tacoli (2003) as they stress that the reliance of households in smaller urban centres on both rural and urban resources is often stronger and economically linked, thus highlighting the important role these urban areas could play in local economic development. In South Africa, natural resource use will more than likely remain an important „hidden“ livelihood strategy, particularly within poor urban contexts, and therefore needs to be incorporated into sustainable lifestyles to ensure the protection of these resources without undermining dependent or vulnerable livelihoods.

References

- Agergaard, J. & Birch-Thomsen, T. 2006. Transitional rural landscapes: The role of smallscale commercial farming in former homelands of Post-Apartheid KwaZulu-Natal, *Danish Journal of Geography*, 106(2): 87-102.
- Ainslie, A. 2005. Farming cattle, cultivating relationships: Cattle ownership and cultural politics in Peddie District, Eastern Cape, *Social Dynamics*, 31(1): 129-156.
- Alemu, Z. G. 2010. Tracing Spatial Dimension of Food Insecurity, A First Step to a Strategic Move to Combat Food Insecurity: The Case of South Africa, *Development Bank of Southern Africa*, 1-31.
- Aliber, M. 2003. Chronic Poverty in South Africa: Incidence, Causes and Policies, 31(3): 473-490.
- Ambrose-Oji, B. 2009. Urban Food Systems and Indigenous African Vegetables: Defining the Spaces and Places for African Indigenous Vegetables in Urban and Peri-Urban Agriculture. In Shackleton, C. M., Pasquini, W. & Drescher, A. W. (Eds). *African Indigenous Vegetables in Urban Agriculture*, Earthscan Publications Ltd, UK. 1-34pp.
- Ashebir, D., Pasquini, M. & Bihon, W. 2007. Urban agriculture in Mekelle, Tigray state, Ethiopia: Principal characteristics, opportunities and constraints for further research and development, *Cities*, 24(3): 218-228.
- Baiphethi, M. N. & Jacobs, P. T. 2009. The contribution of subsistence farming to food security in South Africa, *Agrekon*, 48(4): 459-482.
- Baker, J. (Ed) 1990. *Small Town Africa: Studies in Rural-Urban Interaction*. Nordiska afrikainstitutet, Uppsala, Sweden. 268pp.
- Baker, J. L. 2008. *Urban Poverty: A Global View*, The World Bank, Washington D.C., 27pp.
- Ba-Phalaborwa IDP 2010. *Ba-Phalaborwa Municipality: Approved ID Document 2010-2015*. Available, [Online]: http://www.ba-phalaborwa.gov.za/docs/IDP/Approved_IDP_2010.pdf. Accessed 22/08/2011.
- Ba-Phalaborwa SDF 2009. *Ba-Phalaborwa Municipality: Spatial Development Framework (SDF) 2009*, Aurecon South Africa (Pty) Ltd, Pretoria. 140pp.
- Barrett, C. B., Reardon, T. & Webb, P. 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications, *Food Policy*, 26: 315-331.
- Barrett, C. B. 2010. Measuring Food Insecurity, *Science*, 327: 825-828.
- Baumann, P. 2002. *Improving Access to Natural Resources for the Rural Poor. A Critical Analysis of Central Concepts and Emerging Trends from a Sustainable Livelihoods Perspective*. FAO, Rome.

- Bebbington, A. 1999. Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty, *Overseas Development Institute (ODI)*, 27(12): 2021-2044.
- Belcher, B., Ruiz-Perez, M. & Achdiawan, R. 2005. Global Patterns and Trends in the Use and Management of Commercial NTFPs: Implications for Livelihoods and Conservation, *World Development*, 33(9): 1435-1452.
- Bennett, J. & Lent, P. C. 2007. Livestock Production and Forage Resources. In: Hebinck, P. & Lent, P.C. (Eds). *Livelihoods and Landscapes: The People of Guquka and Koloni and their resources*, BRILL, Leiden. 221-256pp.
- Bhattacharya, P. C. 2002. Urbanisation in Developing Countries, *Economic and Political Weekly*, 37(41): 4219-4221 and 4223-4228.
- Biggs, R., Desanker, P. V., Fabricius, C., Lynam, T., Misselhorn, A. A., Musvoto, C., Mutale, M., Scholes, R. J., Shikongo, S. & van Jaarsveld, A. S. 2004. *Nature Supporting People: The Southern African Millennium Ecosystem Assessment: Integrated Report*, Council and Industrial Research, South Africa, 58pp.
- Bryld, E. 2003. Potentials, problems, and policy implications for urban agriculture in developing countries, *Agriculture and Human Values*, 20: 79-86.
- Burgess, R., Carmona, M. & Kolstee, T. (Eds) 1997. *The Challenge of Sustainable Cities: Neoliberalism and Urban Strategies in Developing Countries*. Zed Books Ltd, London. 294pp.
- Campbell, B. M., Jeffrey S., Luckert M., Mutamba M. & Zindi C. 2002. Household livelihoods in semi-arid regions: options and constraints, *Center for International Forestry Research*, Bogor, Indonesia, 154pp.
- Carney, D. 2002. *Sustainable Livelihoods Approaches: Progress and Possibilities for Change*, Department for International Development (DFID), Canada. 67pp.
- Cavendish, W. 2001. Quantitative methods for estimating the economic value of resource use to rural households. In: Campbell, B. M., & Luckert, M. J. (Eds). *Uncovering the hidden harvest: Valuation methods for woodland and forest resources*, Earthscan, London. 17-65pp.
- Cezula, T. 2010. *Summit to address drought-hit Chris Hani District*, Architect Africa: Africa built environment news and information. Available, [Online]: <http://architectafrica.com/node/4462>. Accessed 10/11/2010.
- Chambers, R. & Conway, G. R. 1991. Sustainable rural livelihoods: practical concepts for the 21st century, *Institute of Development Studies (IDS)*, 296: 1-29.
- Cocks, M., Dold, T. & Wiersum, F. 2003. The Cost of Culture, *Veld & Flora*, 146-149.
- Cocks, M. L. & Dold, A. P. 2006. Cultural significance of biodiversity: The role of medicinal plants in urban African cultural practices in the Eastern Cape, South Africa. *Journal of Ethnobiology*, 26: 60-81.

Cofie, O. O., van Veenhuizen, R. & Drechsel, P. 2003. Contribution of urban and per-urban agriculture to food security in Sub-Saharan Africa, *International Water Management Institute*, Paper: 1-12pp.

Cohen, B. 2004. Urban Growth in Developing Countries: A Review of Current Trends and a Caution Regarding Existing Forecasts, *World Development*, 32(1): 23-51.

Council for Scientific and Industrial Research (CSIR). 2004. 2004 Eastern Cape State of the Environment Report. *CSIR Division of Water, Environment and Forestry Technology*, Durban, South Africa. 138pp.

Cousins, B. 1999. Invisible capital: the contribution of communal rangelands to rural livelihoods in South Africa, *Development Southern Africa*, 16(2): 299-318.

Chris Hani IPD 2010. *Chris Hani District Municipality: Integrated Development Plan Review 2010/11*. Available, [Online]:
<http://mfma.treasury.gov.za/Documents/01.%20Integrated%20Development%20Plans/2010-11/03.%20District%20Municipalities/DC13%20Chris%20Hani/DC13%20Chris%20Hani%20-%20IDP%20-%20201011.pdf>. Accessed 22/08/2011.

Crush, J., Hovorka, A. & Tevera, D. 2010. *Urban Food Production and Household Food Security in Southern African Cities*, Urban Food Security Series No. 4, Queen's University and AFSUN, Kingston and Cape Town, 34pp.

Davenport, N. A. & Gambiza, J. 2009. Municipal commonage policy and livestock owners: Findings from the Eastern Cape, South Africa. *Land Use Policy*, 26(3): 513-520.

Davenport, N. A., Gambiza, J. & Shackleton, C. M. 2011. Use and users of municipal commonage around three small towns in the Eastern Cape, South Africa, *Journal of Environmental Management*, 92: 1449-1460.

Davenport, N. A., Shackleton, C. M. & Gambiza, J. 2012. The direct use value of municipal commonage goods and services to urban households in the Eastern Cape, South Africa, *Land Use Policy*, 29: 548-557.

de Wet, C. 2011. Where are they now? Welfare, development and marginalization in former a Bantustan settlement in the Eastern Cape, post 1994. In Hebinck, P. & Shackleton, C. (Eds). *Reforming Land and Resource Use in South Africa: Impact on livelihoods*, Routledge, New York. 294-314pp.

Department of Agriculture 2011. *Drought conditions in Limpopo*, Department of Agriculture: Limpopo Provincial Government. Available, [Online]:
http://www.lda.gov.za/index.php?option=com_content&view=article&id=138:drought-conditions-in-limpopo&catid=1:latest-news&Itemid=118. Accessed 04/08/2011.

Diao, X., Hazell, P. & Thurlow, J. 2010. The Role of Agriculture in African Development, *World Development*, 38(10): 1375-1383.

