



**Sustainable Agricultural Practices in Smallholder Farming Systems: A  
Case Study of Smallholder Farmers in the Ugu District, KwaZulu-Natal,  
South Africa**

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**As the candidate's supervisor I have approved this thesis/dissertation for  
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**Signed:** 

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**Date:** 22 March 2016

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## **Abstract**

Agriculture is viewed by both World Bank reports of 2005 and 2008 as a viable activity for rural development for the developing economies. Smallholder farming is the dominant type of agricultural practice especially in the Sub-Saharan Africa. Although in South Africa smallholder farming is not a dominant form of agriculture, it has been highlighted as important for rural development and sustained rural livelihoods. Smallholder farming is faced with a number of challenges including climate change, unproductivity, farming in fragile areas and lack of financial support from authorities. The study investigated whether smallholder farmers in Port Shepstone, KwaZulu-Natal engage in sustainable farming practices in the face of the challenges they are confronted with. The challenges faced by smallholder farmers in South Africa include being productive in the face of environmental degradation and climate change as they farm in marginal lands. Sustainability of smallholder farmers in South Africa is based on three principles: economic, social and environmental viability. In investigating sustainable farming practices among smallholder farmers in Port Shepstone, KwaZulu-Natal both quantitative and qualitative methods were used to collect primary data. Questionnaires were used to collect quantitative data and the focus group discussion was used to collect qualitative information. Furthermore, the constraints faced by smallholder farmers that hinder them from practicing sustainable farming were identified. The findings in the research indicate that smallholder farmers in Port Shepstone practice both traditional and conventional methods of farming where chemical fertilizer is used. Smallholders in the study area indicated that they practiced crop rotation, use of green and animal manure, use crop cover and intercropping methods. The main challenges identified included limited or no access to loans, drought and floods, soil infertility, lack of fertilizer, shortage of farm labour, wild pigs and moles that consume their crops, shortage of farm land and lack of access to tractors.

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## ACRONYMS AND ABBREVIATIONS

Agri-BEE	Agriculture Black Economic Empowerment
Agri-SA	Agri-South Africa
AIDS	Acquired Immune Deficiency Syndrome
AISP	Agriculture Input Support Programme
ANC	African National Congress
CASP	Comprehensive Agricultural Support Programme
ASP	Agricultural Support Programme
CRDP	Comprehensive Rural Development Programme
DAFF	Department of Agriculture, Forestry and Fisheries
DFID	Department for International Development
Ecosan	Ecological Sanitation
EPI	Environmental Performance Indices
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GHG	Greenhouse gases
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research Council
ILO	International Labour Organisation
IAASTD	International Assessment of Agricultural Science and Technology
IFOAM	International Federation for Organic Agriculture Movement
IPCC	Intergovernmental Panel on Climate Change
IFAD	International Fund for Agricultural Development
ISRDS	Integrated Sustainable Rural Development Strategy
LADA	Land Degradation Assessment in Drylands
LRAD	Land Redistribution for Agricultural Development
MDGs	Millennium Development Goals
NDA	National Department of Agriculture
NUMSA	National Union of Metal workers in South Africa
OECD	Organisation for Economic Co-operation and Development
PLAS	Proactive Land Acquisition Strategy
RDP	Reconstruction and Development Programme
SANHANES-1	South African National Health and Nutrition Examination Survey
STATS SA	Statistics South Africa
SADT	South African Development Trust
SLA	Sustainable Livelihoods Approach
SLAG	Settlement/Land Acquisition Grant
SPSAA	Strategic Plan for South African Agriculture
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
UN	United Nations

USA	United States of America
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
WBWS	Willing Buyer Willing Seller
WCED	World Commission on the Environment and Development
WEF	World Economic Forum
WFP	World Food Programme
WFS	World Food Summit
WOCAT	World Overview of Conservation Approaches and Technologies

# **CHAPTER ONE: INTRODUCTION**

## **1.1 Chapter outline**

This chapter provides an overview of the research, where the research topic is “Sustainable agricultural practices in smallholder farming systems: a case study of smallholder farmers in the Ugu District, KwaZulu-Natal, South Africa”. The chapter presents a brief background of the literature review on the importance of agriculture, particularly, smallholder farming in rural development and further looks at the conceptual framework which is the Sustainable Livelihoods Approach (SLA). The aim and objectives of the research are presented in this chapter together with the methodology used in this dissertation.

## **1.2 Introduction and motivation of the study**

The background of the research is drawn from rural development literature, where agriculture is seen as a viable activity for rural development. The government policies of South Africa such as the South African New Growth Path of 2010 and National Growth Plan of 2012 highlighted by Hendricks (2014) show that since the advent of democracy the government has acknowledged the importance of agriculture, particularly, smallholder farming in poverty alleviation, job creation and rural development. Laurence et al. (2014) argue that conventional agriculture has harmed the environment and has a major influence on climate change. The Intergovernmental Panel on Climate Change (IPCC, 2014) report indicates that African countries have already been affected by climate change and East Africa and Southern Africa would be particularly vulnerable to climate change. This research looks at the farming practices of smallholder farmers in Ugu District and examines whether they farm sustainably or not, so as to draw experiences about smallholder farming practices in the country.

The conceptual framework used in this research is the SLA. According to this framework, for sustainable livelihoods to be achieved, capital resources such as natural, economic, human and social capital should be available for effective rural development and sustainable livelihoods. The methodology used in this research is a mixed method approaches where both qualitative and quantitative approaches are used. The research design used in data collection

involved the use of primary data where questionnaire surveys and one focus group discussion was used. The sampling approach used was both simple random probability sampling which was used for the questionnaire survey and purposive sampling which was used for focus group participant selection. The sample size of the respondents was selected from a list of 120 smallholder farmers in the Ugu District area which was obtained from the extension office in the area. Systematic sampling was used to select 50 smallholders in the Ugu District. The lists of smallholder farmers was collected from the extension office of the Department of Agriculture, one in Mthwalume in Kwa Qoloqolo and one in Izingolweni extension office, which includes Hibiscus, Umziwabantu and Izingolweni. The list consisted of 102 smallholders combined which was the sample frame. The first individual was selected from the sample frame, using a random number table and then subsequent subjects were selected using a fixed sampling interval (every 2<sup>nd</sup>) to achieve the targeted sample size of fifty smallholders. Field data was collected on ten different days from July to August 2014. Furthermore, quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS) and qualitative data was analysed in relation to key thematic issues obtained during the focus group discussion.

In the rural development literature agriculture is indicated as one of the most important activities for rural development which has been reiterated by the Food and Agriculture Organisation (FAO, 2007) of the UN. Tshuma (2014) states that the government of South Africa has acknowledged the role that can be played by agriculture in rural development in poverty alleviation and job creation and the skewed nature of development in South Africa in the past years which has resulted in rural being left behind in economic development and that has prompted the new democratic government to focus the economic development of rural areas where, according to the South African National Planning Commission (2010), agriculture should take the centre stage in rural development. Tshuma (2014) adds that the focus in the development of agriculture should be more on smallholder agriculture since it is a dominant farming practice in the rural areas of South Africa. Hendricks (2014) indicates that agriculture underpins national food security and is important to rural communities as a source of livelihoods and employment. Two recent policies in South Africa, that is, the South African New Growth Path, (2010) and National Growth Plan, (2012) have identified agriculture as an important sector for rural development (Department of Agriculture, Forestry and Fisheries, [DAFF], 2012).

Akowuah (2012) and Kleemann (2013) indicate that Sub-Saharan Africa (SSA) is the top region in the world where food production is lagging behind population growth and by 2010 about 49% of the population in the region was indicated as living in absolute poverty. South Africa is no exception in relation to these estimates and this is indicated by Senyolo et al. (2014) who state that the poverty head count in rural areas of South Africa is as high as 98% compared to 44% for the national average. Altman et al. (2009) indicate that the reason why the majority of people in South Africa are food insecure is because of the huge gaps between the rich and the poor where South Africa's Gini coefficient is estimated at 0.67 which causes some people to live under extreme poverty, especially in rural areas and in the urban periphery. Food production is a necessity in alleviating poverty in South Africa as Baiphethi and Jacobs (2009), DAFF (2012) and Tshuma (2014) highlight and, in order to boost rural economies; smallholder farming has to be promoted for sustainable livelihoods.

Both Cousins (2010) and Du Toit et al. (2011) estimate that about 4 million people in South Africa are engaged in smallholder agricultural production. Aliber (2009) and Hart (2009) estimate that about 2.5 million households practice subsistence farming in South Africa, and the large number of these households reside in the former homelands. Agriculture in South Africa reflects the legacy of the past where black races were marginalised and excluded from economic and political participation in the country (Mudhara, 2010). The author indicates that agriculture in South Africa is characterised by dualism, where large-scale commercial and smallholder farmers exist side by side and further highlights that the large-scale commercial sector in South Africa is well resourced and is mainly operated by whites, while small-scale farmers are poorly resourced and mostly operated by black farmers who mainly produce for subsistence purposes and lack institutional support. Lester et al. (2000) and Thornton (2009) trace the formation of black small-scale farming from the formation of homelands as the result of a created system that was meant to control black urbanisation and racial segregation which served to provide key sectors of the economy with a steady supply of cheap black labour, and the majority of the unwanted people in cities were left with no option but to live off the land.

Due to the previous racialisation of South African society, the post-apartheid government in South Africa is faced with major challenges including, as Thornton (2009) states, the challenges of poverty and unemployment. These challenges prompted many scholars in the rural development literature and world bodies such as the FAO and the World Bank to view

agriculture as a viable activity for rural development, more so, because in most instances poor rural people in South Africa and in SSA live in rural areas and they rely mostly on farming as one of their key livelihood strategies, especially those engaged in smallholder farming (Kepe, 2009; International Fund for Agricultural Development, IFAD 2013; IFAD Policy Brief, 2015; Thamaga-Chitja and Morojele, 2014; Tshuma, 2014). Although agriculture and smallholder farming is heralded as the remedy for poverty and job creation, it is nevertheless indicated as the major cause of biodiversity loss, overconsumption of water resources and the reduction of about 3% of the world's farmland, where the most affected are poor farming communities in Africa (Akowuah, 2012). This puts agriculture at more risk while facing the effects of climate change as Zerihun et al. (2014) state. The IPCC (2014), Kong et al. (2014) and Lal et al. (2012) indicate that African countries have already suffered the effects of climate change such as land degradation and desertification.

Agriculture in South Africa is faced with many challenges including soil infertility. As Manicus (2009) indicates, about 13% of land in South Africa is for crop production and only 3% is considered as having high agricultural potential. Louw and Ndanga (2010) indicate that large portions of land in South Africa are arid with low rainfall and poor soil fertility. This view is supported by Hardy et al. (2011) who mention that about 80% of surface land in South Africa is classified as arid or semi-arid. This makes South African soil very fragile to unsustainable farming practices. Furthermore, Murungu et al. (2011) indicate that the major challenge that faces agriculture in South Africa is land degradation which is caused by the burning of crop residues that goes with continuous tillage which results in soil erosion that removes the top fertile soil suitable for farming.

Laker (2004), Mills and Fey (2004) and Murungu et al. (2011) highlight that agriculture is a major producer of greenhouse gases (GHG) that cause global warming and climate variability and they further indicate that agriculture accounts for 15% of anthropogenic emissions of GHG and SSA is projected as the hotspot of climate change. Small-scale farmers need to engage in sustainable practices as they will be the most vulnerable if further soil depletion is not kept in check. Sustainable agricultural practices will help keep the land productive which is critical to support livelihoods and alleviate poverty, especially in rural areas.

This research is driven by the need to understand current agricultural practices and challenges among smallholder farmers with the view to assist small-scale farmers to engage in

sustainable practices to protect the natural environment restore and sustain agricultural land, improve economic viability for small-scale farming, and enhance benefits to society and the next generations to come. The research is crucial for the development of smallholder farmers and their general perceptions about sustainable agricultural practices. The research will eventually culminate in an overview of agricultural practices among smallholder farmers in within the Ugu District Municipality where recommendations will be made to the relevant Ugu District officials regarding the assistance that could be offered to smallholder farmers in the area in relation to protecting the natural environment and promoting poverty alleviation.

### **1.3 Aim**

The research aims at examining the farming practices of smallholder farmers in the Ugu District, KwaZulu-Natal. The study intends to investigate whether they engage in sustainable farming practices.

### **1.4 The objectives of the research are:**

- To identify agricultural practices that smallholder farmers in Port Shepstone currently engage in
- To evaluate smallholders' knowledge and attitudes towards sustainable agricultural practices and
- To examine the challenges/constraints experienced by farmers in relation to promoting and sustaining sustainable agricultural practices

### **1.5 Conclusion and chapter sequence**

This chapter has presented the background to the literature review on sustainable agriculture and smallholder farming in South Africa. The policy stance of the government of South Africa in reviving smallholder farming has been briefly presented and discussed. The chapter has discussed the aim and the objectives of the research. The chapter has further looked briefly at the methodology used in this dissertation. This study comprises of five chapters. Chapter one presented the introduction and motivation of the study, aim, objectives, a

conclusion and chapter sequence. Chapter Two presents the literature review, current themes and a discussion in relation to sustainable farming. It looks at agriculture in the context of rural development in South Africa, particularly the important role of smallholder farming in rural development. Furthermore, it discusses the importance of sustainable smallholder farming in the face of poverty, environmental degradation and climate change. The challenges faced by smallholder farmers are discussed both in South Africa and in general that are crucial to sustainable farming practices. Chapter Three discusses the methodology used in this research. It further describes the study area and presents the methods and techniques used in data collection. Chapter Four presents the research findings and the discussion thereof. Lastly, chapter Five presents conclusion and recommendations.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter presents the literature review related to sustainable agriculture. In this chapter the following sub-topics are discussed in presenting the literature review:

- Agriculture in the context of rural development
- The SLA as the conceptual framework
- The relationship between poverty and the environment
- Rural development policy and smallholder farmers in South Africa
- Land policy in South Africa before and after 1994 and influence on smallholder farming
- Who are the smallholder farmers in South Africa?
- Food security in South Africa and its implications for agriculture and smallholder farmers
- Challenges faced by smallholder farmers generally and in South Africa more specifically
- Sustainable agriculture as an alternative to conventional agriculture, The practice of sustainable agriculture and policy measures for sustainable agriculture in South Africa

### **2.2 Agriculture in the context of rural development and smallholder farmers**

The role of agriculture in development has been highlighted long before the industrial revolution. De Janvry et al. (2009) argues that agriculture has been articulated as a precursor to the acceleration of industrial growth from England in the 18<sup>th</sup> century to Japan in the late 19<sup>th</sup> century and in Asia in the 20<sup>th</sup> century. Christiaensen et al. (2011) trace the role of agriculture in poverty reduction from earlier scholarly debates and theories to the middle of 18<sup>th</sup> century, where agriculture was viewed as of less importance in economic development and the role of agriculture in development was said to be based on the dual economic model of Lewis in 1954 (Lewis, 1979). According to the dual economic model, agriculture was seen as not viable for economic development and was seen as the supplier of labour and resources needed for industrial development, but in the 21<sup>st</sup> century agriculture was viewed differently.

Christiaensen et al. (2011) highlight that the change in thinking regarding agriculture was due to the desire to increase food production as world population increases at a faster rate than expected, and is anticipated to reach 9 billion in the middle of the 21<sup>st</sup> century. They further argue that food insecurity and malnutrition in the developing world prompted the need for an increase in food production. The authors highlight the success of the green revolution both in Asia and in India as it promoted renewed thinking in agriculture as well. De Janvry and Sadoulet (2010) note that agricultural development has been lagging behind in SSA and yet the hungriest people come from this region with 70% of SSA poverty being rural. De Graaf et al. (2011), when analysing shortages of food in SSA, acknowledge the importance of agriculture in alleviating food shortages in the region mentioning that agriculture in the region is a major means of livelihoods for the majority of the population. In SSA, as mentioned by the United Nations Development Programme (UNDP 2010) and De Graaf et al. (2011), indicate that the failure of agriculture can be traced to a number of reasons including the portion agriculture contributes to the Gross Domestic Product (GDP) of most countries in SSA (which is close to 50%). This results in the economies of the SSA countries mostly relying on agriculture which is subject to many forces including climate change. According to De Graaf et al. (2011), forces that affect agriculture in SSA include the fact that SSA has a heavy reliance on rainfed agriculture which is affected by rainfall variability resulting in poor harvest, shortage of labour that is attributed to the impact of the Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS), high population growth which is about 3% in SSA per year, transport costs and small markets. Although these challenges affect almost all countries in SSA, the authors indicate that these challenges vary in each country in the SSA region.

Ovwigbo (2014) views rural development as not limited to the development of agriculture, but the whole development of other aspects of rural areas and its population, including human capital development (education), skills acquisition, health and nutrition, poverty alleviation programmes, provision of recreational facilities, cottage industries and rural infrastructure. Furthermore, Ovwigbo (2014) indicates that rural development aims at improving the quality of life and economic well-being of people living in rural areas. Rural development is linked to addressing rural poverty and food insecurity, especially in developing countries. Buffett (2012), in highlighting the plight of poor people in the world, indicates that every 3-6 seconds someone in the world dies of hunger that makes up about 10 million people a year. The FAO (2013a) states that, about 12% of the world's population is food insecure and many of these

people are from developing nations. The World Food Summit (WFS, 1996; 2002) and FAO (2013a) resulted in the crafting of the Millennium Development Goals (MDGs) have committed itself to halving poverty by the year 2015, and the challenge will be meeting the target of those goals by the stipulated time. FAO (2008) has over the years acknowledged the role of agriculture in reducing hunger and poverty in the world.

According to Godfray et al. (2010), the world's population is expected to reach about 9 billion by 2050 and this means more food will be needed to feed the fast growing population and the largest population growth is from the developing countries where currently there are high incidences of poverty and malnutrition. The argument posed by the FAO is that most poverty is rural, particularly in the developing nations where the population in the rural areas is estimated to be about 70% (FAO, 2013a). Christiaensen et al. (2011) highlight the fact that the majority of poor people in the developing world depend on agriculture for their livelihoods and that poor people stand to gain more from the GDP originating from agriculture than from an equal amount of GDP generated outside of agriculture. The FAO, World Food Programme (WFP) and IFAD (2012) state that for development to include the poor it has to utilise assets owned by the poor such as labour which the report argues is the most important asset owned by the poor. Access to wages by the poor means more food purchasing power and reduction of poverty.