- Dovie, D. B. K., Witkowski, E. T. F. & Shackleton, C. M. 2003. Direct-use value of smallholder crop production in a semi-arid rural South African village, *Agriculture Systems*, 76: 337-357.
- Dovie, D. B. K., Witkowski, E. T. F. & Shackleton, C. M. 2005. Monetary valuation of livelihoods for understanding the composition and complexity of rural livelihoods, *Agriculture and Human Values*, 22: 87-103.
- Dovie, D. B. K., Shackleton, C. M. & Witkowski, E. T. F. 2006. Valuation of communal area livestock benefits, rural livelihoods and related policy issues, *Land Use Policy*, 23: 260-271.
- Drakakis-Smith, D. 1995. Third World Cities: Sustainable Urban Development, 1, *Urban Studies*, 32(4-5): 659-677.
- Drescher, A. W. 2001. *The German Allotment Gardens – a Model for Poverty Alleviation and Food Security in South African Cities?* City Farmer, Canada.
- Ellis, F. 1999. Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications, *Overseas Development Institute (ODI)*, Number 40.
- Faber, M., Witten, C. & Drimie, S. 2011. Community-based agricultural interventions in the context of food and nutrition security in South Africa, *South African Journal of Clinical Nutrition*, 24(1): 21-30.
- Farrington, J., Carney, D., Ashley, C. & Turton, C. 1999. Sustainable Livelihoods in Practice: Early Application of Concepts in Rural Areas, *Overseas Development Institute (ODI)*, Number 42.
- Farrington, J., Ramasut, T. & Walker, J. 2002. Sustainable Livelihoods Approaches in Urban Areas: General Lessons, with Illustrations from Indian Cases, *Overseas Development Institute (ODI)*, Working Paper 162: 1-53.
- Fengu, M. 2010. *Water Crisis in Eastern Cape Worsens*, Grey Water Systems. Available, [Online]: <http://www.greywatersystems.co.za/2010/03/08/1273/>. Accessed 01/10/2010.
- Fernandes, E. (Ed) 1998. *Environmental Strategies for Sustainable Development in Urban Areas*. Ashgate Publishing Ltd, England. 212pp.
- Foeken, D. W. J. & Owuor, S. O. 2008. Farming as a livelihood source for the urban poor of Nakuru, Kenya, *Geoforum*, 39: 1978-1990.
- Fox, R. & Nel, E. 1998. Pension payouts, periodic marketing and the continuance of urban dependence in rural South Africa, *South African Geographical Journal*, 80(2): 108-110.
- Goldblatt, A. 2010. Agriculture: Facts and Trends, South Africa, *World Wildlife Fund (WWF)*, 1-27.
- Gordon, A., Davis, J., Long, A. & Meadows, K. 2000. The Role of Natural Resources in the Livelihoods of the Urban Poor, *Natural Resources Institute*, Policy Series 9: 1-47.

Hajdu, F. 2006. Local Worlds: Rural Livelihood Strategies in Eastern Cape, South Africa. *Linköping Studies in Arts and Science*, No. 366.

Haub, C. & Gribble, J. 2011. Population Bulletin: The World at 7 Billion, *Population Reference Bureau*, 66(2): 1-12.

Hebinck, P. & Lent, P. C. (Eds) 2007. *Livelihoods and Landscapes: The People of Guquka and Koloni and their resources*, BRILL, Leiden. 408pp.

Hebinck, P. & Shackleton, C. (Eds) 2011. *Reforming Land and Resource Use in South Africa: Impact on livelihoods*, Routledge, New York. 336pp.

Helen Keller Institute (HKI) 2010. Homestead food production model contributes to improved household food security, nutrition and female empowerment – Experience from scaling-up programs in Asia (Bangladesh, Cambodia, Nepal and Philippines), *Nutrition Bulletin*, 8(1): 1-8.

Hessein, K. & Nelson, J. 1998. Sustainable Livelihoods and Livelihood Diversification, *International Development Studies (IDS)*, Working Paper 69: 1-32.

High, C. & Shackleton, C. M. 2000. The comparative value of wild and domestic plants in home gardens of a South African rural village, *Agroforestry Systems*, 48: 141-156.

Hovorka, A. & Lee-Smith, D. 2006. Gendering the Urban Agriculture Agenda. In: van Veenhuizen, R. (Ed). *Cities Farming for the Future, Urban Agriculture for Green and Productive Cities*, RUAF Foundation, IDRC and IIRR. 125-144pp.

Iaquinta, D. L. & Drescher, A. W. 2000. Defining Periurban: Understanding Rural-Urban Linkages and Their Connection to Institutional Contexts, *Partnership Programme of the Food and Agriculture Organization of the United Nations (FAO)*, 1-26.

International Food Policy Research Institute (IFPRI) 2005. Beyond: Keeping up with Changing Realities, *International Food Policy Research Institute*. Available, [Online]: <http://www.ifpri.org/>. Accessed 12/03/2010.

Jacobi, P., Amend. J. & Kiango, S. 2000. Urban agriculture in Dar es Salaam: Providing for an indispensable part of the diet. In: Bakker, N. (Ed). *Growing cities, growing food: Urban agriculture on the policy agenda*, Feldafing: German Foundation for International Development. 257-283pp.

Jumbe, C. B. L., Bwalay, S. M. & Husselman, M. 2008. *Contribution of dry forests to rural livelihoods and the national economy in Zambia*. Available, [Online]: <http://www.cifor.cgiar.org/miombo/docs/ZambiaNationalCaseStudy.pdf>. Accessed 12/03/2010.

Kannan, K. P., Mahendra Dev, S. & Alakh Narain Sharma 2000. Concerns on Food Security, *Economic and Political Weekly*, 35(45): 3919-3922.

King, B. 2011. Spatialising livelihoods: resource access and livelihood spaces in South Africa, *Transactions of the Institute of British Geographers*, 36:297-313.

- Knuth, L. 2006. Greening cities for improving urban livelihoods: Legal, policy and institutional aspects of urban and peri-urban forestry in West and Central Asia (with a case study of Armenia), *Food and Agriculture Organisation of the United Nations*, LSP Working Paper 37: 1-60.
- Kok, P. & Collinson, M. 2006. *Migration and urbanization in South Africa*, Statistics South Africa, Pretoria. 36pp.
- Kruger, F. 1998. Taking advantage of rural assets as a coping strategy for the urban poor: the case of rural-urban interrelations in Botswana, *Environment and Urbanisation*, 10(1): 119-134.
- Kruger, F. 2006. Taking Advantage of Rural Assets as a Coping Strategy for the Urban Poor: The Case of Rural-Urban Interrelations in Botswana. In: Tacoli, C. (Ed). *Rural-Urban Linkages*. Earthscan Publications Ltd, UK and USA. 229-243pp.
- Lahiff, E. 2003. Land reform and sustainable livelihoods in South Africa's Eastern Cape Province. *Sustainable Livelihoods in Southern Africa*. Research paper 9: 1-58.
- Lee-Smith, D. 2010. Cities feeding people: An update on urban agriculture in equatorial Africa, *Environment and Urbanization*, 22: 483-489.
- Leibbrandt, M., Woolard, I., Finn, A. & Argent, J. 2010. Trends in South African Income Distribution and Poverty since the Fall of Apartheid, *OECD Social, Employment and Migration*, Working Paper 101: 1-92.
- Lester, A., Nel, E. L. & Binns, T. 2000. *South Africa past, present and future: gold at the end of the rainbow?*, Longman, Harlow. 374pp.
- Limpopo DFED 2004. Limpopo State of the Environment Report (Phase 1). *Limpopo Department of Finance and Economic Development*, Pretoria, South Africa. 55pp.
- Lukhanji IDP 2009. *Lukhanji Municipality: Integrated Development Plan Review 2009/2010*. Available, [Online]: <http://www.lukhanji.co.za/Documents/IDP/Final%20IDP%202009-JULY.pdf>. Accessed 09/02/2010.
- Lukhanji SDF 2005. *Lukhanji Spatial Development Framework*, Lukhanji Municipality, Queenstown. 97pp.
- Lundqvist, J., Appasamy, P. & Nelliya, P. 2003. Dimensions and Approaches for Third World City Water Security, *Philosophical Transactions: Biological Sciences*, 358(1440): 1985-1996.
- Makhado, R. A., von Maltitz, G. P., Potgieter, M. J. & Wessels, C. J. 2009. Contribution of woodland products to rural livelihoods in the northeast of Limpopo Province, South Africa, *South African Geographical Journal*, 91(1): 46-53.
- Maxwell, D., Levin, C. & Csete, J. 1998. Does urban agriculture help prevent malnutrition? Evidence from Kampala, *Food Policy*, 23(5): 411-424.

May, J. & Rogerson, C. M. 1995. Poverty and Sustainable Cities in South Africa: The Role of Urban Cultivation, *Habitat International*, 19(2): 165-181.

McConnachie, M. & Shackleton, C. M. 2010. Public green space inequality in small towns in South Africa, *Habitat International*, 34: 244-248.

Mears, R. 1997. Rural-Urban Migration or Urbanisation in South Africa, *South African Journal of Economics*, 65(4): 275-284.

Meikle, S., Ramasut, T. & Walker, J. 2001. Sustainable Urban Livelihoods: Concepts and Implications for Policy, *Department for International Development (DFID)*, Working Paper 112: 1-34.

Millennium Ecosystem Assessment 2005. *Ecosystems and Human Well-being, Our Human Planet: Summary for Decision Makers*. Island Press, Washington. 109pp.

Mkwambisi, D., Fraser, E. D. G. & Dougill, A. J. 2011. Urban Agricultural and Poverty Reduction: Evaluating how food production in cities contributes to food security, employment and income in Malawi, *Journal of International Development*, 23: 181-203.

Moench, M. & Gyawali, D. 2008. *Desakota: Reinterpreting the Urban-Rural Continuum*. Available, [Online]:

<http://www.nerc.ac.uk/research/programmes/espa/documents/Final%20Report%20Desakota%20Part%20II%20A%20Reinterpreting%20Urban%20Rural%20continuum.pdf>. Accessed 18/02/2010.

Mopani IDP 2009. *Mopani District Municipality: Integrated Development Plan 2006-2012*. Available, [Online]: <http://www.mopani.gov.za/docs/speeches/REVIEWED%20IDP%202009-12.pdf>. Accessed 22/08/2011.

Mougeot, L. J. A. 2000. *Achieving Urban Food and Nutrition Security in the Developing World: The Hidden Significance of Urban Agriculture, A 2020 Vision for Food, Agriculture, and the Environment*, Focus 3, Brief 6 of 10, IFPRI, Washington, DC.

Mougeot, J. A. (Ed) 2005. *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture*, Earthscan and IDRC, UK. 279pp.

Mucina, L. & Rutherford, M. C. (Eds) 2007. *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19, South African National Biodiversity Institute (SANBI). 816 pp.

National Treasury 2011. *Budget Review: Republic of South Africa*. Available, [Online]: www.treasury.gov.za. Accessed 17/08/2011.

Naudé, A., Le Maitre, D., De Jong, T., Forsyth, G., Mans, G. and Hugo, W. 2008. *Modeling of spatially complex human-ecosystem, rural-urban and rich-poor interactions*. Paper submitted to International Conference: "Studying, Modelling and Sense Making of Planet Earth"; Lesvos, Greece. 1 – 6 June 2008, 10pp.

Nel, E. 2007. Critical reflections on urban and local development in Africa, *Environment and Planning C: Government and Policy*, 25: 459-465.

Nel, E. & Rogerson, C. M. 2007. Evolving Local Economic Development Policy and Practice in South Africa with Special Reference to Smaller Urban Centres, *Urban Forum*, 18:1-11.

Nel, E., Taylor, B., Hill, T. & Atkinson, D. 2011. Demographic and Economic Changes in Small Towns in South Africa's Karoo: Looking from the Inside Out, *Urban Forum*, 22: 395-410.

Nugent, R. 2000. The impact of urban agriculture on the household and local economies. In: Bakker, N. (Ed). *Growing cities, growing food: Urban agriculture on the policy agenda*, Feldafing: German Foundation for International Development. 67-97pp.

Oksanen, J. 2011. *Multivariate Analysis of Ecological Communities in R: Vegan Tutorial*. Available, [Online]: URL: <http://www.cc.oulu.fi/~jarioksa/opetus/metodi/vegantutor.pdf>. Accessed: 27/01/2012.

Organisation for Economic Co-operation and Development (OECD) 2006. Agricultural Policy Reform in South Africa, *OECD*, Policy Brief: 1-8.

Patton, M. Q. 2002. *Qualitative research and evaluation methods*, Thousand Oaks, CA: Sage. 598pp.

Paumgarten, F. 2005. The Role of non-timber forest products as safety-nets: A review of evidence with a focus on South Africa, *GeoJournal*, 64: 189-197.

Paumgarten, F., Shackleton, C. & Cocks, M. 2005. Growing of trees in home-gardens by rural households in the Eastern Cape and Limpopo Provinces, South Africa, *International Journal of Sustainable Development & World Ecology*, 12: 365-383.

Perez-Vazquez, A., Anderson, S. & Rogers, A. W. 2005. Assessing Benefits from Allotments as a Component of Urban Agriculture in England. In: Mougeot, J. A. (Ed). *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture*, Earthscan and IDRC, UK. 239-266pp.

Prain, G., Karanja, N. K. & Lee-Smith, D. (Eds) 2010. *African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda*, Springer, New York. 322pp.

R Development Core Team 2010. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. Available, [Online]: URL: <http://www.R-project.org/>. Accessed: 27/01/2012.

Rakodi, C. & Lloyds-Jones, T. (Eds). 2002. *Urban Livelihoods: A People-centred Approach to Reducing Poverty*. Earthscan, London. 306pp.

Ramin, B. 2009. Slums, climate change and human health in sub-Saharan Africa, *Bull World Health Organ*, 87-886.

Reuther, S. & Dewar, N. 2006. Competition for the use of public open space in low-income urban areas: the economic potential of urban gardening in Khayelitsha, Cape Town, *Development Southern Africa*, 23(1): 97-122.

Rosegrant, M. W. & Cline, S. A. 2003. Global Food Security: Challenges and Policies, *American Association for the Advancement of Science*, 302(5652): 1917-1919.

Ruel, M. T., Garrett, J. L., Hawkes, C. & Cohen, M. J. 2010. The Food, Fuel, and Financial Crises Affect the Urban and Rural Poor Disproportionately: A Review of the Evidence, *The Journal of Nutrition*, 140: 170S-176S.

Satterthwaite, D. & Tacoli, C. 2003. The urban part of rural development: the role of small and intermediate urban centres in rural and regional development and poverty reduction, *International Institute for Environment and Development (IIED)*, 1-68.

Satterthwaite, D. 2006. Outside the Large Cities: The demographic importance of small urban centres and large villages in Africa, Asia and Latin America, *United Nations Human Settlement Programme*, 1-28.

Schönfeldt, H. C., Gibson, N. & Vermeulen, H. 2010. The possible impact of inflation on nutritionally vulnerable households in a developing country using South Africa as a case study, *British Nutrition Foundation Nutrition Bulletin*, 35: 254-267.

Scoones, I. 1998. Sustainable Rural Livelihoods: A Framework for Analysis, *Institute of Development Studies (IDS)*, Working Paper 72: 1-22.

Scoones, I. 2009. Livelihoods perspectives and rural development, *The Journal of Peasant Studies*, 36(1): 171-196.

Shackleton, S. E., Dzerefos, C. M., Shackleton, C. M. & Mathabela, F. R. 1998. Use and Trading of Wild Edible Herbs in the Central Lowveld Savanna Region, South Africa, *Economic Botany*, 52(3): 251-259.

Shackleton, C. M., Shackleton, S. E. & Cousins, B. 2001. The role of land-based strategies in rural livelihoods: the contribution of arable production, animal husbandry and natural resource harvesting in communal areas in South Africa, *Development Southern Africa*, 18(5): 581-604.

Shackleton, S. E., Shackleton, C. M., Netshiluvhi, T. R., Geach, B. S., Ballance, A. & Fairbanks, D. H. K. 2002. Use Patterns and Value of Savanna Resources in Three Rural Villages in South Africa, *Economic Botany*, 56(2): 130-146.

Shackleton, C. M. 2003. The prevalence of use and value of wild edible herbs in South Africa, *South African Journal of Science*, 99: 23-25.

Shackleton, C. M. & Shackleton, S. E. 2004. The importance of non-timber forest products in rural livelihood security and as safety nets: a review of evidence from South Africa, *South African Journal of Science*, 100: 658-664.

Shackleton, S. E. 2005. *The significance of the local trade in natural resource products for livelihoods and poverty alleviation in South Africa*. PhD thesis, Rhodes University, Grahamstown, 287pp.

- Shackleton, C. M., Shackleton, S. E., Netshiluvhi, T. R. & Mathabela, F. R. 2005. The contribution and direct use value of livestock to rural livelihoods in the Sand River catchment, South Africa, *African Journal of Range & Forage*, 22(2): 127-140.
- Shackleton, C. M. & Shackleton, S. E. 2006. Household wealth status and natural resource use in the Kat River valley, South Africa, *Ecological Economics*, 57(2): 306-317.
- Shackleton, C. M., Shackleton, S. E., Buiten, E. & Bird, N. 2007a. The importance of dry woodlands and forests in rural livelihoods and poverty alleviation in South Africa, *Forest Policy and Economics*, 9: 558-577.
- Shackleton, C. M., Timmermans, H. G., Nongwe, N., Hamer, N. & Palmer, R. 2007b. Direct-use Values of Non-Timber Forest Products from two areas on the Transkei Wild Coast, *Agrekon*, 46(1): 135-136.
- Shackleton, S., Campbell, B., Lotz-Sisitka, H. & Shackleton, C. 2008. Links between the Local Trade in Natural Products, Livelihoods and Poverty Alleviation in a Semi-arid Region of South Africa, *World Development*, 36(3): 505-526.
- Shackleton, C. M., Pasquini, M. W., Ambrose-Oji, B. & Drescher, A. W. 2009a. *Promoting Indigenous Vegetables in Urban Agriculture and Livelihoods: Policy Lessons from sub-Saharan Africa*, Rhodes University, Grahamstown, Policy Brief: 6.
- Shackleton, M., Cundill, G. & Knight, A. T. 2009b. Beyond Just Research: Experiences from Southern Africa in Developing Social Learning Partnerships for Resource Conservation Initiatives, *Biotropica*, 41(5): 563-570.
- Shackleton, C. M., Pasquini, W. & Drescher, A. W. (Eds) 2009c. *African Indigenous Vegetables in Urban Agriculture*, Earthscan Publications Ltd, UK. 298pp.
- Shackleton, C., Paumgarten, F., Thami, M., Mthembu, T., Ernst, L., Pasquini, M. & Pichop, G. 2010. Production of and trade in African indigenous vegetables in the urban and peri-urban areas of Durban, South Africa, *Development Southern Africa*, 27(3): 291-308.
- Shackleton, S. E., Delang, C. O. & Angelsen, A. 2011. From Subsistence to Safety Nets and Cash Income: Exploring the Diverse Values of Non-timber Forest Products for Livelihoods and Poverty Alleviation. In: Shackleton, S., Shackleton, C. & Shanley, P. (Eds). *Non-Timber Forest Products in the Global Context*, Springer, Germany. 55-82pp.
- Slater, R. & Twyman, C. 2003. Hidden Livelihoods? Natural Resource-Dependent Livelihoods and Urban Development Policy, *Overseas Development Institute (ODI)*, 225: 1-53.
- Smith, R. M., Gaston, K. J., Warren, P. H. & Thompson, K. 2005. Urban domestic gardens (V): relationships between landcover composition, housing and landscape, *Landscape Ecology*, 20: 235-253.
- Solesbury, W. 2003. Sustainable Livelihoods: A Case Study of the Evolution of DFID Policy, *Overseas Development Institute (ODI)*, Working Paper 217: 1-28.