As the global demand for food is expected to grow as world population increases, the FAO, IFAD and WFP (2012) emphasise the need for smallholder farmers to step up to the challenge and produce more food for the growing demand and to do that sustainably. The authors cite on the success stories of smallholder farmers in bringing about enough food to sustain Indian and Asian populations. The argument is that smallholder farmers adopted technological innovations to increase production and lower food prices. Therefore mass production of food will reduce food prices and that means accessibility of all to food supplies. The likelihood of mass production of food will increase the general demand for labour in rural areas and increase wages for unskilled labour in rural areas although this has been done to the detrimental of the environment (Laurence et al., 2014).

Smallholder production, according to the FAO, IFAD and WFP (2012) is likely to be efficient as it is labour-intensive. IFAD (2013) indicates that about 80% of the world's small farms are managed by smallholders and 80% of food consumed in the developing world is

produced by smallholder farmers contributing significantly to poverty alleviation and food production, so smallholder farmers are well positioned to help in poverty alleviation. Since smallholder farmers are a major employer in rural areas more workers are hired during peak farming times and smallholder farmers tend to spend their income buying locally produced goods thereby stimulating local economic development (IFAD, 2013). Jama and Pizarro (2008) indicate reasons why smallholder farmers in Africa have been seen as indisputable to development which include the increase in income for rural people as agricultural input increases and the benefits of cheap food for both rural and urban populations. Agholor and Obi (2013) further reiterate the view that agriculture is the backbone of most African economies including South Africa, and is still viewed as the panacea in reducing rural poverty.

### **2.3 Conceptual framework: Sustainable Livelihoods Approach**

The conceptual framework used in this research is the SLA. This is appropriate since the sustainable livelihoods framework looks at available resources, opportunities and structures (conducive environment) that smallholder farmers have to access to keep them productive and more sustainable. This research is on sustainable agricultural practices among smallholder farmers, what limitations they face, and what opportunities can be explored for them to farm sustainably to save the very same environment that they depend on for themselves and the generations to come. The SLA is the framework that has been used in rural development intervention since the 1990s (McNamara and Achlo, 2009). Most of the conventional rural development interventions have always looked at low income as the root cause of rural poverty leading to top-down intervention strategies which have not resulted in much success since poverty is still prevalent in the rural areas of most developing countries in the world. This has resulted in the coining of the SLA to understand rural poverty (McNamara and Achlo, 2009).

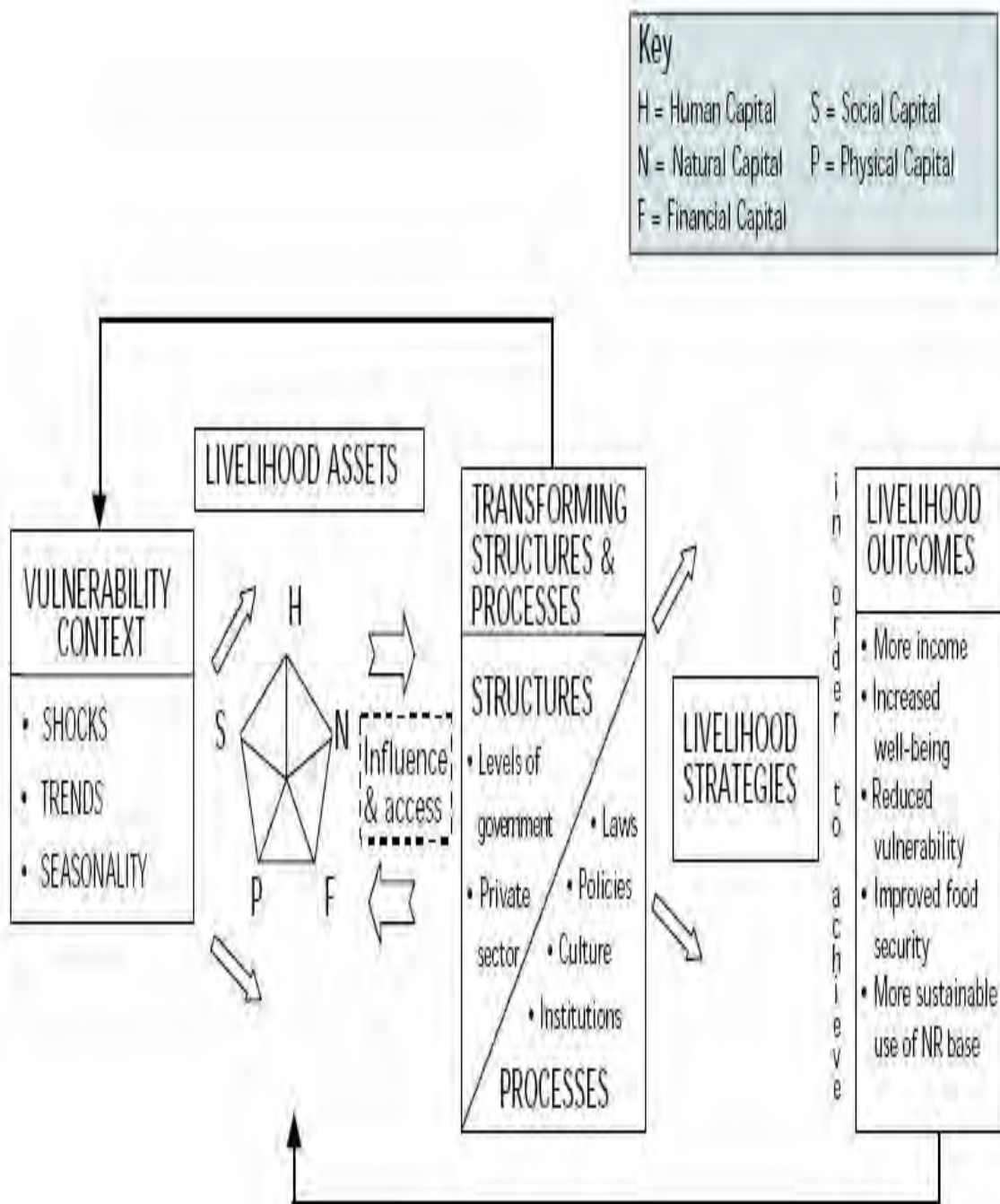
Livelihoods have been the dominant concept in rural development discussions. A livelihood is a term that Scoones (2009:5) defines as “how different people at different places live, how do people make a living, what are the forces at work that allow people to have access to resources, what capabilities they have to access the resources and what activities they do to pursue a living”. Mackeller and Smardon (2012) argue that there are processes at work that determine whether people would have sustainable livelihoods or not. Understanding

livelihoods for poor people has been regarded as providing a basis for a better understanding of rural poverty. The SLA, according to McNamara and Achlo (2009), has dominated the development agenda since 1990. The SLA, according to Krantz (2001), offers a more coherent and integrated approach to understanding poverty. The author indicates that the concept of sustainable livelihoods was first introduced by the Brundtland Commission on the environment and development as a way of linking socio-economic and ecological considerations.

The United Nations Conference on Environment and Development (UNCED) in 1992 expanded the concept in Agenda 21 by advocating the SLA as a broad goal for poverty eradication. Chambers and Conway (1991:6) define sustainable livelihoods as “a livelihood that comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living”. The authors further indicate that a livelihood is sustainable only if it 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. Scoones (1998:5) further refines the definition of sustainable livelihoods as “a livelihood that consists of capabilities, assets (including both material and social resources) and activities needed for means of living”. Scoones (1998) further argues that a livelihood is sustainable when it can cope with and recover from stresses and shocks to maintain or enhance its capabilities and assets, while not undermining the natural resource base. Embracing the above definition, the author adopted the SLA which is used for understanding poverty, people’s livelihoods for policy development and for intervention strategies to end poverty. According to Assan and Beyene (2013), the sustainable rural livelihoods framework focuses on three main issues, that is, setting indicators, identifying livelihood resources and strategies, and identifying the practical and operational implications of adopting a SLA.

Serrat (2010) views the SLA as a way of thinking about the objectives, scope and priorities for development activities based on the evolving thinking about the way the poor and vulnerable live their lives and the importance of policies and institutions. Serrat (2010) states that in the SLA, there should be a partnership between private and public sectors in activities that are dynamic and sustainable, indicating that the SLA is not the panacea for development, arguing that there are other valuable tools that can be utilised in poverty policy development and in the intervention strategy but it makes the connection between people and the overall

enabling environment that influences the outcomes of the livelihood strategy. Place et al. (2005) highlight that the sustainable livelihoods framework is the tool that improves an understanding of the livelihoods of the poor. The framework figure below summarises the SLA and indicates linkages between variables without necessarily showing causal factors (Figure 2.1).



**Figure 2.1: Sustainable Livelihoods Framework (Department for International Development, DFID 1999:1)**

Scoones (1998) in his analysis of the sustainable rural livelihoods framework above indicated that for rural poor to pursue their livelihoods strategies they should have capital possessions such as natural capital, economic capital, human capital and social capital. The author categorises assets as the following:

- Natural assets (soil, water, air, genetic resources and environmental services including hydrological cycle, pollution sinks, etc.).
- Economic or financial capital (cash, credit/ debt, savings, etc.), including basic infrastructure and production equipment and technologies which are essential to pursue any livelihoods.
- Human capital (skills, knowledge, ability to labour and good health).
- Physical capital (transport and communication systems, shelter, water and sanitation systems and energy). Physical capability are basic infrastructure that people need to make a living as well as the tools and equipment that they use is important for the successful pursuit of different livelihood strategies.
- Social capital (networks, social claims, social relations, affiliations, associations, etc.) upon which people draw from when pursuing different livelihoods strategies.

DFID (1999) explains vulnerability context in the sustainable livelihoods framework as framing the external environment in which people exist, and states that vulnerability context has three aspects, that is, shocks, trends and seasonality; and people have limited or no control over the vulnerability context. The author further indicates that shocks such as floods, storms and civil conflicts can destroy assets and trends have influence on the chosen livelihood strategies, while seasonality such as shifts in prices, employment opportunities and food availability are one of the greatest challenges for people in developing countries. The author refers to the transforming structures and processes as institutions, organisations, policies and legislation that shape livelihoods. The author further argues that the structures and processes determine access to livelihoods and need to be aligned properly with the needs of the poor to ensure sustainable livelihoods.

Place et al. (2005) in his analysis of the sustainable livelihoods framework reiterates that structures and processes shape access to sustainable livelihoods by poor people, and that context is the environment in which poor people live their lives and which is responsible for their many hardships. According to Place et al. (2005), contexts is not limited to broad political and economic structures but extend to immediate physical, social and cultural

environments, and these determine the sustainability of a livelihood. He further argues that context can promote or limit a livelihood. Livelihood is localised and it needs to be understood in a particular context (Place et al. 2005). Serrat (2010) highlights the vulnerability contexts that hinder sustainable livelihoods which results in the insecurity of the individuals, households and communities. Benson and Twigg (2007) argue that seasonality is expressed through shifts in prices, food availability, employment opportunities and health. They further state that trends include demographic, environmental, economic, governance and technological trends. Analysing the vulnerability context is essential for any developmental intervention (Benson and Twigg, 2007).

Mackeller and Smardon (2012) argue that institutions and organisations play a crucial role in constructing a sustainable livelihood for people to effectively combine and allocate resources. Benson and Twigg (2007) state that policies, institutions and processes have a huge influence on the livelihoods of the poor. They determine access to assets and choice of livelihoods. Serrat (2010) highlights that structures and processes are linked to public and private organisations that are set to implement policy and legislation, and they embrace laws, regulations, policies, operational arrangements, agreements, societal norms and practices, and in turn they determine the way in which structures operate. Scoones (1998) refers to structures and institutions as formal or informal but they have power that influences the choice of livelihood strategy/strategies of poor people. Serrat (2010) states that it is important for governments to adopt pro-poor policies, as structures and processes may restrict poor people's access to their livelihoods.

Benson and Twigg (2007) refer to livelihood strategies as the way in which poor people deploy their assets such as consumption, production, processing, exchange and income generating activities and capabilities to improve their livelihoods. According to Serrat (2010), sustainable strategies may be derived from natural resource based activities, non-natural resource based activities and off-farm activities, migration and remittances, pensions and grants, intensification and diversification. Assan and Beyene (2013) highlight that while human beings are highly dependent on the natural environment for their livelihoods, poor people in particular are dependent mostly on the services they receive from the physical environment, and if this is not done sustainably it causes severe harm to the very same people who are fragile and marginalised.



Scoones (1998) included five indicators of sustainable livelihoods or livelihoods outcomes: creation of employment (a livelihood strategy should be able to create employment opportunities), poverty reduction, increased well-being, reduced vulnerability and more sustainable use of the natural resource base. Scoones (1998) further argues that reduction of poverty is the key criterion of livelihood measurements. Benson and Twigg (2007) and Serrat (2010) have summed up sustainable livelihood outcomes as when the livelihood creates more income, increases the well-being of poor people, reduces vulnerability, improves food security, promotes more sustainable use of natural resources and recovers human dignity. This dissertation will analyse the farming practices of smallholder farmers using the sustainable livelihoods framework. The approach will assist in understanding the farming practices of smallholders in the study area. DAFF (2012) highlights that in South Africa smallholders are faced with tremendous challenges including the unsustainable exploitation of the natural environment on which their livelihoods depend. Assan and Beyene (2013) have highlighted that human beings are highly dependent on the natural environment especially those who are poor for their livelihoods, since people, because of poverty, are forced to use the services of nature such as food, fodder and water. Duraiappah (1998) and Assan and Beyene (2013) indicate that the predominant school of thought argues that poverty is a major cause of environmental degradation since poor people depend on surrounding natural environments for their livelihoods. This brings to the notion that there is a relationship between poverty and the environment.

## **2.4 Poverty and the environment**

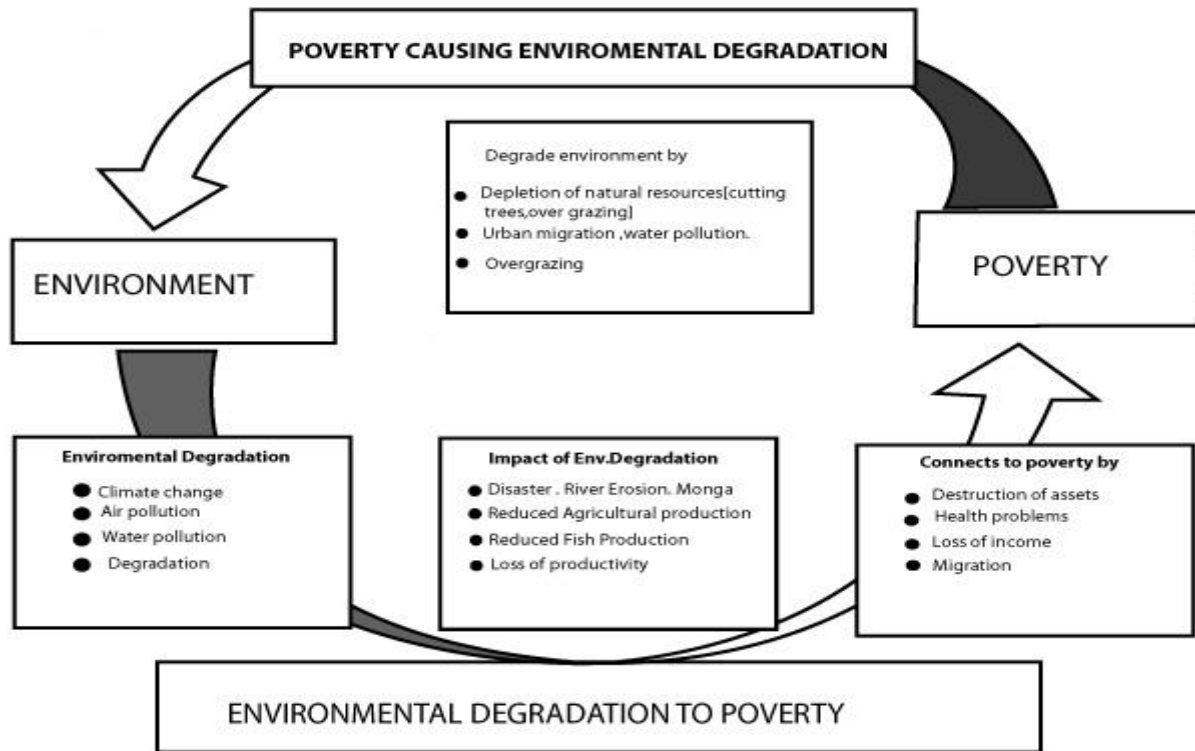
There is an interactive relationship between humans and the environment since the beginning of time. Nahui et al. (2014) highlight that in the past years due to population growth there has been interference with terrestrial ecosystems. According to the FAO (2002), about 13 million ha of land is converted to agricultural use every year in the world and this, according to Nahui (2014), pose great threats to ecosystems. The threats to ecosystems have resulted in much debate within academic circles about the relationship that exists between poverty and the environment. Conventional theory sees the relationship between poverty and the environment as a 'downward spiral' (Duraiappah, 1998; Scherr, 2002). According to this theory, environmental degradation is caused by population growth and economic marginalisation of poor people (Scherr, 2002). The authors indicate that 'the downward spiral' is the belief that rural poor people are placing too much pressure on natural resources

due to growing populations, limited access to land or only access to fragile or poor quality land and this results in environmental degradation, and in turn results in declining consumption, human health and food security.

According to the FAO (2011), 40% of the degraded land is located in poverty-stricken areas, with 30% in moderate poor areas and 20% in slightly poor areas. Duraiappah (1998) states that the 'downward spiral' theory has caused the poor people to bear the brunt of contributing to environmental degradation and the Brundtland Commission report of 1987 was founded on the assumption that poverty is the major cause of environmental degradation. Nahui et al. (2014) argue that the idea that poverty causes environmental degradation was based on various studies conducted, including the study by Cavendish (2002) which was undertaken in Zimbabwe which concluded that dependence on natural resources varies with income amongst different classes of people and poor people are more dependent on natural resources than rich people. Nahui et al. (2014) further highlights a similar study conducted in India which examined the role of agriculture, forests and livestock in people's lives. The study found out that poor people generate their income from natural resources and due to the shortage of basic essentials; poor people tend to exploit the natural environment.