South African Cities Network (SACN) 2011. *The State of Cities Report: Toward Resilient Cities*. Available, [Online]: <http://www.sacities.net/what/strategy/report/607-towards-resilient-cities>. Accessed 05/08/2011.

South African Risk and Vulnerability Atlas 2010. *South African Risk and Vulnerability Atlas: Mapping the way to a resilient future*, CDP Print, Pretoria. 56pp.

South African Social Security Agency (SASSA) 2011. *You and your grants 2011/12*. Available, [Online]: www.sassa.gov.za. Accessed on 01/09/2011.

Spiaggi, E. 2005. Urban Agriculture and Local Sustainable Development in Rosario, Argentina: Intergration of Economic, Social, Technical and Environmental Variables. In: Mougeot, J. A. (Ed). *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture*, Earthscan and IDRC, UK. 187-202pp.

Stats SA 2007. *A national poverty line for South Africa*. National Treasury. Available, [Online]: www.treasury.gov.za. Accessed 17/08/2011.

Stats SA 2011. *Mid-year population estimates*. Available, [Online]: www.statssa.gov.za. Accessed 01/08/2011.

Stoian, D. 2005. Making the Best of Two Worlds: Rural and Peri-Urban Livelihood Options Sustained by Nontimber Forest Products from the Bolivian Amazon, *World Development*, 33(9): 1473-1490.

Tacoli, C. (Ed) 2006. *Rural-Urban Linkages*. Earthscan Publications Ltd, UK and USA. 329pp.

Thornton, A. 2008. Beyond the Metropolis: Small Town Case Studies of Urban and Peri-urban Agriculture in South Africa, *Urban Forum*, 19:243-262.

Timmermans, H. 2005. *Case Studies on Beekeeping and Honey Production in South Africa*, Department of Water Affairs and Forestry (DWAF), Rhodes University. 45pp.

Tratalos, J., Fuller, R. A., Warren, P. H., Davies, R. G. & Gaston, K. J. 2007. Urban form, biodiversity potential and ecosystem services, *Landscape and Urban Planning*, 83: 308-317.

Twine, W., Moshe, D., Netshiluvhi, T. & Siphugu, V. 2003. Consumption and direct-use values of savanna bio-resources used by rural households in Mametja, a semi-arid area of Limpopo province, South Africa, *South African Journal of Science*, 99: 467-473.

UNFPA 2007. *State of the world population 2007: Unleashing the Potential of Urban Growth*. United Nations Population Fund, 99pp.

UN-HABITAT 2006. *State of the World's Cities 2006/7: The Millennium Development Goals and Urban Sustainability*. Earthscan Publications Ltd, London. 204pp.

UN-HABITAT 2010. *The State of African Cities: Governance, Inequality and Urban Land Markets*, UNON/Publishing Services Section, Nairobi, 268pp.

UNPD 2008. *United Nations expert group meeting on population distribution, internal migration and development: An overview of urbanization, internal migration, population distribution and development in the world*. United Nations Secretariat, New York. 34pp.

Valdes, A. & Foster, W. 2010. Reflections on the Role of Agriculture in Pro-Poor Growth, *World Development*, 38(10): 1362-1375.

van Averbeke, W. 2007. Urban farming in the informal settlements of Atteridgeville, Pretoria, South Africa, *Water SA*, 33(3): 337-342.

van Huyssteen, E., Oranje, M., Robinson, S. & Makoni, E. 2009. South Africa's City Regions: A Call for Contemplation...And Action, *Urban Forum*, 20: 175-194.

van Veenhuizen, R. (ed) 2006. *Cities Farming for the Future – Urban Agriculture for Green and Productive Cities*. RUAF Foundation. Available, [Online] <http://www.ruaf.org/node/961>. Accessed 18/08/2011.

Webb, N. 1998. Urban cultivation: food crops and their importance, *Development Southern Africa*, 15(2): 201-213.

Webb, N. L. 2011. When is enough, enough? Advocacy, evidence and criticism in the field of urban agriculture in South Africa, *Development Southern Africa*, 28(2): 195-208.

Wiersum, K. F. & Shackleton, C. M. 2005. Rural dynamics and biodiversity conservation in southern Africa, in Ros-tonen, A. F. & Dietz, T. (Eds). *Linking Global Conservation Objectives and Local Livelihood Needs: Lessons from Africa*, Edwin Mellen Press, UK, 67-92pp.

WinklerPrins, A. M. G. A. & de Souza, P. S. 2005. Surviving the City: Urban Home Gardens and the Economy of Affection in the Brazilian Amazon, *Journal of Latin American Geography*, 4(1): 107-126.

World Bank 2009. Urban and Local Government Strategy: Concept and Issues Note, *Sustainable Development Network*, 1-22.

Appendices

Appendix 1 Livelihoods interview schedule

SECTION A: Interview Details

- A1 Date: _____ A2 Researcher: _____
- A3 Translator: _____ A4 Country: _____
- A5 Name of town or village: _____ A6 Name of suburb or section: _____
- A7 Street name: _____ A8 House no. _____
- A9 GPS position: Latitude: _____ Longitude: _____
- A10 Position on rural-urban continuum: ☐ Rural ☐ Urban ☐ In between/peri-urban
- A11 Who in the household is being interviewed? _____
- A12 What is their relationship to the head of the household? _____
- A13 Who is the head of the household? _____

SECTION B: Physical Capital & Indirect Wealth Indicators

- B1 How long has your family lived in this town/village: _____ (years/months)
- B2 How long has your family lived in this neighbourhood: _____ (years/months)
- B3: Where did you live before: _____
- B4: How far away is it from here: _____
- B5: Why did you move: _____
- B6 Do you own it or rent this house: ☐ Own customary ☐ Own with title deed ☐ Rent
☐ Other (give details) _____
- B7 How big is the plot: _____ (if they don't know the size, pace it)
- B8 How many rooms are there in total: _____
- B9 Describe the basic nature of the *main* building:
 Roof materials: _____
 Wall materials: _____
- B10 Describe the basic nature of the fence around the plot (tick more than one if necessary):
☐ no fence ☐ stone/brick wall ☐ mesh fencing ☐ wire fencing
☐ scrap material ☐ dead branches ☐ live hedge
☐ Other (give details): _____
- B11 Does the house have electricity ☐ Yes ☐ No
- B12 How much do you spend on electricity: _____ ☐ per week ☐ per month
- B13 What is the main energy you use for cooking: ☐ electricity ☐ gas ☐ kerosene ☐ firewood ☐ charcoal
- B14 What is the main energy you use for lighting: ☐ electricity ☐ gas ☐ kerosene ☐ candles
- B15 Does the house have piped drinking water on site: ☐ Yes ☐ No
- B16 If yes, how much do you spend on water _____ ☐ per week ☐ per month
- B17 What is the quality of the water? ☐ drinkable ☐ needs additional treatment before drinking
☐ not suitable for consumption
- B18 If the house has no piped drinking water on site, where do you obtain water from?

B19 Which of the following assets does your household own (fill in the number of each):

[] Car [] Motorbike [] Bicycle
[] Tractor [] Plough [] Fridge
[] TV [] Cell phone

B20 Typically, how many meals do members of the household eat per day _____

B21 How often does your household eat meat: [] 5-7 x/week [] 3-4 x/week [] 1-2 x/week
[] 3-5 x/month [] 1-2 x/month [] < 1 x/month
[] Never (vegetarian)

B22 Have your family as a group ever had to go to sleep at night feeling hungry: [] Yes [] No

B23 If yes, when was the last time: _____

SECTION C: Crop Production

C1 Do you grow any of your own staple foods or vegetables: [] Yes [] No

C2 If no, why not? _____

C3 If yes, why? _____

C4 Where do you grow your staple foods and vegetables? [] Homestead plot [] Field [] Both
[] Other (specify) _____

C5 What is the status of the land: [] Owned by family [] Rented [] Open land for anyone to use

C6 What is the size of the production area for staple foods and vegetable? (if they don't know, pace it OR express it terms of known ratios which can be paced) (units!!!)