Ravinborg (2003) highlights that there is a vicious cycle relationship between poverty and the environment and the vicious cycle relationship is mostly affecting countries in the developing world as farmers are believed to ignore environmental sustainability and much more concerned with their livelihoods which in turn are detrimental to the environment and ultimately the degraded environment affects their livelihoods. The author argues that smallholders are too poor to be concerned with the long-term sustainability of natural resources which has been referred to as 'high time preference' of poor farmers and poor farmers are much more concerned with short-term maximisation of profit and are unable to sacrifice immediate economic gains from natural resource exploitation or to make long-term investments in sustained productivity. Zaman et al. (2010) highlight the vicious-cycle theory relationship between poverty and the environment by stating that poverty in this theory affects the environment through over-population, indicating that poor people tend to have more children than the non-poor and the effects of over-population leads to environmental degradation. They further indicate that there are low living standards in the poor areas of the developing countries as a result poor people increase their dependence on the natural resources. Jehan and Umana (2002) state that the environment affects poverty in three distinct

dimensions through providing sources of livelihoods to poor people, through affecting their health and by influencing their vulnerability. The following diagram illustrates the vicious-cycle relationship between poverty and environment (Figure 2.2)



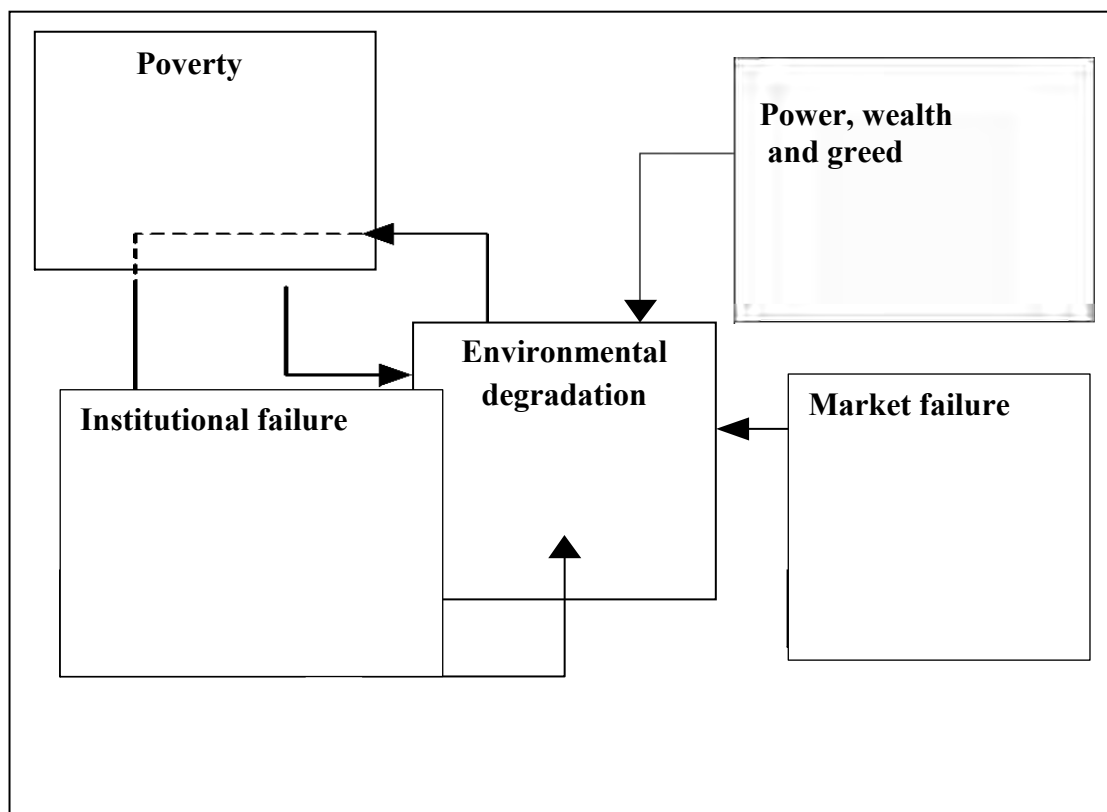
**Figure 2.2: The Poverty-Environment Vicious Cycle**

**Source: Chowdhury and Ahmed (2010:92)**

Figure 2.2 above illustrates the concept of the poverty-environment vicious cycle. On the one hand, environmental degradation reinforces incidences of poverty by reducing the availability of natural resources and making the poor more vulnerable to natural disasters, while on the other hand, poverty forces people to degrade the environment through over-exploitation in the absence of alternatives.

Duraiappah (1998) indicates that there are other factors that should be considered when analysing poverty-environment relationships, that is, demographic, cultural and institutional factors. Ravinborg (2003) highlights that farmer’s natural resources management strategies are shaped by the societal relationship endowments, and also by societal relationships governing access to and control over resource and the norms for which type of natural resource management should be stimulated. Scherr (2002) highlights key factors that are

affecting poverty and environmental linkages when it comes to poor farmers, that is, local endowments (soil characteristics, rainfall, and surface and ground water resources), topography, landscape differences arising from settlement history, past historical degradation, crop mix, and the mix of commercial and subsistence enterprises. Yusuf (2004) expanded the idea of Duraiappah (1998) that there is a causal relationship that exists between poverty and the environment by adding economic development which is accompanied by power, wealth and greed, market and institutional failures, and poverty which are some of the factors that cause environmental degradation. Yusuf (2004) states that economic development that favours the rich, accompanied by power and greed results in environmental degradation. Yusuf (2004) further argues that weak markets that are not regulated to favour the interests of the poor lead to environmental degradation. He further indicates that institutional failures refer to poor institutions that do not support environmental sustainability which lead to environmental problems. The figure below illustrates Yusuf's (2004) assertions (Figure 2.3).



**Figure 2.3: Causal relationship that exists between poverty and the environment**  
**Source: Yusuf (2004:15)**

Scherr (2002) suggests that local endowments, conditions for the adoption of conservation technology and local institutions are the key to generating livelihood security for poor farmers while also improving environmental conditions. Public policies and investments need to be designed to reduce degradation and improve natural resources.

## **2.5 Rural development, land policy and smallholders in South Africa**

According to Matunhu (2008), rural development became a policy for discussion since its recognition by the World Bank, FAO, the International Labour Organisation (ILO) and the UNDP as a medium for addressing rural poverty and social inequality. According to Agholor and Obi (2013), the situation in South Africa is unique as the inequalities in the population was mainly caused by the past laws and injustices that left the majority of the population sinking into chronic poverty and food insecurity. Tshuma (2014) states that the government of South Africa since the birth of democracy has recognised the role of agriculture in alleviating rural poverty and the creation of job opportunities. Kepe (2009) states that in ensuring food security of rural people and to alleviate poverty, some basic livelihood aspects have to be considered including the issue of land in South Africa and other livelihood variables. According to Agholor and Obi (2013), the South African Constitution (Act no.108, 1996) is the main legal policy document which forms the basis for fighting poverty that was adopted by the government since 1994 and land is seen as the foundation of addressing poverty in South Africa.

Rural development in South Africa is meant to address the imbalances brought about by the injustices of the past apartheid policies. The National Planning Commission estimates that about 40% of the South African population lives in rural areas, where poverty, landlessness and food insecurity is prevalent (National Planning Commission, 2012). De Cock et al. (2013) state that many households in South Africa are food insecure. According to the World Bank (2012), this is caused by the huge gap between the rich and the poor in South Africa with a Gini-coefficient of 0.67 in 2009. De Cock et al. (2013) and Jacobs (2009) estimate that about 45% to 65% of the population in South Africa is poor. Twala and Selesho (2013) state that although South Africa has a lot of natural resources, the large majority of people live in poverty. Since the dawn of democracy in 1994, the government of South Africa has placed rural development as a top priority in its government plans and its endeavours to fight rural poverty and achieve food security (Olivier et al., 2010). In 1994 when the African National

Congress (ANC) took over power in government, they declared the following: “no political democracy can survive and flourish if the majority of its people remain in poverty, without land, without their basic needs being met and without tangible prospects for a better life, attacking poverty and land deprivation will therefore be the first priority of the democratic government” (Olivier et al. 2010:5). The ANC’s rural development policy programme started from the premise of addressing the imbalances of the past of landlessness among the black rural population and food insecurity among poor South Africans. Rural development in South Africa is accompanied by land reform which is articulated as land and agrarian reform (Olivier et al., 2010).

Land ownership is crucial in rural development for the revival of smallholder farming in South Africa and in the adoption of sustainable agricultural practices. Nkala et al. (2011) and Arslan et al. (2014) state that the practice of sustainable agriculture in Southern Africa is constrained by lack of infrastructure, insufficient involvement of farmers in the process, existing livestock norms, imperfect inputs and credit markets and land tenure as obstacles that limit widespread adoption in Southern Africa. Nyaga et al. (2015) indicate that in Zambia, households with secure land tenure increase long-term investment in their farms by planting more trees to prevent soil infertility and erosion. In understanding land reform in South Africa, it is imperative to look at the land policy before and after 1994 when South Africa became a democratic country. According to Kepe (2009), the history of land in South Africa can be defined in two major periods, the period during colonialism and apartheid (pre-1994) and the period from 1994 onwards (democratic dispensation period).

Twala and Selesho (2013) trace land dispossession of African people in South Africa from the arrival of the British and the Dutch settlers which began in the Cape of Good Hope in the 1650s and progressed northwards and eastwards over a period of 300 years. The formation of the Union of South Africa in 1910 brought about institutionalisation of African land dispossession, where a series of Acts were passed to this effect, the most well-known being the Native Land Act of 1913 and the Land Act of 1936. According to Twala (2013), the Native Land Act of 1913 was instrumental in triggering the process of land dispossession of African people in South Africa as land dispossession started way back during the arrival of British and Dutch settlers in the Cape. Twala and Selesho (2013) indicate that although 5.7% of the land was further allocated to black people in South Africa, according to the Land Act of 1936, there was still a chronic shortage of land in the reserves where black people resided.

Chivanga and Kang'ethe (2015) argue that the further allocation of 5.7% of land to the Land Act of 1936 was never distributed to people but remained under the government.

Chivanga and Kang'ethe (2015) further argue that the shortage of land that belonged to black people in South Africa was further compounded by the 1937 Native Laws Amendment Act which prevented black people from buying land in urban areas. Meredith (2007) and Twala and Selesho (2013) indicate that land dispossession from black people in South Africa converted them from successful farmers prior to the diamond mineral discovery to poorly paid wage labourers. Ottawa (1996) shares the same view that the 1913 Native Land Act and 1936 Land Act destroyed black labour tenancy and share cropping of black people on white farms. Both the Native Land Act of 1913 and the Land Act of 1936 automatically meant that the remaining 87% of the South African land remained in the hands of the white people and overcrowding in the reserves resulted in environmental degradation. De Wet (2005) states that the cropping fields in the reserves were reduced to a mere 0.2 ha (average per household) of land and black agriculture was reduced to gardening. Labadarios et al. (2011) argue that land dispossession of indigenous population in South Africa was by far greater than any other country in Africa. Twala and Selesho (2013) indicate that when the ANC took over power in 1994 it was faced with a huge task of redressing inequalities in South Africa including the issue of land. By 2013 though, land reform in South Africa did not bear much fruit in relation to most people of South Africa who were the victims of land dispossession, and little attempt was made to have the land returned to them (Twala, 2013).

Agholor and Obi (2013) indicate that the ANC government in South Africa instituted the land reform programme from 1994 with three components: land restitution, land distribution and land tenure reform. This, according to Chivanga and Kang'ethe (2015), was an attempt by the government to undo the unequal distribution of land from the past. Ramutsindela and Mogashoa (2013) and Chivanga and Kang'ethe (2015) state that the land reform programme was underpinned by restitution, redistribution and tenure reform. According to Agholor and Obi (2013) and Antwi and Oladele (2013), land restitution was about the return of land to people who were dispossessed because of the 1913 Land Act. The action of the government was made legal through the Restitution of Land Rights Act, 22 of 1994 (Agholor and Obi, 2013; Antwi and Oladele, 2013). Under land restitution the affected people had to submit claims for restitution (Antwi and Oladele, 2013). Chivanga and Kang'ethe (2015) and Antwi and Oladele (2013) further indicate that the land reform programme in South Africa can be

grouped into phases, from the year 1994-2000, was the Settlement/Land Acquisition Grant Scheme (SLAG), where the government of South Africa allocated a grant which provided R16 000 to poor families to buy land. Antwi and Oladele (2013) further indicate that the requirement for the SLAG was that black landless poor families had to buy land as groups which resulted in its failure because of group dynamics. The authors highlight that between the period 2000 and 2008 the Land Redistribution for Agricultural Development (LRAD) was instituted to empower beneficiaries of land reform to improve their economic and social well-being through productive use of land. Agholor and Obi (2013) highlight that the LRAD was meant to promote commercially oriented agriculture. The LRAD, according to Aliber and Cousins (2013) and Chivanga and Kang'ethe (2015), was non-prescriptive. The Proactive Land Acquisition Strategy (PLAS) was initiated from 2008-2014 where the government targeted 30% land distribution of which 24.6 million ha of the 82 million ha of land that was owned by white commercial farmers, to black landless people (Antwi and Oladele, 2013). According to Chivanga and Kang'ethe (2015), the government became the major player in the PLAS.

The land distribution beneficiaries, according to Hall and Aliber (2010), included a wide range of South African communities such as very poor labour tenants, farm workers, women and new entrants into agriculture. The principle under which the land was to be acquired for distribution was the willing-buyer willing-seller (WBWS) approach (Hall and Aliber, 2010). In 2004 the Agricultural Support Programme (ASP) was introduced to assist all new land owners in retaining and maintaining their land through the provision of information and management skills, technical advice and skills support (Agholor and Obi, 2013).

Chivanga and Kang'ethe (2015) state that land reform in South Africa is based on the WBWS approach which is not an effective model as it is market oriented, as white farmers sometimes charge exorbitantly for the land the government wants to buy from them. The National Union of Metal Workers (NUMSA) in South Africa (2013) and Chivanga and Kang'ethe (2015) indicate that the WBWS approach may not solve 361 years of injustice in South Africa. Wegerif (2004) and Chivanga and Kang'ethe (2015) indicate that in 1994 the RDP was intended to redistribute 30% of the land to the landless poor people but, by the year 2010 South Africa was still not able to distribute the target of 30% of land to poor people in the country. Antwi and Oladele (2013) warn that agrarian reform can result in lower productivity, if the land includes collectivisation, but it can increase productivity if the land is redistributed



to the tiller. Indicating the failure of land reform in Zimbabwe, Antwi and Oladele (2013) mention that land distribution in Zimbabwe almost threatened national food security as the land was transferred to black people who had little farming experience and inadequate equipment. The authors argue that land reform should be conducted with caution without risking national food security. As indicated above, there is a strong link between land ownership and sustainable agricultural practices.

Olivier et al. (2010) indicate that rural development in South Africa can be categorised into three different phases since South Africa became a democratic country in 1994. The first phase is the period from 1994-2000 (the period of Reconstruction and Development Programme (RDP) followed by the period from 2000-2009, when the Integrated Sustainable Rural Development Strategy (ISRDS) came into effect and the Comprehensive Rural Development Programme (CRDP) which came into effect from 2009-2014. Ruhiiga (2013) indicates that rural development in South Africa was meant to close the inequality gap within the South African society created by the past racial policies that resulted in the neglect of rural areas where the majority of the poorest of the poor reside as well as fight poverty through optimal management of natural resources and job creation. Ruhiiga (2013) further indicates that the South African government in 2009 realised that the past rural development policy was not aggressive enough to bring about rural development in South Africa, and therefore in 2009 an aggressive rural development policy was initiated which was called the CRDP.

The CRDP, according to Olivier et al. (2010) and Ruhiiga (2013), focused on service provision and basic infrastructure in developing rural areas of South Africa. The CRDP had three aggressive components in addressing rural development, that is, land reform, rural development and agrarian transformation as indicated by Ruhiiga (2013). The author indicated that in ensuring agrarian transformation the CRDP intended a fundamental change in relation to land, livestock, cropping and communities. The CRDP wanted to establish rural business initiatives, agro-industries, co-operatives, cultural activities, vibrant local markets, women and youth empowerment, and public amenities and facilities in rural towns. Twala and Selesho (2013) indicate that for land reform and agrarian transformation, agriculture had to be revived in ensuring the success of the CRDP. Hall and Aliber (2010) and Twala and Selesho (2013) indicate that smallholders in South Africa have been neglected since the dismantling of the Bantustan Agricultural Development Co-operation in the 1990s which left

a vacuum in production and marketing support for the estimated, at that time, of about 200 000 commercially-oriented smallholders and 2.5 million households practicing agriculture mainly for consumption purposes. According to Twala and Selesho (2013) and Ruhiiga (2013), the South African government in support of the CRDP launched the Comprehensive Agricultural Support Programme (CASP) in 2004 to provide agricultural support to smallholders. Twala and Selesho (2013), highlight that the CASP was the largest form of capital budget allocated to small-scale black farmers in South Africa. According to Ruhiiga (2013), the CASP focused on the following six pillars in supporting small-scale farmers: on and off-farm infrastructure, information and knowledge management, financial assistance, technical and advisory services, training and capacity building, and marketing and business development.

As mentioned above, rural development in South Africa has acknowledged the role of agriculture in development of rural areas as this has been confirmed by South Africa's financial commitment in assisting small-scale farmers. Thamaga-Chitja and Morojele (2014) have traced government intervention and fiscal spending with regard to smallholders from the Marketing Act of 1996 which set out how smallholders operate within agricultural markets. According to the authors, the Marketing Act of 1996 paved the way for the formulation of key policies meant to assist smallholders, such as, the Strategic Plan for Agriculture in 2001, the Agriculture Black Economic Empowerment (Agri-BEE) and the CASP in 2004. They further argue that the CASP has experienced difficulties including delays in procurement, having difficulties in retaining technical staff, and lack of skills among staff. The authors argue that despite the large financial budget of the CASP, its impact on supporting smallholders is not clear due to the lack of data. As mentioned above, the land ownership (access to natural resources) and farmer support are crucial to the adoption of sustainable agricultural practices.

## **2.6 Who are the smallholder farmers in South Africa?**

Arko-Achemfuor (2014) indicates that South Africa is faced with many socio-economic challenges which include high levels of poverty, growing economic inequalities, low levels of education, lack of education, high rate of unemployment and HIV/AIDS pandemic among other things. Due to these challenges, communities in rural areas depend on agriculture for their livelihoods, as many adults from rural areas in South Africa engaged are in animal

husbandry, crop production and small-scale agro-processing. These farmers, according to the author, use traditional methods in farming practices which are less productive and expensive. Sustainable farming practice has been suggested as a way of addressing the issues of low productivity, poor farming practices, high production costs and ensuring environmental sustainability. It is against this background that this research looks at the smallholder farmers in South Africa.

Different names are given to farmers that farm at the small-scale level throughout the world. Lawder et al. (2014) indicate that farming that is done on a small-scale in countries of Latin America, Caribbean as well as in high income countries such as the United States of America (USA), are called family farms. The authors further state that in Brazil small-scale farms are called family farms if the owner manages it with his or her family, on these types of farms labour comes from family rather than hired labour. While in the USA family farms include all sizes ranging from farms of low level revenues to multi-million dollar enterprises, but the difference lies with the ownership of the farm, where the operator owns the majority of shares with his or her relatives which is called a family farm (FAO 2013b; Lawder et al. 2014). According to the FAO (2013a:7), “family farming includes all family-based agricultural activities (agricultural, forestry, fisheries, pastoral, and aquaculture production) which is managed and operated by a family and predominantly reliant on family labour, including both women and men”.

In South Africa the definition of smallholder farming is different from other countries. Mudhara (2010) indicates that the definition of smallholder farming in South Africa is drawn from their historical background of its formations. South Africa agriculture is dominated by two types of farming, that is, large-scale or commercial farming and small-scale farming. Large-scale farms are regarded as modern and small-scale farms are regarded as backward and owners lack resources to pursue commercial farming (Mudhara, 2010). Cousins and Scoones (2010) indicate that the categorisation of smallholder farms in South Africa is no surprise considering the history of their formations. Cousins and Scoones (2010) base their argument on the dispossession of land from the African people in South Africa in the past by both colonial governments and the apartheid government. Moyo (2007) indicates that the dispossession of land from black people in South Africa by the colonial settlers led to the confinement of black people in the overcrowded rural reserves with limited land which resulted in poor farming practices due to the lack of government farming support. The author

states that this situation caused the highly dualistic nature of agriculture in South Africa where the large-scale white capitalist farming sector dominated production and international markets and, on the other side, the struggling smallholder farming sector in the reserves. Aliber and Cousins (2013) indicate that smallholders in South Africa are very diverse as most smallholders produce for subsistence purposes.

Tshuma (2014), drawing his argument from Kirsten and Van Zyl (1998), indicates that in South Africa small-scale farmers are equated to not regarded as modern, non-productive, non-commercial and the subsistence agricultural sector that is found in the former homeland areas and generally associated with black people who do not have the ability to become large-scale commercial farmers. Tshuma (2014) further states that smallholder farming is made up of those farmers whose main goal is to produce food for their families on a daily basis and under such circumstances the surplus is considered for sale to supplement their income. Adekunle (2014) and Dent (2008) indicate that small-scale farmers are those farmers that receive only a portion of their gross income from farming, who usually have production rights not land rights and make use of family members as labour in the fields. Adekunle (2014) indicates that turnover or net farm income is the correct way of categorising the farm not the land size, which is used in South Africa in classifying types of farms. The author distinguishes the smallholder from subsistence farming by identifying the production of crops or livestock for the market as well as consumption as the key criterion, and smallholder farmers produce for both consumption and the selling of the surplus in the market while subsistence is solely for family consumption and to supplement food sources where there is a shortage of income to buy food in the market. Aliber and Cousins (2013) state that there is about 4 million people in South Africa situated in the former homelands and only a small number of about 200 000 mainly farm to generate income.

Tshuma (2014) highlights that in South Africa smallholders are also defined in terms of their socio-economic characteristics such as demographic characteristics, land holdings, and skills and training. The author describes smallholders as usually aged and could be both male and females and those involved in smallholder farming lack formal education as those who have formal education prefer to seek employment elsewhere in other sectors rather than in smallholder farming. In reference to land holdings and the categorisation of smallholder farming in South Africa, Tshuma (2014), Van Rooyen and Vink (2009) highlight that in South Africa there has been a decrease in land holdings in both small-scale farming and large-scale

farming. Lowder et al. (2014) indicate that there is a decrease in farm size in most low-middle income countries of the world particularly in Africa and in Asia. Thus, a decrease in smallholder farming land holdings in South Africa is not an exception only to South Africa. Tshuma (2014) indicates that smallholder farming has been defined in terms of skills and training that smallholder farmers receive. The author further indicates that smallholder farmers have limited access to various training due to several factors such as their remote location, lack of education and limited training opportunities.

Freguin-Gresh et al. (2012) indicate that smallholders in South Africa battle to access resources as a result of their marginalisation of the past through discriminatory policies. According to the authors smallholder farmers engaged in family-based agriculture compared to about 40 000 large-scale farmers who own 82% of the privately owned agricultural land which is characterised by highly intensive farming activities and produce 95% of the country's marketed agricultural outputs. Adekunle (2014) refers to South African smallholders as those farmers in South Africa that are poor people who lack capital assets and need to farm to sustain their livelihoods.

Cousins (2010) states that the South African government realised the need for investing in small-scale farming as it has the potential of alleviating poverty and job creation and therefore institutional support is highly needed to support these small-scale farmers in the form of accessing services and markets, land distribution and rental markets for the available arable land in the communal areas and expanded access to value chains. Tshuma (2014) further highlights the role of smallholder farmers in the economy as follows:

- Poverty alleviation (smallholder farmers help poverty alleviation by raising agricultural produce). Tshuma (2014) indicates that the literature suggests that intensive application of labour inputs by smallholder farms as compared to larger farms increase production.
- Contribution towards rural income (smallholder farmers produce their own food, sell their surplus food in the market and stand to have more income).
- Employment creation (smallholder farming creates employment since it is labour intensive unlike large-scale farming that uses heavy machinery instead of labour).
- Backward and forward linkages (smallholder farming allows growth in other businesses through the income it creates).

- Distribution of farming capital (decentralisation of land ownership produces more equitable economic opportunities for people in rural areas).

Ruhiiga (2013) indicates that in 2009 rural development became a top priority of the government as poverty and unemployment continued to be on the rise. Thamaga-Chitja and Morojele (2014) indicate that the government of South Africa has realised that poverty in rural areas can also be reduced by reviving smallholder farming. Statistics South Africa (Stats SA, 2012) indicates that the rural poor in South Africa have used different livelihood strategies including salaries and wages, followed by social grants, income from businesses and pension remittances to meet their needs. Thamaga-Chitja and Morojele (2014) indicate that although poor people in rural areas have other sources of income, small-scale farming continues to supplement their income. The government of South Africa revamped its rural policy and a more aggressive rural development policy was launched called the CRDP. The launch of the new rural development policy was accompanied by a fiscal budget meant to assist smallholder farmers.

Thamaga-Chitja and Morojele (2014) summed up government intervention in assisting smallholder farmers in the series of policies that government launched which includes the Marketing Act of 1996; which was passed to assist smallholder farmers to enter the market. The Strategic Plan for South African Agriculture (SPSAA) was launched in 2001. Aliber and Hall (2012) indicate that the SPSAA was meant to bridge the gap of agricultural dualism in South Africa aimed at assisting smallholder farmers to graduate from being smallholders to commercial farmers. The Agri-BEE in agriculture policy was passed to enable black people's meaningful participation in the agricultural sector. The CASP was launched in 2004 to distribute funds to farming households in rural areas, meant to give beneficiaries support and services to facilitate agriculture development. According to the National Department of Agriculture (NDA 2007a), 70% of the CASP funds were to go directly to assist land reform beneficiaries and 30% of the funds were to go to other agrarian beneficiaries who already have access to land. The Strategic Plan for Smallholder Support was launched in 2011-2014/2015 which was meant to promote alignment and co-ordination of support services, including financial services, technical support and access to off-farm infrastructure by smallholder farmers (NDA, 2007a). According to the Strategic Plan for Smallholder Support, 30% of smallholder farmers had to form or organise themselves in the form of producer associations or marketing co-operations to enable bargaining power in negotiations for inputs

and marketing (NDA, 2007a). As indicated above, smallholder farmers in South Africa cannot be ignored as they are important for food production and ensuring environmental sustainability.

## **2.7 Food security in South Africa and its implications for agriculture and smallholder farmers**

Lack of food security is a worldwide problem, with most scholars agreeing that food insecurity is a phenomenon that faces humanity in the 21<sup>st</sup> century (du Toit et al., 2011). According to the authors, the issue of food insecurity has been a topic for discussion at national and international level and the right to food is enshrined in international and national laws. Food security is the broad term that is defined in different ways by the number of organisations around the world. According to the World Food Summit held in Rome in 1996, “food security exist when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active lifestyle” (du Toit 2011:3). The concept of food security covers not only the amount of food required to guarantee the absence of hunger, but also the right choice of nutritional intake to avoid malnutrition and health issues (Barrett, 2002). Dethier et al. (2012) highlight that food insecurity can arise due to shocks at a national level, putting the entire population in danger and this is so because even when food is available in sufficient quantities, poor and vulnerable groups might be unable to consume food sufficiently and adequately because they lack access to it

According to the FAO, IFAD and WFP (2012), food security is still a major concern in the world where one billion people suffer from starvation or malnutrition. The FAO, IFAD and WFP (2012) conclude that countries of the world are far from reaching the MDG 1 of halving poverty by 2015. In SSA, a number of people, about 329 million, are estimated to be living in extreme poverty (Sasson, 2012). Statistics have indicated that although South Africa is food secure at the national level, this does not translate to what is happening at the individual and household level, where people are exposed to food insecurity (Altman et al., 2009; Faber et al. 2011; Van Zyl and Kirsten, 1992). According to the South African National Health and Nutrition Examination Survey (SANHANES-1 cited in D’Haese et al. 2013: 470), about 45.6% of the population in South Africa were food insecure, 28.3% at risk of hunger and 26% were experiencing hunger. De Cock et al. (2013) highlight the fact that food insecurity

is multidimensional in nature and this makes the accurate measuring and policy targeting of food insecurity very difficult.

Altman et al. (2009) indicate that food security cannot be understood in isolation from other developmental questions such as social protection; sources of income; rural and urban development; changing household structures; health; and access to land, water and inputs, retail markets or education and institutional knowledge. Altman et al. (2009), Hart (2009) and Jacobs (2009) indicate that in South Africa different methods are used to measure food security such as the National Food Consumption Survey, the Food Insecurity and Vulnerability Information and Mapping System, the General Household Survey (GHS), the Income and Expenditure Survey, the Community Survey, the South African Social Attitudes Survey and the Labour Force Survey, and each of these measures or indicators obtains different results. They further indicate that there are usually variations in results caused by the fact that each survey probes different dimensions of food security using different indicators. De Cock (2013) agrees to this by highlighting that South Africa lacks specific and acceptable methods of measuring food security. This makes it difficult for South Africa to understand the severity of food insecurity.

Kepe and Tessaro (2014) indicate that in South Africa most people that are affected by poverty and food insecurity are people living in rural areas that constitute about 40% of South Africa's 50 million inhabitants. Kepe and Tessaro (2014) further indicate that the reason for food insecurity in South Africa is caused by the enormous gap between the rich and the poor. The FAO (2008) indicates that food security is determined by four key dimensions: availability, stability, accessibility and utilisation and they further indicate that if one or four of the components of food security are uncertain, this leads to vulnerability among poor people. Drimie and McLachlan (2013) summarises the causes of food security in South Africa as the result of multiple stressors that are complex and interrelated including environmental, health, economic, socio-political and agro-food issues which comprise of increasing unemployment, food volatility, HIV/AIDS, drought conditions, major trading partners, a reduction in government spending in agriculture and persistent high levels of urban and rural poverty. Faber et al. (2011), D'Haese et al. (2013), Mkandawire and Aguda (2009) and Van Averbeke and Khosa (2007) state that poor households in South Africa become more at risk with the lack of access to resources (money, land, transport and intellectual capacity).



D’Haese et al. (2013) and Rose and Chalton (2000) indicate that the increase in household size leads to an increase in the demand for food. D’Haese et al. (2013) and Rose and Chalton (2000) further argue that households with decreasing income (less buying power) to purchase food and female-headed households are also at risk of food insecurity. Gulati et al. (2013) indicate that although South Africa is almost food secure at the national level and has the ability to import food basket items such as rice, sugar and poultry, some poor households have no access to food. The authors highlight the fact that poor people in South Africa spend large amounts of their monthly income on food as indicated by the graphs below. According to Gulati et al. (2013) and Jooste (2012), the cost of a basic food basket expressed as a share of the average monthly income of the poorest 30% of the population in Figure 2.4 versus the wealthiest 30% of the population in Figure 2.5 illustrate that poorer South Africans spend roughly 34% of their income on food than wealthier South Africans.

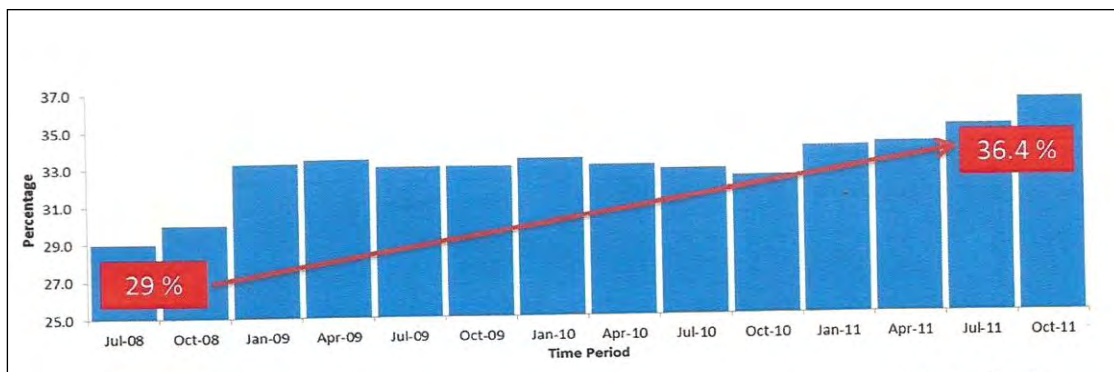


Figure 2.4: Cost of a basic food basket as a share of average monthly income for the poorest 30% of the population in South Africa (Jooste, 2012:4)

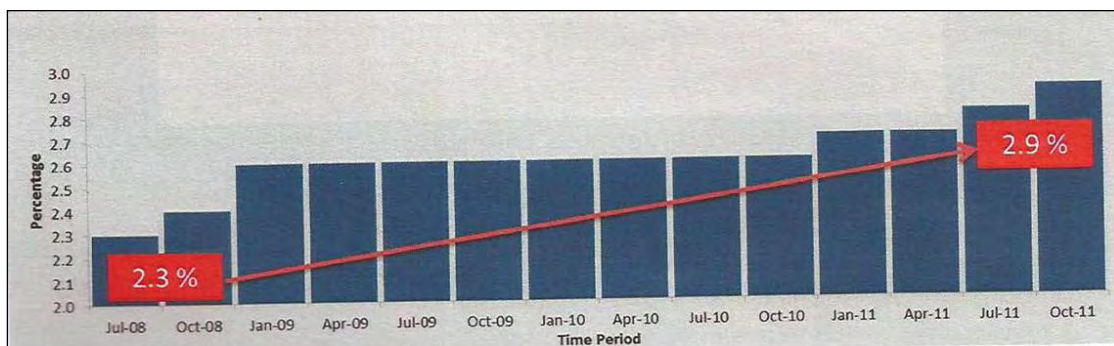


Figure 2.5: Cost of a basic food basket as a share of average monthly income for the wealthiest 30% of the population in South Africa (Jooste, 2012:4)

Due to the high rate of unemployment in South Africa many rural households rely on grants (old age pensions, disability grants, foster care grants and child support grants) (Altman et al. 2009; Labadarios et al. 2011). According to Stats SA (2012), some South African rural people are forced to supplement their incomes by own production in the form of subsistence farming. Stats SA (2012) further highlights that the South African rural population have mixed livelihood strategies that include salaries, wages, social grants, income from businesses and pension remittances. Hendriks (2014) traces the reason for food insecurity in South Africa from what shaped the past, arguing that the arrival of Dutch settlers in the Cape in 1652 and the establishment of a refreshment station in the Cape were all driven by a desire for obtaining food security. Hendriks (2014) further mentions that the dispossession of South African indigenous communities of land from 1910 onwards planted the seed for food insecurity among many black South Africans who are food insecure today. Stats SA (2012) and Thamaga-Chitja and Morojele (2014) highlight that large numbers of households in rural South Africa are engaged in subsistence agricultural activities to curb food insecurity and, according to Stats SA (2012), this can never be ignored.

Kepe and Tessaro (2014) mention that two World Bank reports, one in 1982 and the other in 2008, indicate that agriculture (especially small-scale farming) is a panacea for food security. Smallholder farmers have the potential to ensure food security among most of the families in Africa who suffer shortages of access to food. Aliber and Hart (2009) estimate that about 4 million or 2.5 million households are engaged in agriculture in South Africa and about 300 000 to 400 000 of these are full-time subsistence farmers. Aliber and Hart (2009) make mention that although black smallholder farming in South Africa contributes very little to the South African GDP; it plays a very important role in food security for rural communities. In highlighting the importance of smallholder farming, Baiphethi and Jacobs (2009) note the study done in Malawi of the contribution of smallholder farming in food production and food security after the government of Malawi initiated the Agricultural Input Support Programme (AISP) to assist smallholder farmers. The study found that due to the input support there was an increase in yields of staple food for smallholder farmers and this enabled the households to purchase food at cheaper prices.

The importance of smallholder farmers in food production and food security among the rural and the urban poor in South Africa resulted in government taking food security very seriously. The South African government increased its spending on most projects such as

school nutrition, social grants, free health services, public works, agricultural programmes, community food gardens and land reform. In 2002 the Integrated Food Security for South Africa (IFSA) was initiated. According to NDA (2002), the main aim of the IFSA was to attain universal physical, social and economic access to sufficient, safe and nutritious food by all in South Africa at all times to meet their dietary and food preferences for an active and healthy lifestyle. Jacobs (2009) indicates that to complement IFSA the Integrated Food Security and Nutrition Programme was launched which was a task team within the DAFF to oversee the implementation of the IFSA.

According to Hendriks (2014), the South African government programmes on food security were examined in terms of their direct as well as indirect contribution to household food security and the increase in production of small-scale farmers was hoped to improve the availability and nutritional content of food and food security in general. Hendriks (2014) highlights that in South Africa there is no national food security policy except that in 2013 the first National Food and Nutrition Security Policy and the Household Food and Nutrition Security Strategy were approved by cabinet.

## **2.8 Challenges faced by smallholder farmers generally and in South Africa**

The literature on agriculture in South Africa suggests that smallholder farming have received little attention or not enough attention since the birth of democracy in 1994 (Hall and Aliber, 2010; 2012). Although there has been numerous policy intervention and programmes, there is little progress, if any, in smallholder agriculture in South Africa (Hall and Aliber, 2010; 2012; Sikwela and Mushunje 2013). According to Hall (2007), Hall and Aliber (2010) and Sikwela and Mushunje (2013), the problem with smallholder farming in South Africa is that they lack necessary support they need to be productive. They further argue that the dismantling of the Bantustan Agricultural Development in the 1990s left a vacuum in relation to smallholders in South Africa. Hall and Aliber (2010) indicate that although there has been growth in the budget to support smallholders in the form of grants for infrastructure, production inputs and other items and through extension service; yet evidence shows that most black farming households receive little attention if any support at all, largely because available support is highly skewed towards certain farmers over others. They further indicate that as smallholders in South Africa are mostly located in former homeland areas and they therefore farm in poor quality communal land which results in poor production.