Homestead plot _____

Field 1 _____

C7 What are the main staple foods & vegetables grown in each season and how long are they collectively worked on?

	Wet season	Dry season
Homestead plot		
Fields		
How many hours a day work on crops		
How many days a week work on crops		

C8 Please provide details of *who does most* of the work in producing the crops (include hired labour as an option!!)

Task	Homestead plot	Fields
Preparing the soil for planting		
Plant the seeds/tubers		
Weeding		
Spraying		
Watering		
Harvesting		

C9 What is the daily rate for hired labour around here: _____

C10 If you had to estimate, what proportion of your household staple foods and vegetables needs are self-grown:

	Almost all	More than $\frac{3}{4}$	Between $\frac{1}{2}$ and $\frac{3}{4}$	Between $\frac{1}{4}$ and $\frac{1}{2}$	Less than $\frac{1}{4}$	Tiny amount
Staple foods						
Vegetables						

C11 Please estimate the amount produced in the last planting season and the unit price in the nearest shop or market:

Staple food or vegetable crop	Number of units produced	Type of units	All used at home (Y/N)	Some sold (Y/N)	Approx. % that was sold	Local price

C12 What were the costs associated with the last production cycle:

Input	Used Y/N	Where did it/they come from	How many units	Type of units	If bought, was the cost per unit or in total (indicate which)
Seeds/seedlings					
Fertiliser					
Animal manure					
Vegetable manure (compost)					
Pesticides					
Hired labour					

C13 Do you make use of waste water? ☐ Yes ☐ No

C14 If yes, for what purpose do you use it? _____

C15 From where do you obtain the waste water? _____

SECTION D: Fruit Production

D1 Do you grow any of your own fruits: ☐ Yes ☐ No

D2 If no, why not? _____

D3 If yes, why? _____

D4 Where does the fruit production take place: ☐ Homestead plot ☐ Field ☐ Both
☐ Other (specify) _____

D5 What is the size of the production area for fruits? (if they don't know, pace it OR express it terms of known ratios which can be paced) (units!!!)

Homestead plot _____

Field 1 _____

D6 What are the main fruits grown?

Homestead plot _____

Field 1 _____

D7 Please provide the details of who does most of the work in producing the fruits (include hired labour as an option!!):

Task	Homestead plot	Fields
Planting the trees		
Looking after the trees		
Spraying (chemicals)		
Harvesting		

D8 Approx how many hours a day do they spend working on the trees: _____

D9 How many days a week: _____

D10 What is the daily rate for hired labour around here: _____

D11 If you had to estimate, what proportion of your household fruit needs are self-grown:

☐ Almost all ☐ More than $\frac{3}{4}$ ☐ Between $\frac{1}{2}$ and $\frac{3}{4}$

☐ Between $\frac{1}{4}$ and $\frac{1}{2}$ ☐ Less than $\frac{1}{4}$ ☐ Tiny amount

D12 Please estimate the amount produced last year and the unit price in the nearest shop or market:

Fruit	Number of units produced	Type of units	All used at home (Y/N)	Some sold (Y/N)	Approx. % that was sold	Local price

D13 What were the costs associated with the last production cycle:

Input	Used Y/N	Where did it/they come from	How many units	Type of units	If bought, was the cost per unit or in total (indicate which)
Seeds/seedlings					
Fertiliser					
Animal manure					
Vegetable manure (compost)					
Pesticides					
Hired labour					

D14 Do you make use of waste water? [] Yes [] No

D15 If yes, for what purpose do you use it? _____

D16 From where do you obtain the waste water? _____

SECTION E: Livestock Production

E1 Does your household own any livestock or poultry: [] Yes [] No

E2 If your household doesn't own any livestock, why not? _____

E3 If yes, please provide the numbers of livestock and poultry kept as well as the primary purpose for keeping them:

Livestock type	Number	What is the primary purpose for keeping livestock	Poultry type	Number	What is the primary purpose for keeping poultry
Cattle			Geese		
Goats			Ducks		
Sheep			Chickens		
Pigs			Other (specify)		
Horses			Other (specify)		
Donkeys			Other (specify)		

E4 Please indicate the type and the frequency and value of the benefits provided from poultry:

Poultry	Frequency of slaughter to eat by household	Frequency live or slaughtered one is donated	Frequency live or slaughtered one is sold	Local price to buy or sell a whole one	Approximate no. of offspring (babies) last year	No. of eggs collected by hh each day or week or month (specify!!)	Local price of eggs
Chickens							
Geese							
Ducks							
Other (specify)							

NB: Frequency means number per period of time, i.e. per week, per month or per year; therefore *MUST* specify the period

E5 Please indicate the frequency with which you slaughter or sell animal livestock:

Livestock	Frequency of slaughter to eat by household	Frequency live or slaughtered one is donated	Frequency live or slaughtered one is sold	Local price to buy or sell a whole one	Approximate no. of offspring (babies) last year	Who looks after the livestock	Approx. no. of hours per day they tend the animals
Cattle							
Sheep							
Goats							
Pigs							
Horse & donkeys							
Other (specify)							

E6 Other than meat and sales what other tangible products do you obtain from your livestock (NB units!!!!):

Livestock	Milk			Dung			Other (specify)		
	Amount produced per time	Use (at home; sell; donate)	Local price per unit	Amount produced per time	Use (at home; sell; donate)	Local price per unit	Amount produced per time	Use (at home; sell; donate)	Local price per unit
Cattle									
Sheep									
Goats									
Pigs									
Horse & donkeys									

E7 Do you use any of your livestock for ploughing or for transport: ☐ Yes ☐ No

E8 If yes, please provide details (NB units!!!!):

Livestock	Transport				Ploughing			
	How often do you use it (x per week, month, year)	Approx how many hours per time	Is it for hh use or to rent out for income	What is the local price for the service or next best alternative	How often do you use it (x per week, month, year)	Approx how many hours per time	Is it for hh use or to rent out for income	What is the local price for the service or next best alternative
Cattle								
Horse & donkeys								
Other (specify)								

NB: Frequency means number per period of time, i.e. per week, per month or per year; therefore MUST specify the period

E9 Do you every buy or cut/collect food for the livestock? ☐ Yes ☐ No

E10 If yes, please provide details:

Livestock	Buy food			Cut/collect food				
	How often	Amount	Cost	How often	Amount	People involved (number)	Approx no. of hours each time	Approx how long does it take to walk to the collection site
Cattle								
Sheep								
Goats								
Pigs								
Horse & donkeys								
Other (specify)								

E11 Please indicate the main costs (other than food) associated with keeping livestock:

Livestock	Type of cost (#)	Frequency incurred	Amount (cost)
Cattle			
Sheep			
Goats			
Pigs			
Horse & donkeys			
Other			

Codes (#)
D = dipping F = fees, permits, taxes H = herding, shepherding M = medicines S = overnight shelter

E12 How did you obtain the first few?

Livestock type	Mode of acquisition of starting few (*)	Poultry type	Mode of acquisition of starting few (*)
Cattle		Geese	
Goats		Ducks	
Sheep		Chickens	
Pigs		Other (specify)	
Horses		Other (specify)	
Donkeys		Other (specify)	

Codes (*)
B = bought G = gift or donation H = inherited W = received as payment for herding someone else's livestock or other work, instead of cash

E13 Do you make use of organic waste or compost? [] Yes [] No

E14 If yes, for what purpose do you use it? _____

E15 From where do you obtain the organic waste? _____

D16 Do you make use of waste water? [] Yes [] No

D17 If yes, for what purpose do you use it? _____

D18 From where do you obtain the waste water? _____

SECTION F: Wild Natural Capital

Firewood

F1 Does your household ever use firewood: ☐ Yes ☐ No

F2 What are the species that you most commonly use _____

F3 If yes, do you usually collect this firewood or buy it: ☐ Usually collect ☐ Usually buy it ☐ Both

F4 If bought please give details (if bought only from a supermarket, disregard section):

How often do you buy firewood	Where do you usually buy it	What is the price per unit

F5 If collected please give details:

Where do you usually collect it	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F6 Has the abundance of firewood in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F7 If yes, how: ☐ Increased ☐ Decreased

F8 What do you think is the cause of this change:

F9 Does your household ever sell firewood: ☐ Yes ☐ No

F10 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in		Where do you get the firewood that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

F11 Please show or tell us how much firewood your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

Wild fruits

F12 Does your household ever use wild fruits: ☐ Yes ☐ No

F13 If yes, what are the species that you most commonly use _____

F14 Please show or tell us how much wild fruit your household uses in the wet and dry season:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

F15 Do you usually collect these wild fruits or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F16 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F17 Has the abundance of wild fruits in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F18 If yes, how: ☐ Increased ☐ Decreased

F19 What do you think is the cause of this change: _____

F20 If bought, please give details:

How often do you buy wild fruits	Where do you usually buy them	What is the price per unit

F21 Does your household ever sell wild fruits: ☐ Yes ☐ No

F22 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the wild fruits that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Wild vegetables/spinach

F23 Does your household ever use wild vegetables: ☐ Yes ☐ No

F24 If yes, what are the species that you most commonly use? _____

F25 Please show or tell us how much wild vegetable your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

F26 Do you usually collect these wild vegetables or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F27 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F28 Has the abundance of in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F29 If yes, how: ☐ Increased ☐ Decreased

F30 What do you think is the cause of this change?