Adekunle (2014) indicates that smallholders in South Africa lack livelihood assets such as physical assets (irrigation, water supply, housing infrastructure, roads and transport), capital assets (machinery, production inputs such as power, fertilisers, feeds and seeds), social assets (labour where they only rely on family labour), and financial assets (access to markets and credit facility). Sikwela and Mushunje (2014) paint the picture that although different policies and programmes have been passed in South Africa and there has been an increase in fiscal budget in assisting smallholders, the reality is that they are faced with serious production challenges that result in them facing insolvency. According to Sikwela and Mushunje (2014) and Umhlaba Rural Services (2006), a comprehensive review conducted under the Belgian Technical Cooperation concluded that support services rendered to smallholders either by the state or private sector have not been successful, and they mention that state support was underfunded, poorly designed and fragmented. According to Sikwela and Mushunje (2014), the majority of smallholder programmes failed to get off the ground due to the lack of knowledge, skills, conflict within groups and due to the loss of interest of people involved in the projects.

Adekunle's (2014) research conducted in the Nkonkonbe village in the Eastern Cape, South Africa on the constraints faced by smallholders concluded that smallholders in the Nkonkonbe area are faced with similar challenges that are faced by the smallholders in South Africa, including difficulty in the attainment of seeds (respondents cited the lack of knowledge on their side in attaining proper seeds suitable for the area where they farm), access to information (about 80% of the respondents indicated that they do not have knowledge of where they can sell their produce), financial support (respondents indicated the lack of knowledge about loans available to them) and extension services. The study revealed that extension services are very poor. Bienabe and Vermeulen (2011) indicate that the common feature that is hindering progress of the smallholders in South Africa is the lack of participation in the markets which is compounded by poor infrastructure and communication due to the geographical dispersion of farmers, inadequate support services and weak institutions. Bienabe and Vermeulen (2011) and the NDA (2011) highlight that about 1.3 million smallholders in South Africa use only 14% of the farmland, are mostly subsistence-orientated with low production levels, use traditional land tenure, lack physical infrastructure, have poor credit facilities, and have poor access to input resources.

Aliber and Hall (2012) indicate that the reason why the government seems not to be making any progress with smallholder farming in South Africa, although the budget has gone up in the past decades, is that the government is making poor choices in relation to resource use at its disposal, including the shortage of extension officers and choosing the right methodology and tools to assist smallholders. They further indicate that the excess in staff numbers in the agriculture department in South Africa has a negative impact in the service delivery to smallholders as the large amount of budget goes to salaries in the provincial departments. The authors state that further indicate that most smallholders in South Africa are invisible, not known by the agriculture department, and this makes it very difficult to facilitate assistance and support as there is a tendency of concentrating resources on few projects and this leads to most of the smallholders being neglected.

Kepe (2009) argues that in academic circles there is an acknowledgment that the success and failure of agriculture, small or large, depends on what and how much is done to adjust land and agrarian relations to deal with new challenges. The author further highlights the World Bank Report of 2008 as it declared that land reform can promote smallholder entry into the market. Although South Africa has made progress with regard to land redistribution but there has been concern that there is slow progress in this regard and most poor people who practice subsistence agriculture in South Africa are still landless (Kepe, 2009). The author states that land redistribution and restitution in South Africa have been hampered by the policy of WBWS approach of the South African government which is a pro-market approach, and this approach, has resulted in poor quality land being sold to the state at very high prices. Hall (2007) and Kepe (2009) indicate that the land acquisition grants were too small for the beneficiaries, as a result they were forced to pool their grants together to buy farms being offered on the market and this resulted in overcrowding and unsustainable land use. Land distribution in South Africa focused on establishing the class of commercial farmers and the focus on elite black farmers limits the impact of land reform for the greater majority of landless people in South Africa (Hall, 2007).

The challenges faced by smallholders extend to the lack of support that they need, including information. Information is accessed through various agricultural support and information services in South Africa and elsewhere. Purcell and Anderson (1997) and Taye (2013) highlight the importance of extension services to farmers as the key element in enabling farmers to access information and technology to improve their production. Akpalu (2013)

indicates that for rural communities in South Africa to achieve their livelihoods they require access to productive services; information on input supply; new technologies; early warnings on droughts, pests and diseases; and access to credit facilities and markets. The author identifies several functions for agricultural extension services including technical advice about specific technologies, preparing material on those technologies, provision of secondary data on issues such as soils, climate, prices, encouraging farmer to obtain extension advice and participatory experience and sharing of results in a wider sense, and using knowledge of farmer's situation and questions to influence extension policy. Kassie and Zikhali (2009) highlight that extension services are about skilling farmers with knowledge and suggest that information on sustainable farming should be cascaded to farmers for the desirable results in sustainable farming.

## **2.9 Agriculture and the environment**

Laurence et al. (2014) paint the picture that agricultural production has affected and has been affected by the environment since humans began crop cultivation. They state that the growth in population has resulted in the increase in per-capita consumption of food and biofuels and indicate that the increase in the consumption of food and biofuels have been harmful and beneficial to the environment, particularly the impact of agriculture on the environment in meeting food demands. According to the FAO (2002), agriculture has a vast impact on the environment as it accounts for a large share of land use by human beings and in 1999 pasture and crops alone took about 37% of earth's land area and over two-thirds of water by humans is for use in agriculture. Laurence et al. (2014) state that the major global agricultural footprints are already massive; cropland is about an area the size of South America and grazing lands which is an additional area is about an area the size of Africa. They further argue that since the population is expected to reach 11 billion in the 21<sup>st</sup> century, there is going to be a major expansion of agriculture in the tropics, especially in SSA and South America and the expansion of agriculture poses the greatest challenge to the environment and the sustainability of agriculture itself in the context of climate change.

Scherr (2002) argues that environmental concerns associated with agriculture relate mainly to the sustainability of the natural resource base for agricultural production such as soil quality, protection of biodiversity and habitats, and environmental services influenced by agricultural land use, such as carbon sequestration. According to the FAO (2002) and the International

Assessment of Agricultural Science and Technology (IAASTD, 2009), about 1.9 ha and 2.6 billion people in 2009 were already affected by significant levels of soil degradation due to agriculture and about 70% of fresh water globally is drawn for irrigation in agriculture. Agriculture contributes to about 60% of anthropogenic emissions of GHG such as methane and nitrous oxide because of inappropriate fertilisation which has resulted in eutrophication (FAO, 2002; IAASTD, 2009). GHG have altered the climate on earth that sustains the very same agriculture. According to the FAO (2002), the most profound negative impact of agriculture on the environment is caused by livestock and crop production because of fertilisation, manure and pesticides which results in both surface and ground water being polluted by nitrates, phosphates and pesticides. Moreover, pesticides reduce biodiversity by destroying weeds and insects and consequently affect the food species of birds and other animals (FAO, 2002). The author indicates that the application of fertiliser can sometimes be heavily applied with minimum absorption by crops which results in pollution or being washed away and excessive nitrogen and phosphate can leak into the underground water or run-off into waterways and this causes water pollution. The author states that ammonia is the major cause of acid rain which damages trees; acidifies soils, lakes and rivers; and harms biodiversity, and if more sustainable agricultural production methods are used, negative impacts of agriculture on the environment can be reduced and some cases agriculture can play an important role in reversing environmental damage by restoring carbon in soils, enhancing the infiltration of water and preserving rural landscapes and biodiversity.

Considering that population is expected to rise into 11 billion in the 21<sup>st</sup> century as Laurence et al. (2014) indicate the demand for food will increase drastically. It cannot be a business as usual approach in sustaining the planet. Sustainable agriculture has to be promoted and practiced. Expansion of agricultural land is not a solution to the problem but rather finding more productive ways of farming that will not expand agricultural land but make use of the land already cultivated, needs to be promoted.

## **2.10 Sustainable agriculture as an alternative to conventional agriculture**

Peterson and Snappy (2015) state that agricultural intensification that have been practiced over the years involving the agricultural inputs to produce more food on a given area of land has dramatically increased food production but at an environmental cost. They argue that sustainable production of food is an alternative in the face of environmental damage by conventional agriculture. DFID (2004) indicates that a call for sustainable agriculture is the result of the success of conventional (industrial) agriculture in the mass production of food since the middle of the 20<sup>th</sup> century, where industrial agriculture globally has performed remarkably well over the past half a century in responding to the accelerating demand for food by the global world population and at low prices , but as the author argues, it ended up depleting the same environment upon which agriculture depends. The author traces the performance of agriculture back from mass agricultural production of the green revolution where agricultural production relied heavily on external inputs such as fertilisers, pesticides, fossil fuel and inorganic seeds, which resulted in mass agricultural production but came with the heavy price on environmental depletion and degradation. The author indicates agriculture as the most important user of environmental resources such as water, forests, pastures and nutrients and its sustainability depends upon their availability and further indicates that if environmental resources such as the ones mentioned above are not available or depleted, agriculture cannot flourish and this threatens food security and biodiversity. The author identifies five key environmental challenges that potentially threaten the future of agriculture as land degradation, limits to water availability, loss of biodiversity, declining agricultural genetic diversity and climate change. Sustainable farming practices are important in ensuring that environmental resources such as mentioned above are not depleted.

Parmentier (2014) traces the problem of the current agricultural system from industrial agriculture where the major concern was profit, where the current agricultural model has reduced food and other agricultural goods to mere consumer goods. The author further argues that the logic that drives industrial agriculture is mass production on a large-scale with the view of getting huge profits and realising economies of scale which lead to the concentration of production in the hands of the few large farms and production gets limited to one type of crop (monoculture). The author indicates that industrial agriculture is further accompanied by massive use of external inputs, which replace local natural resources such as protecting crops, fertilising soils or feeding animals, by using external inputs such as chemical fertilisers



(Parmentier, 2014). Sachs and Santarius (2007) argue that industrial agriculture has made use of pesticides that has replaced indigenous natural control methods of insects, pests, weeds and crop diseases. Inorganic fertilisers have replaced manure, compost, and leguminous plants and fossil fuels have been used instead of locally generated energy sources. Industrial seeds such as hybrid/ transgenic seeds have replaced traditional peasant seeds (Parmentier, 2014). Altieri et al. (2013) and Parmentier (2014) argue that the green revolution has brought about a doubling of cereal production in many parts of the world and resulted to some extent in food security and a drop in malnutrition. But some critics of industrial agriculture accused it of worsening poverty, hunger and malnutrition levels by increasing inequality among farmers, as poor farmers could not access green revolution technology (McMay, 2012; Parmentier, 2014; Utviklingsfondet, 2011).

Parmentier (2014:18) summarised the damage posed by agriculture as follows:

- Loss of vegetal and animal genetic diversity, due to deforestation, and the elimination of beneficial organisms resulting from the use of synthetic pesticides.
- Soil degradation, resulting from overexploitation and the use of synthetic inputs.
- Water pollution, depletion of water resources, and water contamination by the use of nitrate contained in inorganic fertilisers and excessive groundwater withdrawals due to inadequate irrigation techniques such as deep tube-well irrigation.
- Increased vulnerability to pest and disease outbreaks and related economic losses.
- Adverse impacts on farmers and/or consumers health, due to pesticides' intrinsic toxicity, combined with unsafe conditions of use (lack of adequate equipment of protection and/or unsafe storage conditions), and/or excessive concentration of their residues in food products.
- Increased indebtedness induced by various factors including farmers' growing expenses related to the use of pesticides.
- Significant contribution to climate change and increased vulnerability to its impacts.
- Industrial agriculture has particularly badly affected women. As the main food producers and caregivers in most communities in developing countries, they are most affected where there is erosion of biodiversity.

According to DFID (2004), environmental concerns of food production was first advocated by Thomas Malthus in 1798 when he indicated that population growth if not controlled would eventually overtake the capacity of agriculture to produce food, and that less production of food through agriculture would lead to starvation and war. The author state that in the 1970s the Club of Rome indicated that the society would face economic crises when environmental resources are overused. In 1987, the UN set up at the World Commission on the Environment and Development (WCED), which was chaired by Brundtland where links were made between poverty alleviation and natural resource management and the Commission culminated in the United Nations Conference on the Environment and Development (UNCED) in Rio, Brazil in 1992 which advocated sustainable agriculture to curb environmental depletion incurred through agriculture (DFID, 2004).

Von der Weid (2012) argues that industrial agriculture has created massive environmental problems since it relies on renewable and non-renewable resources and has depleted natural resources. Tilman et al. (2002) indicate that society receives many benefits, called ecosystem services, from natural and managed ecosystems which include food, fiber, fuel and materials for shelter. They state that natural forests can minimise flooding by slowing snowmelt and water discharge, moderate regional climate, and remove and store atmospheric carbon dioxide and GHG. The authors further state that forest and grassland ecosystems can create or regenerate fertile soils, degrade plant litter and animal waste, purify water, and recharge streams and aquifers and intact ecosystems provide potable water for little more expense than the cost of its extraction.

According to Von der Weid (2012), agriculture is the highest user of environmental resources and he explains this as follows: farming occupies 30% of global land area and has a bigger impact on natural ecosystems; 8.7 billion ha of land is used for crop production, pasture and forests; 2 billion ha of land has been degraded; farming consumes 70% of all water used by humans and intensive irrigation system are exhausting aquifers on which they rely; and 75% of the world's agricultural biodiversity has become extinct over the last century. Rivera-Ferre (2008) added that industrial agriculture has created enormous environmental problems including environmental degradation, 14% of GHG is released from agriculture, deforestation, land erosion and degradation, salinisation of soil irrigation, water pollution and eutrophication, and pollution of land and water ecosystems with nitrogen and phosphorus

fertilisers. The effect of unsustainable agricultural practices is not being felt by the environment alone. Weisenburger (1993) and Rivera-Ferre (2008) highlight that the impact of agriculture is not only on the environment but extends to humans. Weisenburger (1993) and Rivera-Ferre (2008) further indicate that the use of antibiotics in livestock to increase its growth contributes to antibiotic resistance in humans and pesticides cause health problems such as acute and chronic neurotoxicity, lung damage, chemical burns, various cancers and even death.

Currently the world is faced with enormous challenges including climate change, food shortages and unprecedented population growth. Sorensen and Dankas (2010) indicate that the impact of climate change on the environment is enormous. The global population is expected to rise to about 9 billion by 2050 and food demand is increasing, they indicate that since the population is expected to increase, income is expected to increase as well and that will put pressure on agricultural production as the demand for meat and grain will also increase. IAASTD (2009) investigated how agriculture can mostly and effectively reduce hunger and poverty, improve rural livelihoods and protect human health; while meeting the daunting natural resource challenge facing humanity today, and concludes that the science behind sustainable agriculture provides the most robust set of solutions to the environmental pressures and crises currently facing agriculture. Stocks (2012) states that sustainable agriculture will reduce food poverty and help the world to adapt to and mitigate against climate change.

Scherr and McNeely (2008) indicate the most important reasons as to why agriculture should be sustainable: first, the planet is finite, so future generations should enjoy ecosystem services the same way as the current generation. They further highlight that as the adverse effects of climate change escalates, most of the increased food production will be grown domestically and increasingly in more marginal or fragile lands. They estimate that about 90% of the food products will be consumed locally, and the trend will be exacerbated by the reduction in developed world subsidies. Runge et al. (2003) indicate that the adverse effect of climate change can be cushioned by diversified systems of farming which include soil management, planting a variety of crops and pest management. FAO (2011) and Middelberg (2013) indicate that a sustainable agricultural sector is often considered as being part of the solution to mitigate the adverse effects of conventional agriculture in the environment and

climate change through agricultural practices that build soil fertility, promote wise use of crop and livestock chemicals, and improve carbon sequestration.

Middelberg (2013:166) defines sustainable agriculture as “an agricultural system combining sustainable agricultural practices, while simultaneously discontinuing or reducing the use of agricultural practices harmful to the environment” and further indicates that sustainable agriculture encompasses three main goals: economic efficiency, environmental quality and social responsibility. According to Jacobsen (2012), sustainable agriculture is an integrated system of plant and animal production practices having a site specific application that will over the long-term satisfy human food and fibre needs. DFID (2004) highlights that an agricultural sustainability system includes resilience (the capacity of the systems to buffer shocks and stresses) and persistence (the capacity of systems to carry on), implying the capacity of a system to adapt and change as external and internal conditions change. Bromilow (2013) refers to sustainable agriculture as the maintenance of cropping systems that neither depletes soil fertility, even over the long-term, nor leads to the development of overwhelming pest, disease or weed problems.

Earles (2005) refers to sustainable agriculture as the type of agriculture that produces abundant food without depleting the earth’s resources or polluting its environment, and have social values, one whose success is indistinguishable from vibrant rural communities, rich lives for families on the farms, and wholesome food for everyone. Jacobsen (2012) states that the basic principles of sustainable agriculture are that farming should be environmentally responsible, economically viable and socially desirable. The author further explains that for the farm to be economically sustainable it should reduce financial risks through diversifying the farm with several crops, selling products directly to the markets thereby reducing fuel costs, and making use of crop rotation to reduce the use and purchase of fertilisers and pesticides. The author states that sustainable agriculture includes environmental stewardship which has sound agricultural practices that have very little or no adverse effects on the environment or natural ecosystem. According to the author, sustainable agriculture encourages healthy soils and soil fertility which is provided by adequate soil organic matter and biologically based inputs that feed soil organisms, which release nutrients to plants. The author highlights methods to enhance soil fertility that improve soil health such as using nitrogen-fixing legumes, green manure, minimising soil tillage and maintaining all year round soil cover, crop rotation, intercropping and companion planting, protecting water

quality, composting, integrating crop and animal production, shifting cultivation and soil conservation practices. Jacobsen (2012) further highlights that the strategies for insect, disease and weed control include using crop rotation to disrupt the pest life-cycle, improving soil quality, using optimum planting densities, timing planting and transplanting operations to avoid high pest populations, employing biological control and growing resistant varieties and improving the quality of life for those who work and live on the farm and local community. Pretty (2008) indicates that there are different types of sustainable agricultural practices such as biodynamic, ecological, environmental sensitive, farm fresh, free range, low input, organic.