F31 If bought please give details:

How often do you buy wild vegetables	Where do you usually buy them	What is the price per unit

F32 Does your household ever sell wild vegetables: ☐ Yes ☐ No

F33 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the wild vegetables that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Wild mushrooms

F34 Does your household ever use wild mushrooms: ☐ Yes ☐ No

F35 If yes, what are the species that you most commonly use _____

F36 Please show or tell us how much wild mushrooms your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month OR		
Amount per season		

F37 Do you usually collect these wild mushrooms or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F38 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F39 Has the abundance in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F40 If yes, how: ☐ Increased ☐ Decreased

F41 What do you think is the cause of this change?

F42 If bought please give details:

How often do you buy wild mushrooms	Where do you usually buy them	What is the price per unit

F43 Does your household ever sell wild mushrooms: ☐ Yes ☐ No

F44 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the wild mushrooms that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Wild honey

F45 Does your household ever use wild honey: ☐ Yes ☐ No

F46 Please show or tell us how much wild honey your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month OR		
Amount per season		

F47 Do you usually collect these wild honey or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F48 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F49 Has the abundance of wild honey in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F50 If yes, how: ☐ Increased ☐ Decrease

F51 What do you think is the cause of this change?

F52 If bought please give details:

How often do you buy wild honey	Where do you usually buy them	What is the price per unit

F53 Does your household ever sell wild honey: ☐ Yes ☐ No

F54 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the wild honey that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Edible insects

F55 Does your household ever use edible insects: ☐ Yes ☐ No

F56 If yes, what are the species that you most commonly use _____

F57 Please show or tell us how much edible insects your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

F58 Do you usually collect these edible insects or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F59 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F60 Has the abundance of insects in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F61 If yes, how: ☐ Increased ☐ Decreased

F62 What do you think is the cause of this change:

F63 If bought please give details:

How often do you buy edible insects	Where do you usually buy them	What is the price per unit

F64 Does your household ever sell edible insects: ☐ Yes ☐ No

F65 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the edible insects that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Wild meat

F66 Does your household ever use wild meat: ☐ Yes ☐ No

F67 If yes, what are the species that you most commonly use? _____

F68 Please show or tell us how much wild meat your household uses in the wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

F69 Do you usually hunt or trap the bushmeat or buy it: ☐ Usually hunt or trap ☐ Usually buy it ☐ Both

F70 If hunted or trapped please give details:

Where do you usually hunt or trap	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to hunt/trap there? If yes, state from who
	Walk: Drive:			

F71 Has the abundance of bushmeat in the area you usually get it from changed over the last 5 years?

☐ Yes ☐ No ☐ D/K

F72 If yes, how: ☐ Increased ☐ Decreased

F73 What do you think is the cause of this change:

F74 If bought please give details:

How often do you buy wild meat	Where do you usually buy it	What is the price per unit

F75 Does your household ever sell wild meat: ☐ Yes ☐ No

F76 If yes, please provide details:

What is the selling price per unit	Type of unit	How many units do you sell per day /week /month in -		Where do you get the wild meat that you sell	Did you have to pay for transport? If yes, how much per day/week/month
		Wet season	Dry season		

Wild fish

F77 Does your household ever use wild fish: ☐ Yes ☐ No

F78 If yes, what are the species that you most commonly use? _____

F79 Please show or tell us how much wild fish your household uses in the rainy and wet and dry seasons:

	Wet season	Dry season
Amount per day OR		
Amount per week OR		
Amount per month		

F80 Do you usually catch these wild fish or buy them: ☐ Usually catch ☐ Usually buy it ☐ Both

F81 If caught please give details:

Where do you usually catch them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to fish there? If yes, state from who
	Walk: Drive:			

F82 Has the abundance of wild fish in the area you catch them changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F83 If yes, how: ☐ Increased ☐ Decreased

F84 What do you think is the cause of this change:

F85 If bought please give details:

How often do you buy wild fish	Where do you usually buy them	What is the price per unit

F86 Does your household ever sell wild fish: ☐ Yes ☐ No

F87 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the wild fish that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Medicinal plants for self medication of family members

F88 Does your household ever use medicinal plants for self medication: ☐ Yes ☐ No

F89 If yes, what are the species that you most commonly use? _____

F90 Please show or tell us how many times you might use them in the wet and dry seasons:

	Wet season	Dry season
Times per day OR		
Times per week OR		
Times per month OR		
Times per season		

F91 Do you usually collect these medicinal plants or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F92 If collected please give details:

Where do you usually collect them	How long does it take to walk there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who

F93 Has the abundance of medicinal plants in the area you usually collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F94 If yes, how: ☐ Increased ☐ Decreased

F95 What do you think is the cause of this change:

F96 If bought please give details:

How often do you buy medicinal plants	Where do you usually buy them	What is the price per unit

F97 Does your household ever sell medicinal plants: ☐ Yes ☐ No

F98 If yes, please provide details:

What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the medicinal plants that you sell	Did you have to pay for transport? If yes, how much per day/week/month
	Wet season	Dry season		

Household or traditional brooms from plant materials

F99 Does your household ever use booms made from plant materials: ☐ Yes ☐ No

F100 Please tell us how many you have, of what they are made and how long one lasts:

Number you have at the moment	Materials made of (leaves, twigs, grass, etc)	How long does one last	If one had to buy one, what is the local price

F101 Do you usually collect these materials or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F102 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F103 Has the abundance of these in the area you normally collect from changed over the last 5 years?

☐ Yes ☐ No ☐ D/K

F104 If yes, how: ☐ Increased ☐ Decreased

F105 What do you think is the cause of this change:

F106 Does your household ever sell raw materials or finished brooms made from weaving materials: ☐ Yes ☐ No

F107 If yes, please provide details:

Type of product or unit size of raw material	What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the materials that you sell	Did you have to pay for transport? If yes, how much per day/week/month
		Wet season	Dry season		
Raw leaves					
Raw twigs					
Raw grass					
Leaf boom					
Twig broom					
Grass broom					

Plant fibres for weaving mats, baskets, etc.

F108 Does your household ever use plants materials for weaving: ☐ Yes ☐ No

F109 What are the species you most commonly use? _____

F110 Do you usually collect these materials or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F111 If bought please give details (if bought only from a supermarket/formal shop, disregard section):

How often do you buy them	Where do you usually buy them	What is the price per unit

F112 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	How often do you go	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:			

F113 Has the abundance of these in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F114 If yes, how: ☐ Increased ☐ Decreased

F115 What do you think is the cause of this change:

F116 Does your household ever sell raw materials or finished products made from weaving materials: ☐ Yes ☐ No

F117 If yes, please provide details:

Type of product or unit size of raw material	What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the materials that you sell	Did you have to pay for transport? If yes, how much per day/week/month
		Wet season	Dry season		

F118 Please show or tell us how much plant weaving material your household uses in the wet and dry season:

	Wet season	Dry season
Amount per week OR		
Amount per month OR		
Amount per season		

Plant fibres for roofing (grass/reeds/palm leaves)

F119 Does your household ever use plants materials for roofing: ☐ Yes ☐ No

F120 If yes, what are the species that you most commonly use? _____

F121 Do you usually collect these materials or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F122 If bought please give details (if bought only from a supermarket/formal shop, disregard section):

Where do you usually buy them	What is the price per unit

F123 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:		

F124 Has the abundance of these in the area you normally collect changed over the last 5 years: ☐ Yes ☐ No ☐ D/K

F125 If yes, how: ☐ Increased ☐ Decreased

F126 What do you think is the cause of this change:

F127 Does your household ever sell raw plant materials for roofing: ☐ Yes ☐ No

F128 If yes, please provide details:

Type of product or unit size of raw material	What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the materials that you sell	Did you have to pay for transport? If yes, how much per day/week/month
		Wet season	Dry season		

F129 Please tell us how many structures in the homestead are roofed with such materials:

Structure	Function	Size (perimeter)	Approx no. of bundles on the roof	Structure	Function	Size (perimeter)	Approx no. of bundles on the roof
1				6			
2				7			
3				8			

F130 How often do you add new materials to the roof to keep it waterproof and in good state?

☐ 2x per year ☐ 1x per year ☐ Every two years
☐ Every 3-5 years ☐ Every 5 – 10 years ☐ Longer

F131 How often do you replace the entire roof with new materials?