Flora (2010) indicates that industrial agriculture has failed to feed all people in the world, as in 2009 the number of food insecure individuals had increased to more than 1 billion people. The author states that there are a number of studies that have been conducted on the success of sustainable agriculture in feeding the world, and since sustainable agriculture is more localised, it has the potential to feed more intensively at the local level. Flora (2010) and Rasul and Thapa (2003) argue that in the research they did on the success of sustainable agriculture in Bangladesh, they found that ecological agriculture is relatively more sustainable if market distortions, created by subsidies, were removed and financial benefits were provided to resource saving or conserving farmers with necessary support through extension, credit, research and marketing.

Von der Weid (2012) highlights the study conducted by Pretty et al. (2006) on the impacts of sustainable agriculture in 57 developing countries, over 286 agricultural projects, covering 37 ha of land. The findings were that about 12.6 million farmers on 37 ha of land were engaged in transition towards agricultural sustainability and where sustainable practices were adopted, crops increased by 79%. Pretty et al. (2006) mention the technical improvements that resulted in the increase in crop yields which were more efficient water use in both drylands and irrigated farming, improvement in organic matter in soils and carbon sequestration, pest and weed and disease control emphasising farm-biodiversity and reduced pesticides. Kassie and Zikhali (2009) make reference to the study conducted by Badgley et al. (2007) where they used a global dataset of 293 examples to estimate the average yield ratio in organic and non-organic different food categories for developed and developing countries. The study found that organic food in the developing countries showed an increase of more than 1.0 ratio yield and in developed countries the average ratio yield was less than 1.0. The authors highlight the

potential of sustainable agriculture in producing food for larger populations without putting more farmland into production. They state that leguminous cover crops could fix enough nitrogen to replace the amount of synthetic fertiliser currently in use. In Brazil, minimum tillage system has gone up to 22 million ha in 2003/2004 moving from 1 000 ha in 1973/1974. In Argentina, zero tillage has improved from less than 11 million ha to 20 million ha in 1990 and in Zambia there has been a 10% increase in the adoption rate of conservation tillage among smallholder farmers (Badgley et al., 2007; Kassie and Zikhali, 2009).

### **2.11 Practice of sustainable agriculture in South Africa**

South Africa has shown interest in sustainable farming and sustainable land management practices; this is so considering that South Africa is one of many countries where concerns have been raised in relation to the degradation of natural resources (Middelberg, 2013). The author states that scientists from the universities of Yale and Columbia in the USA in collaboration with the World Economic Forum (WEF) issued a biennial report that measures 132 countries' environmental performance indices (EPIs). The author indicates that the EPI 2012 indicators measure a country's environmental and ecosystem vitality and the report of 2012 indicated that South Africa is ranked 128<sup>th</sup> of 132 countries and that the natural environment has deteriorated. Muller et al. (2009) state that water resources are very scarce as South Africa is listed as the 29<sup>th</sup> driest country out of 139 countries in the world, with 1 110 m<sup>3</sup> of water per capita in 2005 and rainfall pattern being erratic and unequally distributed across the country.

According to the Organisation for Economic Co-operation and Development (OECD, 2011), the South African agricultural policy of 1998 has implications for eco-innovation in the agricultural sector and the policy has strong emphasis on sustainable agricultural production, sustainable utilisation of natural resources, and agricultural technology, research, extension and training. The author indicates that the policy aims at building the agricultural sector to be ecologically, socially and environmentally sustainable, and the policy advocates for the development of a national agricultural research system that promotes technology development required for sustainable agricultural production growth. Sustainable Land Management Practices of South Africa (2009) states that South Africa is a participating member in the global Land Degradation Assessment in Drylands (LADA) project that does

land degradation assessments. South Africa is also a member of the World Overview of Conservation Approaches and Technologies (WOCAT).

Conservation agriculture in South Africa is said to have been implemented as early as 1977 particularly in KwaZulu-Natal Cedara which is an Agricultural college, the research arm of the Department of Agriculture (Sustainable Land Management Practices of South Africa, 2009). The author states that conservation agriculture in South Africa is used to revitalise agriculture and state support for agriculture is made dependent on whether conservation agriculture is applied or not. The author further notes that there is little evidence of the application of conservation agriculture in the Free State Province, North West and Mpumalanga. According to Middelberg (2013) and Willer (2011), the survey conducted by the International Federation for Organic Agriculture Movement (IFOAM) and the Research Institute of Agriculture indicated that South Africa has 59 562 ha of certified organic agricultural land and approximately 250 producers.

DAFF (2011) and Middelberg (2013) indicate that in South Africa a national policy on organic production has been developed by the DAFF. Middelberg (2013) states that interest in sustainable agricultural practices, especially organic agricultural practices, has grown in South Africa, but the industry is faced with many challenges. The author indicates the following challenges facing organic agriculture in South Africa:

- Protection of consumers against practices of labeling conventional products as organic.
- Environmental benefits of organic production including the enhancement of soil structures and conservation of sustained biodiversity.
- Health benefits consuming organic food stuff instead of the permitted more than 500 additives for use.
- The role organic production has on addressing climate change.

Nick Opperman, the Director of natural resources at Agri-South Africa (AgriSA), states that his organisation is advising its members to practice conservation farming to mitigate the increasing threat of climate change to ensure food security (Middelberg, 2013). In South Africa the pace of sustainable farming needs to be promoted to save the natural resources and to mitigate the adverse effects of climate change.

## **2.12 Policy measures for sustainable agriculture in South Africa**

Kassie and Zikhali (2009) suggest that at the government level there should be a policy change that puts sustainable agriculture on par with conventional agriculture. The authors warn that blanket recommendations for agricultural practices should be avoided and an understanding of geographic conditions and underlying factors to every environmental situation is recommended for successful sustainable agricultural practices. The authors further recommend that authorities should remunerate agricultural production that has used sustainable agriculture in its production with stable market prices, to enhance the economic viability of adopting sustainable agriculture and providing safety nets for resource-poor farmers. The authors highlight the value of formal and informal training in sustainable agriculture as important by further recommending that farmer training through extensions should be encouraged and sustainable farming information should be cascaded and education and training should constantly be done with practicing farmers.

The authors further indicate that in ensuring that smallholder farmers practice sustainable farming, governments especially in developing countries, should provide people with modern cooking energy instead of using firewood for cooking as the use of firewood as an energy source encourages deforestation which causes exposure of soil to soil erosion which affects agriculture by encouraging the use of fertilisers in revitalising the soil. The use of fertilisers encourages unsustainable farming practices. The authors state that smallholder farmers should be encouraged to incorporate forage legumes into the cropping system and the governments should support social capital and improve security of land tenure and remove market imperfections. In South Africa the authors recommend that policy changes for sustainable agriculture should include the collaboration of relevant government departments to develop an integrated strategy in addressing food security by providing support to producers enabling them to supply nutritionally adequate food at affordable prices. They argue that the introduction of sustainable agricultural practices should include eco-agriculture, water conservation and offering incentives in the form of subsidies to producers converting from conventional agricultural practices to sustainable agricultural practices, production of biofuels without compromising food security, successful land distribution in South Africa for agricultural projects through collaborated government support, and the encouragement of organic farming as the strategy to mitigate the adverse effect of climate change as well as serve as niche markets in South Africa.



## **2.13 Conclusion**

This chapter has presented the literature review related to sustainable agriculture. The chapter argues that conventional farming practices have contributed to the environmental challenges the world is facing today. Sustainable farming offers an alternative in the face of environmental degradation, food shortages, malnutrition and climate change. This chapter examined the constraints confronting smallholder farmers in South Africa. The key highlights of this literature review are that smallholder farmers are faced with enormous problems that include lack of land, lack of support from the government, farming in fragile and infertile land, and lack of access to loans and markets. This chapter argues that smallholder farming has to be encouraged and supported by the South Africa government as it has the potential to fight poverty, promote rural economic development and combat environmental degradation through sustainable farming.

## **CHAPTER THREE: STUDY AREA AND RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter provides an overview of the study area and discusses the methodology used to undertake the study. It further discusses the research methodology. Furthermore, it looks at the research design or the strategy used in the collection of data, and concludes with a discussion on the limitations and challenges encountered when data was collected.

### **3.2 Background of the study area**

According to Gbetibouo and Hassan (2005), South Africa is categorised into four agro-ecological zones, that is, desert (Northern Cape, Free State, North West and Limpopo); Steppe, arid (Gauteng, Eastern Cape and Mpumalanga); Sub-tropical wet (KwaZulu-Natal) and Sub-Tropical winter (Western Cape). These agro-ecological zones, according to the authors, are the determining factors in the choice of crops in the region. The authors further state that rainfall in South Africa is unevenly distributed across the country with sub-tropical conditions in the east and dry desert conditions in the west where 500 mm rainfall line divides the country into two main sections. This, according to the authors, results in the production of the main crops in South Africa being concentrated on the eastern part which includes maize, wheat, sugar-cane and sorghum. Minor crops are groundnuts, sunflower seeds, dry beans, tobacco and oats.

The Ugu area covers approximately 5 866 km<sup>2</sup> of which more than half is Traditional Authority land and the rest of the land is owned privately or by the state (UMoya-Nilu, 2012). According to the author, climate in the area is temperate with no winter zones and the area is in the coastal where the climate is characterised by high temperatures and high rainfall of the sub-tropical climate and that makes it suitable for the production of sub-tropical crops. The author states that the vegetation in the Ugu District is dominated by thicket and shrub land in the areas that are not built up and can be classified into two major types of biomes: the savannah biome and the Indian Ocean coastal belt biome. The author highlights that various land cover are found in the Ugu District including cultivated land, built up areas and natural

areas and a vast amount of land in the Ugu District is used for agricultural activities, both for commercial farming and smallholding, and commercial agriculture makes up approximately 90% of agricultural activities including the farming of sugarcane, bananas, vegetables, tea, coffee and macadamia nuts. Below is a map that indicates the study area Ugu District (Figure 2.1).

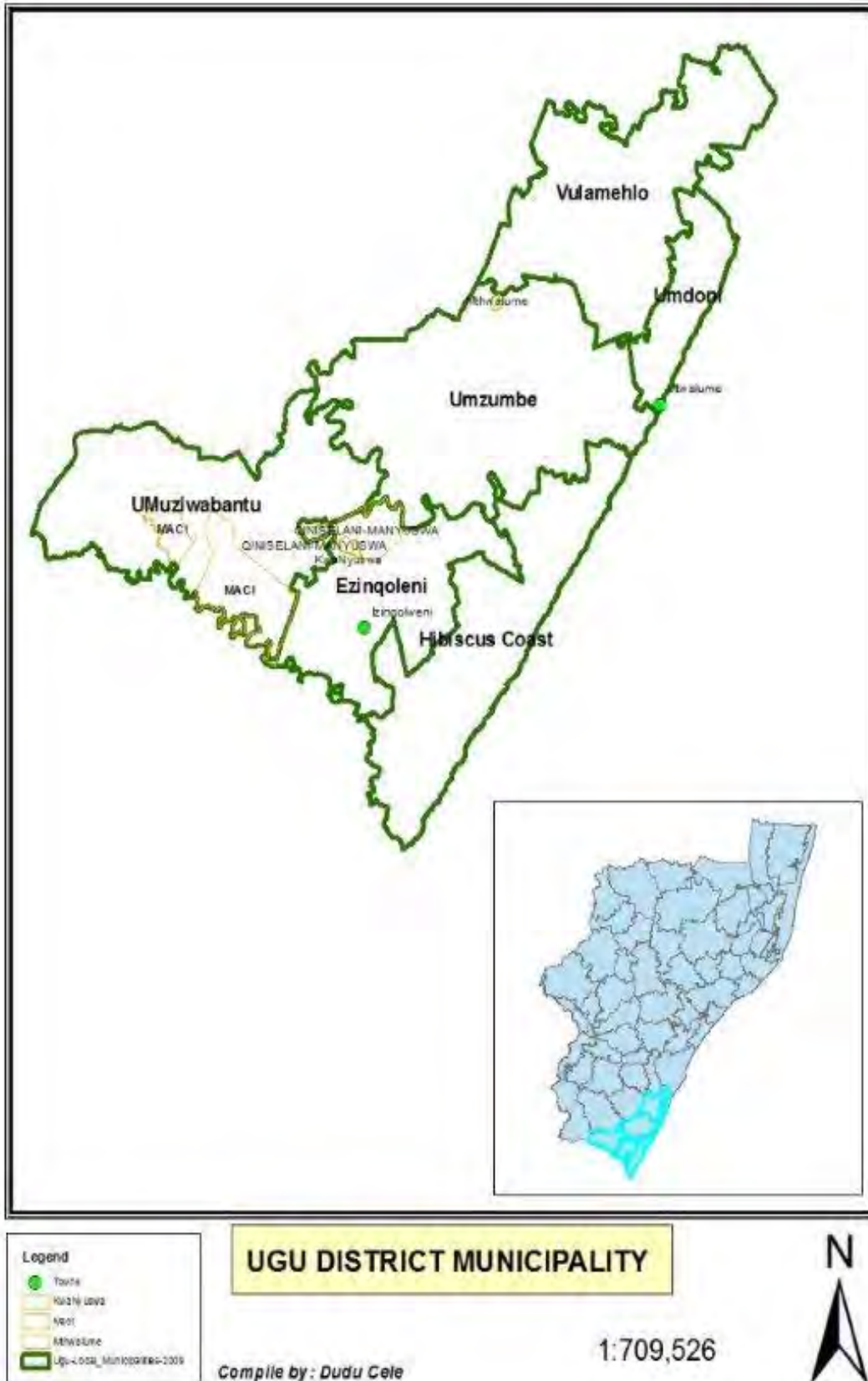


Figure 3.1: Study Area Map: Ugu district in KwaZulu-Natal, South Africa  
 Source: Map produced from the Arch GIS.

### **3.3 Research methodology**

Jabar (2009) argues that research methodology explains how the research is done, the methods used in the data collection, the materials used when data is collected, and the subjects interviewed or the places visited. According to Nyame-Asiamah (2009), research methodology is traditionally classified into two categories which are qualitative and quantitative methods. Cresswell (2013) highlights that qualitative research methods use words through open-ended questions while quantitative research methods use numbers in closed-ended questions. The author states that the type of strategy used in quantitative research involves experiments while a qualitative approach makes use of case studies and the qualitative approach is used for exploring and understanding the meaning of individuals or groups ascribed to a social or human problem. Myers (1997) and Jabar (2009) argue that quantitative research was originally developed in the natural sciences to study natural phenomenon. According to Cresswell (2013), the quantitative approach was meant for testing theories by examining relationships amongst variables, in turn variables can be measured on instruments, so that numbered data can be analysed using statistical procedures. Allen-Meares and Lane (1990) highlight that the quantitative paradigm views the social world as an orderly, ruled/governed, stable reality that can be completely and exactly known. The authors further argue that the quantitative paradigm conceptualises individuals, organisations and society as the instrumental reflections of deterministic structures and social reality that guide and predict social actions.

Glesne (2011) argues that qualitative research is the type of research that focuses on qualities such as words or observations that are difficult to quantify and lend themselves to interpretation or deconstruction. Allen-Meares and Lane (1990) state that the qualitative paradigm views the social world as a highly complex dynamic reality consisting of multiple layers of meaning and perspectives that are strongly influenced by the interaction between the environmental context and the subjective interpretations of the situational actors and people's experiences. Allen-Meares and Lane (1990) further argue that qualitative paradigm interprets the world in very different ways. Chrownholm and Hjalmarsson (2011) highlight that the quantitative research method is criticised for using irrelevant hypothesis and descriptions that are too superficial. They further state that the qualitative research method is criticised for results that are too hard or impossible to generalise and that in qualitative research methods results are not objective and hard to replicate, as they lack transparency. The authors state

that qualitative studies are often based on one or few cases studied and many times data can be hard to interpret, while the aim of the quantitative approach is to suggest a hypothesis that should be approved or disapproved.

Some scholars have used both qualitative and quantitative approaches with the aim of preserving the strengths and reducing the weaknesses in both approaches. This is known as the mixed method approach. Chrownholm and Hjalmarsson (2011) state that the mixed method approach is more than collecting data and analysing it from the qualitative and the quantitative approach, but provides a specific perspective of the world and to achieve findings that are more trustworthy. In this research both qualitative and quantitative methods are used in data collection. To counter the limitation of both approaches, one focus group discussion was undertaken and surveys were done as well. Cresswell (2013) indicates that mixed methods approach involves collecting both qualitative and quantitative data. According to the author, the core assumption of this approach is that the combinations of both qualitative and quantitative approaches provide a more complex understanding of a research problem than either approach alone to provide the best understanding of a research problem.

### **3.4 Research design/strategies used in the collection of data**

#### **3.4.1 Primary data**

Primary data in this research was collected in two ways: through a questionnaire survey and a focus group discussion. The questionnaire represents the quantitative method approach in data collection and the focus group represents the qualitative approach. This is done to counter the shortcomings of both the quantitative and the qualitative approaches (Neville, 2007). Battacherjee (2012) states that the questionnaire instrument in research consists of a set of questions intended to capture responses from the respondents in a standardised manner and further argues that in the questionnaire, questions may be structured (closed questions) or unstructured (open questions). The author further indicates that structured questions ask respondents to select an answer from given responses/options, while unstructured questions ask respondents to provide responses in their own words Westat (2002) states that open ended questions may be difficult to code and require more time and resources to handle than closed ended choices. While Neville (2007) indicates that questions in the questionnaire should attempt to answer the research questions. Allen-Meares and Lane (1990) state that

questionnaires when completed by respondents can provide data on a variety of factors including personal feelings, personality traits, self-reported behaviours, attitudes, interests and characteristics of persons in groups.

### **3.4.2 Questionnaire design**

The questionnaire (Appendix 1) was divided into six sections (A to F). Section A focused on the socio-demographic profile of the respondents; Section B on land, tenure, land-use and management; Section C on economics and sustainable livelihoods; Section D on sustainable agricultural practices; Section E on agricultural services respondents receive as farmers and section F on agricultural constraints they face.

### **3.4.3 Focus group**

Battacherjee (2012) describes the focus group as a type of primary data collection technique that involves a small group of about six to ten people at a location discussing a phenomenon of interest for a period of 1, 5 to 2 hours. Neville (2007) states that a focus group is a type of data collection approach that allows information to be captured in the form of the opinions from a selected group of people on a particular and pre-determined topic. The author further argues that a focus group helps in finding out what the main issues and concerns of any group are and the focus group is useful in bringing to the surface issues that might not otherwise have been discovered. The author argues that the focus group combines elements of both interviewing and participant observation. Roulston (2010) and Frels et al. (2013) indicate that interviews represent one of the most common ways of collecting data in qualitative research because they provide opportunities for the researcher to collect rich and meaningful data. Westat (2002) states that the hallmark of the focus group is the explicit use of the group interaction to generate data and insights that would be unlikely to emerge and that a focus group allows observation of group dynamics, discussion and first-hand insight into the respondent's behaviour, attitudes, language, etc. Burgess (2010) indicates that focus groups assist in allowing the researcher to gain the information on the views of people and their experiences about the subject under discussion. The author states that focus groups can be useful at both formative and summative stages of an evaluation/research and they provide answers to the same type of questions as in-depth interviews, except that they take place in a social context.

In this study the focus group discussion was guided by an interview schedule (Appendix 2) and focused on the level of knowledge respondents have on sustainable farming, the value of sustainable farming to them, the characteristics of farming systems respondents practiced, and how these farming systems impact on natural resource management. Furthermore, the focus group discussed the measures they took to mitigate against the impacts of soil infertility and droughts/floods (climate change effects) to remain productive. The focus group further discussed the constraints respondents' face that hinders their productivity. The discussions of the focus group also looked at the availability of the institutions within the community to support adaptive responses and sustainable agricultural practices. The role played by the institutions in development and dissemination of knowledge of sustainable agricultural practices was looked at. Lastly, there was a discussion on the main issues that impede agricultural growth in the community vis-a-vis adoption of sustainable agricultural practices, and what support small-scale farmers need from government in order to farm sustainably.

### **3.5 Sampling procedure**

Creswell (2013) states that sampling involves the process of selecting the number of individuals for a study in such a way that the individuals represent the larger group from which they were selected. Maxwell (2013) and Guetterman (2015) indicate that a key qualitative feature is that research questions are typically limited; studying a central phenomenon in a particular context and the researcher's intention is not to generalise from the sample of a population, but to explain and describe and interpret the phenomenon.

Cochran (1953) and Latham (2007) indicate that using correct sampling in research reduces costs, allows for the research to be conducted more efficiently and provides for greater accuracy. Latham (2007) states that traditionally there are two categories of sampling methods in research, that is, probability (random) and non-probability (non-random) sampling. While Creswell (2013) and Guetterman (2015) indicate that sampling in the quantitative research follows random sampling procedures; the research calculates the size before the beginning of the study and the size remains constant. Emmel (2013) and Guetterman (2015) highlight that qualitative sampling is not a single planning decision, but it is an iterative series of decisions throughout the process of research. Latham (2007) states that the choice to use either probability or non-probability sampling is determined by the objectives and the goals of the research. Henry (1990) and Latham (2007) highlight that



probability sampling is preferable in data collection since with probability sampling it is possible to determine bias and likely error when it is used.

Henry (1990) and Latham (2007) further states that probability sampling promotes a certain level of confidence when data is collected and analysed. Henry (1990) also argues that although non-probability sampling does not provide an advantage of providing an opportunity to identify bias and pick up errors, it also carries the same weight as being useful to researchers to achieve particular objectives of the research at hand. Fink (1995) clarifies that probability sampling is the type of sampling where everybody or unit has an equal chance of being selected from the population. Frey et al. (2000) and Latham (2007) highlight the fact that it is important to give everyone an equal chance of being selected to eliminate the danger of the researchers biasing the selection process because of their own opinions and desires. Elimination of bias allows for the research findings to be generalised from the sample to the whole population as the sample represents the population (Frey et al., 2000). According to Latham (2007), there are four types of probability sampling, that is, simple random sampling, systematic random sampling, stratified random sampling and cluster random sampling.

Babbie (1990) and Latham (2007) argue that non-probability sampling is a convenient way for researchers to assemble a sample with little or no cost and for those research studies that do not need the representation for the entire population. Fink (1995) and Latham (2007) indicate that the non-probability sampling is useful when conducting research where groups may have sensitivities to the questions being asked and may not want to answer the questions honestly. Henry (1990) notes that subjectivity in non-probability sampling plays a crucial role and caution needs to be exercised by researchers never to generalise the findings received through the non-probability sampling as the general views of the whole population. Latham (2007) indicates four types of non-probability sampling, that is, convenience, purposive, snowballing and quota sampling. For the purpose of this research, purposive non-probability sampling and simple random sampling will be discussed further.

For the selection of smallholder farmers to answer the questionnaires, the simple random probability sampling was used. The simple random probability sampling allows each member of the population to have equal chance of being selected. Purposive sampling was used for the selection of the focus group. Babbie (1990) indicates that purposive sampling is the

selection of the sample on the basis of the researcher's own knowledge of the population, its elements, and the nature of the researchers' aim. McNealy (1990) and Latham (2007) argue that in purposive sampling the researcher is able to select participants based on the internal knowledge of said characteristic.

### **3.5.1 Sample size**

Creswell (2013) indicates that there is a lack of guidance in the selection of sample size in the qualitative research. Patton (2015) acknowledged the role of resource limitation in determining a qualitative sample size. According to Marshall (1996), choosing the study sample is imperative as it is not practical, ethical or efficient to study the whole population. Both quantitative and qualitative sampling methods require different sample sizes. The author highlights that the aim of the quantitative sampling approach is to draw a representative sample from the population so that the results of studying the sample can then be generalised back to the population. The author further highlights that quantitative researchers often criticise qualitative researchers for studying small samples as they argue that its findings cannot be generalised to the larger population. Furthermore, Maxwell (2013) stresses that in qualitative research the researcher studies a phenomenon in a particular context and it cannot be generalised. Onwuegbuzie (2007) argues that the sample size in the qualitative research involves the use of small samples and further states that there is a common misconception about sampling in qualitative research that numbers are unimportant in ensuring the adequacy of sampling strategies. The author highlights that the sample size in qualitative research should not be too large since it is difficult to extract thick, rich data at the same time and that the sample size should not be too large that it becomes difficult to achieve data saturation. Marshall et al. (2013) indicate that the qualitative methodologists openly recognise the lack of standards for the sample size. Marshall et al. (2013) and Patton (2002) explain that qualitative enquiry has uncertainties, there are no methodological rules, no statistical formulas, and uncertainty is more vivid in sample size. Patton (2002) further argues that in qualitative enquiry sample size depends on what the researcher wants to know.

Fox et al. (2007) indicate that generalisation from data to a wider population depends upon the kind of statistics which tests the inferences or hypothesis in the quantitative research. The authors further highlight that if the potential subjects of the study are a big number, reducing the number is necessary, through random sampling in quantitative research as this is

necessary to ensure validity, as every individual in the population has an equal chance of being selected. In the random sample, the first step is to define the target population from which it is drawn (sampling frame) or a list of all people relevant to the study. The authors further state that random sampling is divided into two, simple random sampling and systematic random sampling and when doing simple random sampling, every individual in the sampling frame is allocated a different number and then numbers are randomly selected. They indicate that in systematic random sampling everybody is allocated a number in the population frame, the first individual is picked using a number table and the rest of the people are selected using a fixed sample interval. The authors further suggest that researchers have used caution when using the systematic sampling in case there is some bias in the way the list of sampling frame is compiled, an example, if all the husband's names precede wives' names and all the sampling interval is an even number, and then it could end up selecting all women and no men.

In this research, systematic sampling was done, where the list of smallholder farmers was collected from the extension offices from the Department of Agriculture, one in Mthwalume in Qoloqolo area and one in Izingolweni extension office which includes Hibiscus, Umziwabantu and Izingolweni. The list consisted of 102 small-scale farmers in the Ugu District which is the sample frame as explained above. The first individual was selected from the sample frame, using a random number table and then subsequent subjects were selected using a fixed sampling interval (every 2<sup>nd</sup>) to achieve the targeted sample size of fifty small-scale farmers. For the qualitative method, one focus group interview was conducted where 8 small-scale farmers were selected using purposive sampling. The focus group selection criteria were based on the number of years involved in agricultural activities and the leadership role in farming committees.

### **3.6 Field data collection**

Three visits were made to the extension offices for the study. The first visit was made to Mthwalume (Qoloqolo extension office), the second visit was made to Izingolweni extension office, and the last visit was made to Izingolweni multi-purpose centre. The intentions for the visits were to get the list of the names of the smallholder farmers in Ugu district. The names of farmers on the list were included if they were small-scale farmers in the Ugu District. Each selected farmer was contacted telephonically and appointments were made when it was suitable to undertake the research. Forty five farmers agreed to participate in the study. This comprised 44% of the total number of small-scale farmers (102) in the case study area. Two research assistants were trained on how to complete the questionnaires. The questions in the questionnaire were translated into Isizulu for participants to have a clear understanding of the questions. Collection of the quantitative data took four weeks. For the qualitative data, the focus group discussion took two days. The first focus group discussion was held at the Qoqolo tribal court in Mthwalume area and the second focus group discussion was held at the Izingolweni multi-purpose center. The discussion was scheduled from 12 midday to allow for the return of smallholders from the fields for 3 hours. Smallholders in these group discussions were provided with lunch to allow for the smooth running of the discussion.

### **3.7 Data analysis**

The quantitative data collected was analysed using SPSS. The qualitative data collected was categorised into key issues/themes and analysed. Both the quantitative and qualitative results are discussed thematically in relation to the objectives of the study.

### **3.8 Limitations of the data collection process**

Challenges were experienced in terms of collection of data. Firstly, the questionnaire and the focus group questions were written in English yet smallholder farmers are Zulu speakers. The questionnaire had to be translated into Zulu and it took a long time to translate from English to Zulu. Field workers assisted to conduct the face-to-face interviews. The authors state that translators and interpreters have influence on the research process and they are influenced by their social location and much of the translation literature points to the impossibility of a literal movement of meaning from one language to another. According to Temple and Young

(2004), in a situation where the researcher is fluent in the language of the community where the research is conducted offers an opportunity where the researcher can use the experience of translating to discuss points in the text. Collecting data from participants proved to be very challenging as in some places, especially in the Qoloqolo area, was very hard to access by a small car. In some instances second visits had to be made as some failed to honour my visit and making telephonic appointment was a very difficult exercise as in most cases networks were interrupted and some cell phone numbers were no longer active. Extension officers wanted to be present during the discussion that had some negative impact as participants ended up reluctant to respond to questions with honesty. Although there were challenges in data collection, but the study make a very important contribution in understanding the smallholder farming practices in the study area.

### **3.9 Conclusion**

This chapter provided an overview of the study area and discussed the methodology used to undertake the study. It further looked at the research design or the strategy used in the collection of data, and concludes the discussion on the limitations and challenges experienced when data was collected. This chapter tried to answer the research questions stated in chapter one through qualitative and quantitative techniques to better understand the farming practices of smallholder farmers in Ugu District, specifically whether they practice sustainable farming or not. The findings are presented in the next chapter. The next chapter provides an analysis of the results emanating from the research that was conducted.

## **CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION**

### **4.1 Introduction**

This chapter presents the data collected as well as the data analysis and discussion of the results. Both data collected quantitatively through the questionnaire and data collected qualitatively through the focus group is presented and discussed simultaneously and thematically. The relevant links are made with the literature on sustainable agriculture and smallholder farmers, both in general and specific to South Africa. Data is presented and analysed into themes such as the socio-demographic profile of respondents (gender, age, whether head of households, marital status, level of education and number of years involved in agriculture), household livelihood strategies and sources of income, sources of energy for household use, assets owned by respondents, land tenure, land use and management, sustainable agricultural practices, extension services, incentives for engaging in sustainable agricultural practices and organisational support, agricultural constraints, mitigation strategies and access to loans.

### **4.2 Demographic profile of respondents**

Makhura (2001) states that the demographic profile of respondents are important attributes in any research as they are the determinants of some action or decisions taken by respondents to practice sustainable farming. Makhura (2001) argues that when undertaking research about sustainable agricultural practices of smallholder farmers, it is important to include attributes such as age, gender, education, marital status of respondents, and the number of years involved in farming as they are contributory factors in sustainable agricultural practices. Siulemba and Moodley (2014) are also of the view that socio-economic variables such as gender and age influence decisions for the adoption of sustainable agricultural practices. Demeke (2003), Kotile and Martin (2000) and Sikwela et al. (2013) agree that demographic attributes such as education (level of education) assist smallholder farmers with the ability to interpret and understand information. Demeke (2003) and Siulemba (2011) acknowledge that sustainable agriculture is knowledge intensive, so high levels of education is necessary for the proper implementation and management of sustainable agricultural practices. Kotile and Martin (2000) and Sikwela et al. (2013) mention the importance of the age of the farmer and farming experience as important attributes in influencing the decision for the adoption and

practice of sustainable farming practices. While Chisasa (2014) states that the age distribution of respondents in smallholder farming is asked so as to indicate age concentration and the established patterns of interest in farming. The gender profile of respondents is provided in Table 4.1 below

**Table 4.1: Gender of the respondents**

Gender	Frequency (n=45)	Percentage (%)
Males	13	29.9
Females	32	71.1

Table 4.1 shows that 29.9% of the respondents interviewed were males and in contrast 71.1% of the respondents interviewed were females. The FAO (2002) and Thamaga-Chitja and Morojele (2014) indicate that in the SSA, 80% of active smallholder farmers are females. Thamaga-Chitja and Morojele (2014) further indicate that over 2 million of these come from Southern Africa. Aliber and Hart (2009) and Thamaga-Chitja Morojele (2014) state that in South Africa poor people enter into smallholder farming to obtain extra food, and women are responsible for almost all the productive activities in farming. Makhura (2001) explains the reason for the limited number of men engaged in smallholder farming, especially in KwaZulu-Natal, as the result of the situation in the province where male heads of the households tend to migrate to urban centers to seek jobs and leave women behind to take decisions related to household activities and participation in agriculture. The FAO (2002) and Thamaga-Chitja and Morojele (2014) indicate that it is established that women do most of the productive work in subsistence and smallholder agriculture due to their traditional and cultural roles. This, according to Thamaga-Chitja and Morojele (2014), is linked to women's domestic chores that culturally women are supposed to do in rural areas and these traditional and cultural constraints extend further to women beyond household chores, as women have to do farming to feed their families while male heads of households are in cities to seek jobs. When the respondents were asked why mainly women do farming in this community during the group discussion, they indicated that women are mostly heads of households and they are responsible for food production.

**Table 4.2: If respondent is the head of the household**

If head of household	Frequency (n=45)	Percentage (%)
Yes	36	80
No	9	20

Respondents were asked to indicate whether they were heads of the households. Eighty percent of the respondents indicated that they were the heads of the households. Makhura (2001) highlights that head of households are responsible for co-ordination of household activities including involvement in farming. The heads of households are likely to take a decision to practice sustainable farming to protect the natural environment to sustain their families (Makhura, 2001). The majority of respondents indicated that they were heads of households. Respondents indicated that they entered into farming because they were looking after their families and have an obligation to provide an extra-source of food and income. One respondent in the focus group discussion indicated that they use the extra money they generate from selling produce to take children to school.

**Table 4.3: Age ranges of the respondents**

Age ranges of respondents (in years)	Frequency (n=45)	Percentage (%)
30-50	11	24.4
51-69	26	57.8
70-84	8	17.8

Table 4.3 shows the age ranges of the respondents. The respondents between the ages of 51-69 years constituted 57.7%, the ages of 30-50 years constituted 24.4% and respondents between the ages of 70-80 years constituted 17.7%. Bryceson (2002) indicates that in South Africa there is a sign of an aging countryside, where a broad spectrum of poor and middle-income peasants, particularly young peasants, are mostly no longer part of peasant farming as they are deterred by the lack of economic returns of growing crops. Considering the age distribution of the respondents above, it is safe to say that the majority of people in the study area who are involved in farming are between the ages of 51-69 years of age. Respondents in the focus group discussion indicated that young people are not interested in farming. They have a view that farming is for the elderly people. This indicates the need for encouraging



young people to enter into farming if rural development has to be sustained through smallholder farming.

**Table 4.4: Education level of the respondents**

Level of education of the respondents	Frequency (n= 45)	Percentage (%)
None	6	13.3
Primary school	26	57.8
Secondary school	9	20
Certificate/ diploma	4	8.9

Table 4.4 displays the level of education of the respondents. According to the above table, 57.8% of the respondents have primary education that ranges from grades 1-7 in South Africa, 20% of the respondents in the study area have secondary education, 8.9% of the respondents have certificates or diplomas and only 13.3% of the respondents have no formal education. It has been indicated earlier that sustainable farming practices require high levels of formal education since sustainable farming practices is knowledge intensive (Demeke, 2003; Siulemba, 2011). Siulemba and Moodley (2014) state when smallholders have formal education, it is likely that they would adopt new technologies, especially sustainable agricultural practices, which as they argue is knowledge intensive. The results indicate the challenge faced by smallholder farming in South Africa. DAFF (2012) indicates that the lack of human capital among smallholder farmers in South Africa has a negative bearing in accessing information and technological skills. According to DAFF (2012), smallholder farmers in South Africa are illiterate and this is an obstacle towards accessing formal institutions that disseminate technological knowledge. The lack of formal education amongst smallholder farmers also results in lack of capacitation on financial and marketing skills to meet the quality standards set by fresh produce markets and food processors (DAFF, 2012). Among the sampled respondents, a very small percentage (13.3%) had no formal education. This suggests that smallholder farmers in the sampled areas are likely to adopt new sustainable agricultural practices technologies if accessible to them and affordable.

**Table 4.5: Farming experience among the respondents (the number of years the respondents are involved in farming)**

Number of years in farming	Frequency (n=45)	Percentage (%)
<5 years	24	53.3
5-10 years	13	28.8
11-20 years	6	13.3
> 20 years	2	4.4

X = 7 years

Table 4.5 above shows the number of years the respondents have been involved in farming. According to the table above, 53.3% of respondents have been involved in farming for less than 5 years, 28.8% of the respondents have been involved in farming between 5 and 10 years, 13.3% of the respondents have been involved in farming between 11 and 20 years and 4.4% of respondents have been involved in farming more than 20 years. The average range of years the sampled smallholder farmers in the study area was involved in farming was 7 years. Makhura (2001), as indicated earlier, argues that when undertaking research about sustainable agricultural practices among smallholder farmers, it is important to include attributes such as the number of years involved in farming as it is a contributory factor in relation to involvement in sustainable agricultural practices. The experienced farmers are more likely to look after the natural resources they use while farming. Smallholders in the focus group discussion further explained the reason why they entered farming at a late stage of their lives. One male respondent indicated that he got into farming after he retired from work in Durban. The majority of respondents indicated that they enter into farming because a grant that they are receiving is not enough for them to buy food. One young woman indicated that she entered into farming because she could not find employment. It can be argued that smallholder farming is treated as something to fall back on in times of need to most people.