☐ 1x per year ☐ Every two years ☐ Every 3-5 years ☐ Every 5 – 10 years ☐ Longer

Wooden poles for housing

F132 Does your household ever use poles for building: ☐ Yes ☐ No

F133 If yes, what species are the ones you most commonly use? _____

F134 Do you usually collect these poles or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F135 If bought please give details (if bought only from a supermarket/formal shop, disregard section):

Where do you usually buy them	What is the price per unit	
	Large structural poles	Intermediate support poles

F136 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:		

F137 Has the abundance of these in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F138 If yes, how: ☐ Increased ☐ Decreased

F139 What do you think is the cause of this change:

F140 Does your household ever sell building poles: ☐ Yes ☐ No

F141 If yes, please provide details:

Type of product or unit size of raw material	What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the materials that you sell	Did you have to pay for transport? If yes, how much per day/ week/ month
		Wet season	Dry season		
Large structural poles					
Intermediate support poles					

F142 Please tell us how many structures in the homestead have some such poles in them:

	Function	Size (perimeter) (m)	Year built	Approx. number of poles in			
				Walls		Roof	
				No. of large structural poles	No. of support poles	No. of large structural poles	No. of support poles
1							
2							
3							

Wooden poles and thorn scrub for fencing

F143 Does your household ever use poles or thorn scrub for fencing: ☐ Yes ☐ No

F144 If yes, what are the species that you most commonly use? _____

F145 Do you usually collect these poles or buy them: ☐ Usually collect ☐ Usually buy it ☐ Both

F146 If bought please give details (if bought only from a supermarket/formal shop, disregard section):

Where do you usually buy them	What is the price per unit		
	Large structural poles	Intermediate poles	Thorn branches

F147 If collected please give details:

Where do you usually collect them	How long does it take to walk or drive there	Who in the household usually goes	Must you ask permission to collect there? If yes, state from who
	Walk: Drive:		

F148 Has the abundance of these in the area you normally collect changed over the last 5 years:

☐ Yes ☐ No ☐ D/K

F149 If yes, how: ☐ Increased ☐ Decreased

F150 What do you think is the cause of this change:

F151 Does your household ever sell indigenous fencing poles or thorn branches: ☐ Yes ☐ No

F152 If yes, please provide details:

Type of product or unit size of raw material	What is the selling price per unit	How many units do you sell per day /week /month in -		Where do you get the materials that you sell	Did you have to pay for transport? If yes, how much per day/ week/ month
		Wet season	Dry season		
Large structural poles					
Intermediate poles					
Thorn branches					

F153 Please tell us how many fenced areas you have that contain such materials:

Fence	What is the function of the area it encloses	Length of the fence (perimeter) (m)	Approx. height (m)	Year built	Length of section measured (m)	Approx. no. of poles per measured section		
						Large structural poles	Intermediate or cross poles	Thorn branches
1								

F154 For each fence, approximately how many poles do you add per year for repairs and maintenance?

Fence	Approx. number per year in repairs and maintenance		
	Large structural poles	Intermediate or cross poles	Thorn branches
1			

SECTION G: Remittances & Rentals

G1 Does this household receive regular remittances (cash, food, etc.) from people not normally living here?

☐ Yes ☐ No

G2 If yes, please supply details:

Nature of the remittance (i.e. what is it – cash, clothing, food)	How often is it received	How much is sent	Who sends it	Who do they send it to

G3 Does this household receive regular income from renting out rooms or land: ☐ Yes ☐ No

G4 If yes, please provide details

What is rented out	Income received	Frequency of receipt

SECTION H: Welfare Grants & Pensions

H1 Does this household receive any welfare grants or government or public pensions or investment income?

[] Yes [] No

H2 If yes, please supply details:

Nature of the grant or pension	How often is it received	How much is received each time	Who in the household receives it

H3 Does this household receive any non-cash regular welfare support, such as meals at schools for children?

[] Yes [] No

H4 If yes, please supply details:

SECTION I: Self-employment/Selling of items made

I1 Is anyone in this household self-employed or trades goods (casual, part- or full-time): [] Yes [] No

I2 If yes, please supply details:

Who in the household	What do they do	Approx how many hours do they work per day or per week	Approx how much income do they earn per day, per week or per month	Approx how much of this income is used in the business and how much can be used in the household (express as a fraction to nearest 10 %)

SECTION J: Employment

J1 Does anyone in this household have a part-time or full-time job paid by an employer [] Yes [] No

J2 If yes, please supply details:

Who in the household	What do they do	Approx how many hours do they work per day or per week	Approx how much income do they earn per day, per week or per month	Do they receive any other form of payment besides cash? If yes what and how often	How long have they been in this job	What does it cost for them to get to work and back each time

SECTION K: Household Profile

K1 Please provide us with details of the members of your household:

Name	Relation to head	Year born	Gender (M/F)	Highest education	Still studying (*)	Sleep at home (#)	Eat at home (#)	Occupation

Codes: * *P = primary school; S = secondary school; C = college; U = university*

*U = usually; W = mainly weekends; M = mainly a few days per month; R = rarely*

SECTION L: Social Capital

L1 Is anyone in the household a member of a social group/association (e.g. church, savings farming, volunteer, etc.)

☐ Yes ☐ No

L2 If yes, please supply details (remember to consider all members of the household and indicate on table):

Type of group	Who in the household (consider all members and indicate)	Are they a leader/office bearer in this group
Church		
Savings		
Farming		
Volunteer		
Sports		
Dance/music		
Crèche		
Local governance lobby group		
School parents association		
Health or clinic support group		
Women's group		
Other (specify)		
Other (specify)		
Other (specify)		

L3 Has the household faced any major income shortfalls or unexpectedly large expenditures during the past 2 years?

☐ Yes ☐ No

L4 If yes, please supply details:

Crisis event in the last 2 years	Severity (#)	How did you cope with the crisis (*)
Crop failure		
Serious illness in family (productive age-group adult unable to work for more than two months during past 2 years months, due to illness, or to taking care of ill person; or high medical costs)		
Death in the family		
Land loss (expropriation, etc.)		
Major livestock loss (theft, drought, disease etc.)		
Other major asset loss (fire, theft, flood, etc.)		
Lost wage employment		
Wedding or other costly social events		
Other (specify)		
Other (specify)		
Other (specify)		
Other (specify)		

Codes: **# Severity** 0 = no crisis; 1 = minor; 2 = moderate; 3 = severe

*** Coping**

a = used more wild products

b = sold wild products

c = found local casual employment

d = sent member away to find work elsewhere

e = spent cash savings

f = took children out of school

g = sold household assets

h = borrowed from family/relations

i = borrowed from friends/neighbours

j = borrowed from members of social group/club

k = borrowed from a money lender

l = cashed in retirement savings

m = reduced expenses

n = eat less food

o = other (specify)

SECTION M: Community Typology

M1 Main language you speak at home _____

M2 Main language spoken by your spouse _____

M3 What ethnic group or tribe do you belong to? _____

M4 What ethnic group or tribe does your spouse belong to? _____

M5 Where did you grow up as a child? _____

M6 What was the first language you learned to speak as a child? _____

M7 Where do you think of as your “family home”? _____

M8 Do you stay in contact with family members “back home”? ☐ Yes ☐ No

M9 When you are done working or retire, where would you like to live? _____

M10 Where do you want to be buried after you die? _____

M11 Do most of your neighbours come from the same tribe as yourself? ☐ Yes ☐ No

M12 Do your neighbours assist you when you need it? ☐ Yes ☐ No

M13 In general, do you trust the people in your neighbourhood?

☐ Yes, most people

☐ Some people, not all

☐ Not many

☐ None, other than family and relatives

M14 What do you like and dislike about living in this area/neighbourhood?

Likes	Dislikes

M15 Do you think your neighbourhood has changed since you first came here? ☐ Yes ☐ No

M16 If yes, how? _____

M17 Compared to other households in this neighbourhood, how well do you regard your quality of life?

☐ higher ☐ about the same ☐ lower

M18 Thinking about your quality of life five years ago, has it changed? ☐ Yes ☐ No

M19 If yes, how: ☐ Improved ☐ Declined

M20 What is the reason for this change: _____

Appendix 2 Wild natural resource identification

Phalaborwa		
Spoken name(s)	Common name	Scientific name
Trees:		
Mokawete/Mokhwethe/Mokwete/Mokwiti	Red Bushwillow	<i>Combretum apiculatum</i>
Mokwalo/Mokhwalo/Mokwalo	Knobthorn Tree	<i>Acacia Nigrescens</i>
Mokhuse/Morotse	Monawa creeper	<i>Vigna unguiculata</i>
Mahwelere	Red Bushwillow	<i>Combretum apiculatum</i>
Mmoto	Leadwood	<i>Combretum imberbe</i>
Motlomma/Mototo (motsoma)	Jackelberry	<i>Diospyros mespiliformis</i>
Mogo	Sycamore Figs	<i>Ficus spp</i>
Ntlo/Montwa/Dintho/Montwa (monttlo)	Category 3 invasive plant.	<i>Syzygium cuminii</i> (Jambolan)
Mokgoma/Mogokgowa	-	<i>Berchemia discolor</i>
Yape	Caribbean Annona	<i>Annona cf. cherimola</i>
Mobilo	Velvet Wild-medlar	<i>Vangueria infausta</i>
Mobaba	Natal Mahogany	<i>Trichelia emetica</i>
Liquart	-	<i>Eriobotrya japonica</i>
Curry leaves	Curry leaves	<i>Murraya koenigii</i>
Drum stick	Drum stick	<i>Moringa oleifera</i>
Vegetables:		
Morongo/Morogo	Vegetable	-
Sephaphe/Sepape	Gifappel	<i>Momordica foetida</i>
Kutse/Nkushe/Nkutse	Geel varingblaartjie	<i>Corchorus asplenifolius</i>
Moshigi	Blackjack	<i>Bidens pilosa</i>
Lebipo	Python climber	<i>Cocculus hirsutus</i>
Thepe	Misbredie	<i>Amaranthusv praetermissus</i>
Lerotho	African Cabbage	<i>Cleome gynandra</i>
Motubule	Cassava	<i>Manihot esculenta</i>
Koorka	Chinese Potato	<i>Plectranthus rotundifolius</i>
Koval	Ivy gourd	<i>Leucas aspera</i>
Bitter guard	Bitter guard	<i>Momordica charanthia</i>
Ladies finger	Ladies finger	<i>Abelmoschus esculentus</i>
Yams	Yam	<i>Dioscorea spp</i>
Fruits:		
Motsidi/Mosdidi	Sour Plum	<i>Ximenia caffra</i>
Motsidi mpiswana	Blue Sour Plum	<i>Ximenia americana</i>
Ditshidi	Plural for Sour Plum Fruits	-
Ditlomma	Jackelberry	<i>Diospyros mespiliformis</i>
Mago	Fig Tree	<i>Ficus sp</i>
Fish		
Mesela/Mothshela/Mesila (Moshela)	Lowveld large Scale Fish	-
Digaga	Bream	-
Kgopamabje	Mudfish	-
Baboro	Catfish/ Barbel	-
Plants for weaving		
Lekgogwa (legugo)	Reeds	<i>Cyperus textilis</i>
Lethate	Reeds	<i>Cyperus textilis</i>

Queenstown

Spoken name(s)	Common name	Scientific name
Trees:		
Umga/Unanga/Umnga/umnga	Thorntree/Doring hout	<i>Acacia karroo</i>
Rapesi/Lwapesi	-	<i>Euryops spathaceus</i>
Vegetables:		
Utyuthu	-	<i>Amaranthus hybridus</i>
mfino	Wild spinach	
Amakhawa/amakhowa	Mushrooms	<i>Termitomyces species</i>
Fruits:		
Itolofry/Itolofiya	Prickly pear	<i>Opuntia ficus-indica</i>
Medicinal plants:		
Imphepho	-	<i>Helichrysum odoratissimum</i>
Nentlungungembe/intlungunyembe	-	<i>Acokanthera oblongifolia</i>
Wild animals:		
Imbila	Dassie, rock hyrax	-
Umvundla	Hare	-
Mpunzi	Grey duiker	-

Appendix 3 Cultivation interview schedule

Edible Plants and Fruit Questionnaire

General Details

1. Date: _____

2. Researcher: _____

3. Translator: _____

4. Name of section/area: _____

5. GPS position: **a. Latitude:** _____ **b. Longitude:** _____

6a. Who in the household is being interviewed _____

6b. Gender _____

7. Do you own it or rent this house: ☐ Own customary ☐ Own with title deed ☐ Rent
☐ Other (give details) _____

8. How big is the plot: _____

9. What is the size of the production area for the crops and/or fruit trees?

Crops: _____

Fruit Trees: _____

Combined: _____

Land Use and Farming Practices

10. What work needs to be done to prepare the land around your house for growing edible plants and/or fruit trees?

a. Activity:	b. Cost/Labour:

11. Do you water your crops/fruit trees? Yes [] No []

a. If yes, where does the water come from? _____

b. How often do you water? Daily [] Weekly [] Monthly [] Other [] _____

12. Do you fertilize your crops/fruit trees? Yes [] No []

a. If yes, what type of fertilizer do you use? _____

b. Where do you get the fertilizer from?

c. How much do you use per month/season (units)? _____

d. What is the approximate cost per month/season?

Edible Plant Production

13. Please estimate the amount produced in the last planting season and the local unit price:

Plant Type	Number or rows of plants	Yield per planting season (units)	All used at home/given away (Y/N)	Some sold (Y/N)	Number that was sold	Local price

14. Why do you grow your own crops?

15. What are the advantages and disadvantages of growing your own crops?

Advantages:	Disadvantages:

16. Have you noticed a change in small scale or home-based agricultural practices and habits in your community/area over the last 10 years? Yes [] No []

If yes, please elaborate:

Fruit Production

17. Please estimate the amount produced in the last planting season and the local unit price:

Fruit Type	Number or rows of trees	Yield per planting season (units)	All used at home/given away (Y/N)	Some sold (Y/N)	Number that was sold	Local price

18. Why do you grow your own fruit?

19. What are the advantages and disadvantages of growing your own fruit trees?

Advantages:	Disadvantages:

If yes, please elaborate:

21. How many people live in the household? _____

23. How many members living in the household now have formal jobs? _____

24b. How many grants does the household receive? _____

25b. What type of car is it? _____

25c. What year was the car made in? _____

26. What kind and how many livestock or poultry does the household own? _____

- [] 5-7 x/week
- [] 3-4 x/week
- [] 1-2 x/week
- [] 3-5 x/month
- [] 1-2 x/month
- [] < 1 x/month
- [] Never (vegetarian)

Appendix 4 Significant z-statistic results for crop and fruit types

Significant z-statistic results for crops and fruits grown along the continuum in Queenstown

Crop/Fruit	Section	% within section	z-statistic	Significance
tomato	Urban	20.0	2.1	p < 0.05
	Township	9.0		
beans	Urban	18.8	3.2	p < 0.05
	Township	4.0		
lettuce	Urban	12.9	2.4	p < 0.05
	Rural	1.7		
onion	Township	45.0	4.1	p < 0.05
	Urban	16.5		
onion	Township	45.0	3.0	p < 0.05
	Rural	21.7		
spinach	Township	56.0	2.2	p < 0.05
	Urban	40.0		
potato	Township	28.0	3.2	p < 0.05
	Urban	9.4		
cabbage	Township	41.0	3.5	p < 0.05
	Urban	17.6		
carrot	Township	32.0	2.2	p < 0.05
	Urban	17.6		
pumpkin	Rural	23.3	3.1	p < 0.05
	Urban	5.9		
pumpkin	Rural	23.3	2.7	p < 0.05
	Township	8.0		
maize	Rural	53.3	6.0	p < 0.05
	Urban	8.2		
maize	Rural	53.3	6.6	p < 0.05
	Township	7.0		
cabbage	Rural	53.3	4.5	p < 0.05
	Urban	17.6		
potato	Rural	36.7	4.0	p < 0.05
	Urban	9.4		
lemon	Urban	16.5	3.8	p < 0.05
	Township	1.0		
plum	Urban	16.5	2.5	p < 0.05
	Rural	3.3		
peach	Rural	55.0	2.8	p < 0.05
	Urban	31.8		
apple	Rural	25.0	3.9	p < 0.05
	Urban	3.5		
apple	Rural	25.0	2.3	p < 0.05
	Township	11.0		

Significant z-statistic results for crops grown along the continuum in Phalaborwa

Crop	Section	% within section	z-statistic	Significance
tomato	Urban	22.7	2.3	p < 0.05
	Rural	8.3		
spinach	Urban	20.0	2.5	p < 0.05
	Rural	5.0		
spinach	Township	21.6	2.8	p < 0.05
	Rural	5.0		
onion	Township	14.7	2.3	p < 0.05
	Rural	3.3		
beetroot	Township	8.8	1.8	p < 0.05
	Rural	1.7		
beans	Township	18.6	2.0	p < 0.05
	Urban	8.0		
pumpkin	Township	36.3	4.1	p < 0.05
	Urban	9.3		
maize	Township	48.0	5.9	p < 0.05
	Urban	6.7		
cabbage	Township	10.8	2.0	p < 0.05
	Urban	2.7		
peanuts	Township	15.7	3.2	p < 0.05
	Urban	1.3		
beans	Rural	38.3	4.3	p < 0.05
	Urban	8.0		
beans	Rural	38.3	2.8	p < 0.05
	Township	18.6		
pumpkin	Rural	40.0	4.2	p < 0.05
	Urban	9.3		
maize	Rural	56.7	6.4	p < 0.05
	Urban	6.7		
peanuts	Rural	26.7	4.4	p < 0.05
	Urban	1.3		
peanuts	Rural	26.7	1.7	p < 0.10
	Township	15.7		
watermelon	Rural	31.7	4.9	p < 0.05
	Urban	1.3		
watermelon	Rural	31.7	5.4	p < 0.05
	Township	2.0		

Significant z-statistic results for fruits grown along the continuum in Phalaborwa

Fruit	Section	% within section	z-statistic	Significance
lemon	Urban	30.7	2.2	p < 0.05
	Township	16.7		
lemon	Urban	30.7	2.9	p < 0.05
	Rural	10.0		
mango	Township	87.3	4.5	p < 0.05
	Urban	57.3		
mango	Township	87.3	4.0	p < 0.05
	Rural	60.0		
wild fruit	Township	11.8	2.6	p < 0.05
	Urban	1.3		
wild fruit	Rural	40.0	5.8	p < 0.05
	Urban	1.3		
wild fruit	Rural	40.0	4.2	p < 0.05
	Township	11.8		
banana	Rural	16.7	2.8	p < 0.05
	Township	3.9		
mulberry	Rural	20.0	3.7	p < 0.05
	Urban	1.3		
mulberry	Rural	20.0	3.0	p < 0.05
	Township	4.9		
apple	Rural	8.3	2.0	p < 0.05
	Urban	1.3		