**Table 4.6: Marital status of the respondents**

Marital status of the respondents	Frequency (n=45)	Percent (%)
Married	28	62.2
Single	3	6.7
Widowed	14	31.1

Table 4.6 shows the marital status of the respondents. Close to two thirds of respondents (62.2%) indicated that they were married. Widowed respondents constituted 31.1%, and a few respondents (6.7%) indicated that they are single. Makhura (2001) indicates that the marital status of smallholder farmers is an important attribute in sustainable farming practices as this shows the value of farming within families. Chisasa (2014) further states that farming is taken seriously by people with families to generate extra income to look after their families. Bryceson (2002) states that the internal social composition of small-scale farming communities revolves around family as the primary unit of production and consumption. These results indicate that since most small-scale farmers in the study area have families, this suggests that it is likely that they look after natural resources, since these natural resources sustain their families. Additional evidence to this claim will be examined in the further analysis of results. Siulemba and Moodley (2014) state that smallholder farming relies on family labour, and family labour influences the sustainable agricultural practices adopted and shortage of labour hinders the adoption of sustainable agricultural practices.

### **4.3 Household livelihood strategies and sources of income for the respondents**

Stats SA (2012) and Thamaga-Chitja (2014) state that rural households in South Africa use mixed livelihoods strategies such as salaries, wages, social grants, income from business and pension remittances. Thamaga-Chitja (2014) argues that despite these livelihood strategies, agricultural activities continue to play an important role in providing much needed subsistence in the form of food. IFAD (2013) indicates that smallholder farmers feed up to 80% of the population in Asia and SSA and support about 2 billion to 2.5 billion livelihoods in the world. Mangisoni (2006) indicates that the rural population in South Africa relies heavily for their livelihoods on the public welfare system such as old age pensions, disability grants and child support grants. He further asserts that claiming against the state has become the main source of income. According to Mangisoni (2006) and Mpolase (2011), many people residing in rural areas of South Africa no longer have livelihoods based on the utilisation of natural resources such as land and vegetation due to the well-established welfare system in South Africa.

Several reports, according to Sikwela et al. (2013), have emphasised the need to explore the potential of agriculture as the primary stimulus to development in rural areas. Altman et al. (2009) and Labadarios et al. (2011) indicate that the role of smallholder farming in either

supplementing income or selling agricultural produce cannot be ignored in South Africa. Most experts agree that smallholder farming is important for ensuring food security and rural development. To understand livelihood strategies and sources of income for rural people in South Africa, the following information was captured from the study area: agricultural land cultivated last season, the percentage of agricultural land cultivated by the households against the available land, reasons why land was not all cultivated by households in the last season, percentage of households who extended cultivation land, reasons for extending cultivation land, crops grown during the last season, market where produce was sold, main sources of income in the households and other sources of income.

**Table 4.7: Main sources of income in the household: multiple responses**

Main sources of income ( multiple responses)	Frequency (n=45)	Percentage (%)
Sale of agricultural produce	45	100
Government grants	12	46.6
Pension	24	53.3
Sales of livestock	2	4.4
Full-time job	1	2.2
Part-time job	6	13.3
Remittances	16	35.6
Labour unskilled (other source of income)	7	15.6
Making mats (other source of income)	2	2.2
Security guard (other source of income)	1	2.2
Traditional healer (other source of income)	1	2.2

Table 4.7 shows the main sources of income among the respondents and other sources of income. All of the respondents stated the sale of agricultural produce as their main source of income. This finding is contrary to what Mangisoni (2006) and Mpolase (2011) assert that many people residing in rural areas of South Africa no longer have livelihoods based on the utilisation of natural resources. However, it must be noted that in terms of the sampling, this research targeted smallholder producers within the Ugu District. It is not representative of rural households in the area. It is noteworthy that agriculture has been identified as one of the main sources of household income by all of the respondents. This suggests that smallholder production has the ability to generate household income in rural areas. More than half of the

respondents (53.3%) mentioned pensions as their main source of income. Respondents who received government grants as their main source of income constituted 46.6%. Respondents who received remittances made up 35.6%, 13.3% of the respondents had part-time jobs, 4.4% of the respondents sold livestock and 2.2% of respondents had full-time jobs. Respondents indicated other source of income that they have: 15.6% of respondents indicated that they work as unskilled labour, 4.4 respondents made mats and 2.2% of respondents were traditional healers. These results indicate that farming is still the main source of income among the targeted population and people in rural areas generally. Statistics South Africa (Stats, SA 2012) indicates that the rural poor in South Africa have used different livelihood strategies including salaries and wages, followed by social grants, income from businesses and pension remittances to meet their needs.

**Table 4.8: Percentage of agricultural land cultivated by the households against the available land**

Percentage of agricultural land cultivated by the households	Frequency (n=45)	Percentage (%)
1-20%	4	8.9
21-40%	14	31.1
41-60%	4	8.9
61-80%	7	15.6
81-99%	1	2.2
100%	15	33.3

Table 4.8 shows the percentage of land cultivated by the households during the last season against the available land for cultivation in the households. From the above table it is clear that not all the land was cultivated during the previous season. A third (33.3%) of the respondents cultivated all the land available to them for cultivation, while 31.1% of the respondents cultivated 21-40% of the land available to them for cultivation, 15.6% of the respondents stated that they cultivated 61-80% of the land, a few respondents (8.9%) cultivated both 1-20% and 41-60% and 2.2% of respondents cultivated 81-99% of the land. The results reveal that not all the land that is available to the smallholder farmers is being used for cultivation. This suggests that there exists potential to increase production and there

may be challenges that smallholders face that prevent them from cultivating all the land available. This is examined later in the discussion.

**Table 4.9: Amount of agricultural land cultivated during the last season**

Agricultural land cultivated last season in ha	Frequency (n=45)	Percentage (%)
0.5 ha - 1.0 ha	5	11.1
1.5 ha - 3 ha	1	2.2
3.5 ha - 5 ha	2	4.4
>5 ha	37	82.2

Table 4.9 shows the amount of agricultural land cultivated by the respondents during the previous season. The majority of the respondents (82.2%) indicated that they cultivated more than 5 ha of land during the last season, which they indicated to have borrowed, while 11.1% of respondents cultivated land that was between 0.5 to 1.0, 4.4% of the respondents cultivated land that was between 3.5 to 5 ha and one respondent cultivated 1.5 to 3 ha of land during the last season. The results show that among the smallholder farmers interviewed, substantial amounts of land is being cultivated which reinforces the current and potential role that smallholder farming can play in relation to household livelihoods and contributing to food supply.

**Table 4.10: Reasons why land was not all cultivated**

Reasons for land not being cultivated	Frequency (n=45)	Percentage (%)
Not applicable	15	33.3
Inadequate labour	3	6.7
Lack of fertiliser	7	15.6
Poor rainfall	7	15.6
Lack of seeds	5	11.1
Acidic soil	5	11.1
Shortage of equipment	1	2.2
Lack of grazing land	1	2.2
Steep area that can't be accessed by tractor	1	2.2

Table 4.10 indicates the reasons why respondents failed to cultivate all the land available to them. The main factors identified by the respondents related to the lack of inputs (such as labour, fertiliser, seeds and equipment), land constraints (including acidic soil and availability of land) and climatic variables (specifically, lack of rainfall). The breakdown of responses are as follows: acidic soils (28.6%), lack of fertiliser (15.6%), poor rainfall (15.6%), lack of seeds (11.1%), shortage of labour (6.7%), shortage of equipment (2.2%), shortage of grazing land (2.2%) and steep area (2.2%). The situation faced by smallholder farmers in the study area has similarities with those identified by IFAD (2015) that indicates that smallholder farmers in the developing world are faced with many challenges or constraints that hinder their productiveness including lack of assets; no/ limited access to services; degraded natural resources; poor access to finance, infrastructure, inputs, knowledge and technology; and weak human and social capital. The DAFF (2012) indicates that smallholder farmers specifically in South Africa lack access to land, poor physical and institutional infrastructure and are located in remote areas where roads and information are inaccessible. Thamaga-Chitja (2014) indicates that smallholder farmers in South Africa are faced with agro-climatic conditions of the places where they farm or reside where land is of poor quality. Aliber et al. (2006) and Obi et al. (2012) agree with this arguing that smallholder farmers in South Africa farm in places where rainfall is poor and where there is less fertile soils. Thamaga-Chitja (2014) further highlights that smallholder farmers in South Africa lack skills and empowerment resulting in them failing to manage surface runoffs and they fail to harvest rainwater which limits the availability of water.

**Table 4.11: Crops grown during the last season: multiple responses**

Crops grown last season	Frequency (n=45)	Percentage (%)
Maize	44	97.8
Beans	38	84.4
Vegetables	40	86.6

Table 4.11 indicates the crops that respondents planted during the last season. Almost all respondents (97.8%) indicated that they grew maize, 84.4% grew beans and 86.6% planted vegetables. Gbetibouo and Hassan (2005) highlighted that South Africa is suitable for the cultivation of a large variety of crops which included maize, beans and vegetables.

**Table 4.12: Net income gained last season for produce sold**

Net income	Frequency (n=45)	Percentage (%)
R21000 - R40000	18	40
R10000 - R20000	9	20
> R 10000	18	40

Table 4.12 indicates the amount that respondents gained after they sold their produce in the previous season. Forty percent of respondents indicated that they sold their produce for between R21 000 - R40 000, another forty percent have sold their produce between R10 000 - R20 000 and twenty percent of respondents have sold their produce for less than R10 000.

#### 4.4 Assets owned by the respondents

It is established that small-scale farmers need to have assets for sustainable agricultural practices such as natural, economic, human and social assets (Siulemba, 2011). Table 4.13 displays agricultural equipment assets owned by respondents in the study area.

**Table 4.13: Agricultural equipment assets owned by respondents: multiple responses**

Assets owned by respondents	Frequency (n=45)	Percentage (%)
Hand hoes	45	100
Plough	3	6.7
Slashes	20	44.4
Axes	27	60

Table 4.13 indicates that all respondents own hand hoes which is very basic for subsistence farming, 60% had axes, 44.4% had slashes and 6.7% of the respondents had ploughs. The results show that the smallholders interviewed owned very few agricultural equipment assets which hinder sustainable livelihoods.

#### 4.5 Land tenure, land use and management

As indicated in the literature review, the South African government since 1994 has embarked on agrarian reform which includes land reform. This is intended to support smallholders and contribute to rural development. Respondents indicated they own land that they cultivate. This is illustrated in the table below.



**Table 4.14: Land ownership by respondents in ha**

Land own by respondents	Frequency (n=45)	Percentage (%)
1 ha - 2 ha	28	62
2 ha – 5 ha	16	35
> 5 ha	1	3

Table 4.14 explains land ownership by respondents where 62% of respondents indicated that they own land that is between 1- 2 ha, 35% own 2 - 5 ha of land and 3% own more than 5 ha of land. It is not surprising to see that the majority of respondents own not less than 2 ha of land since these are smallholder farmers and own small pieces of land as discussed in the literature review. Respondents were further asked how they acquired land and their response is displayed by the table below

**Table 4.15: Land acquisition by respondents**

Land acquisition by respondents	Frequency (n=45)	Percentage (%)
Inherited	22	48.8
Tribal authority apportionment	22	48.8
No response	1	2.2

Table 4.15 indicates that almost half of respondents inherited land or received it through tribal authority apportionment. Some rural land in South Africa is tribal land and it is not surprising that sampled smallholders farm land that was allocated to them by the tribal chief. It is interesting to note that land that respondents possess is not through the land reform programme in South Africa. The land that respondents farm is tribal land where they reside. During the focus group discussion respondents indicated that they applied to the Department of Land Affairs to get fertile land that they could farm as a collective and they have not received it as yet. Although government wants to redistribute land to assist smallholders in South Africa, in the study area none of the respondents indicated that they benefited from land redistribution. Twala (2013) indicates that land reform in South Africa did not bear much fruit in relation to most people of South Africa who were the victim of land dispossession. Chivanga and Kang’ethe (2015) indicate that the WBWS approach on land redistribution policy may not solve 361 years of land injustice in South Africa. Siulemba and Moodley (2014) indicate that lack of land and other resources lead to food insecurity

problems. Respondents indicated during the focus groups that although they farm on tribal land, it does not discourage them from adopting natural resource management techniques. They indicated that they do minimum tillage, using green and animal manure, intercropping and crop shifting.

#### 4.6 Sustainable agricultural practices

The main aim of the research was to find out whether farming practices among smallholder farmers in the Ugu District are sustainable. Sustainable agriculture is intended to achieve three main goals which are economic efficiency, environmental quality and social responsibility (Azman et al. (2012). According to the Jacobsen (2012), sustainable agriculture is an integrated system of plants and animal production practices having a site specific application that will over the long-term satisfy human food and fiber needs. Kleemann (2013) indicates that an agricultural system is sustainable when it is able to assure the food security of the population by producing enough food. It is noted previously in the literature review that smallholders farm in fragile land where land is not fertile. Musvota et al. (2015) highlight that environmental impacts of agriculture are not limited to large-scale agriculture only but extend to small-scale farming. They further indicate that although small-scale farming uses low levels of inputs and little machinery has adverse effects on the environment as well. They argue that in South Africa soil degradation has been reported as severe in many croplands and grazing lands where small-scale farming is practiced. Respondents were asked to indicate how they prevent soil degradation on their farms as part of sustainable agricultural practices. Table 4.16 indicates activities they engaged in to prevent soil degradation.

**Table 4.16: Prevention of land degradation practices by respondents: multiple responses**

Prevention of land degradation	Frequency (n=45)	Percentage (%)
Shifting cultivation	38	84.4
Agroforestry	3	6.7
Minimum tillage	12	26.7
Cover crops	3	6.7

Table 4.16 shows how respondents prevent land degradation. Respondents indicated that they practice shifting cultivation (84.4%) while 26.7% practice minimum tillage, 6.7% practice agroforestry and 6.7% make use of cover crops. Respondents during the focus group discusses further stated that they engage in crop rotation to restore soil fertility after every harvest. One respondent stated that he rotates between legume crops and maize. The majority of respondents during the focus group discusses stated that they use minimum tillage to avoid soil disturbances through using hand hoes. One respondent stated that he does not remove plant residues after harvest instead residues are kept under the soil to make green manure. Five respondents during the focus group discussion stated that they use animal and chicken manure to revive soil fertility. Respondents indicated that though they make use of animal manure, they have shortage of animals. The majority of respondents indicated that though they try to revive soil fertility through traditional farming methods they still use chemical fertiliser. Respondents in the focus group were further asked about the knowledge they have on sustainable farming.

**Table 4.17: Knowledge of sustainable agricultural practices by respondents: multiple responses**

Knowledge of sustainable agricultural practice	Frequency (n=45)	Percentage (%)
Conservation agriculture	10	22.2
Crop rotation	42	93.3
Intercropping	15	33.3
Green manure	32	71.1
Integrated agriculture	21	46.7
Animal manure	41	91.4

The respondents indicated that they have knowledge of the following sustainable agricultural practices. The majority of respondents stated that they have knowledge on crop rotation (93.3%), 91.4% of respondents know about the use of animal manure, while 71.1% of respondents know about the use of green manure, 46.7% of respondents have knowledge on integrated agriculture, 33.3% of respondents know about intercropping and 22.2% of respondents understand conservation agriculture. The results mean that among the smallholders interviewed, they have knowledge of sustainable agricultural practices, which can assist in the general practice of sustainable farming. During the focus group discussions

one respondent stated that sustainable farming is “yilokho abazali bethu ababekwenza uma belima besebenzisa izindlela zakudala zokulima, ezifana nokusebenzisa umquba wemfuyo” (sustainable farming is what our parents used to do when they farmed in the olden days, where they use animal manure instead of chemical fertiliser when they farm). Respondents during the focus group discussions indicated the importance of sustainable farming as one that results in improved production and soil fertility restoration. One respondent during the focus group discussion indicated that sustainable farming is important to preserve natural resources for his family and generations to come. Respondents were further asked about sustainable agricultural practices they engaged in. Table 4.18 indicates sustainable agricultural practices respondents engaged in.

**Table 4.18: Sustainable agricultural practices respondents engaged in: multiple responses**

Agricultural practices respondents engaged in	Frequency (n=45)	Percentage (%)
Crop diversification	41	91.1
Growing new crops	17	37.8
Crop rotation	43	95.6
Minimum tillage	34	75.6
Green/animal manure	40	88.9
Soil conservation	42	93.3
Intercropping	30	66.7
Irrigation	27	60.0
Integrated cropping	27	60.0

Table 4.18 indicates the different types of agricultural practices respondents engage in. The respondents engaged in the following sustainable agricultural practices: the majority of respondents (95.6%) practiced crop rotation, 93.3% of respondents practiced soil conservation, 91.1% practiced crop diversification, 88.9% used green and animal manure, 75.6% did minimum tillage, 66.7% used intercropping, 60.0% used irrigation, 60.0% did integrated cropping and 37.8% grew new crops. The results mean that among the smallholders interviewed, they are engaged in various sustainable farming practices. This could be explained by the fact that traditional farming practices also form part of sustainable farming. These results indicate that respondents identify more sustainable practices they

engaged in rather than they were aware of. This indicates that what they thought was traditional ways of farming constituting sustainable farming practice. As indicated previously, in the focus group discussion respondents indicated that in preventing soil degradation they do what their parents used to do. Thus the results imply that respondents are engaging in sustainable agricultural practices but do not define them as such. This is important in relation to research in this area since they should be more of a focus on the examination of actual practices rather than asking farmers about concepts which they may not be familiar with.

#### **4.7 Agricultural services (agricultural extension services, information on sustainable agricultural practices and organisational support)**

Researchers agree that sustainable agricultural practices are knowledge intensive as has been mentioned previously. Butler (2010) indicates that sustainable agriculture is knowledge intensive and uses few external inputs. He further argues that conservative agriculture is the one type of sustainable agriculture that contributes to economic, environmental and social sustainability for smallholders in the face of land degradation, declining available water and increasing energy costs. He highlights that conservation agricultural systems for smallholders are best developed through a multi-stakeholder adaptive learning process. Farmers, particularly those that are resource poor, have to be trained and supported in sustainable agricultural practices to keep them in the market and to ensure the sustainability of natural resources. It is necessary that smallholders access information and support so that they remain productive. Respondents in this study indicated that they received information and training on sustainable agriculture from extension officers. Table 4.19 below indicates that 91.1% of the respondents received information and training on sustainable agricultural practices. Table 4.19 indicates that all of these respondents received information and training on sustainable agriculture from extension officers.

**Table 4.19: If respondents received information or training on sustainable agricultural practices**

Respondents received information on sustainable agriculture	Frequency (n=45)	Percentage (%)
Yes	41	91.1
No	4	8.9

These results indicate that respondents receive support from the extension officers. This is so because in South Africa, the Ugu District one of the districts in the country that has a substantial number of smallholders. During focus group discussion three extension officers were part of the meeting. One of extension officer indicated that per annum they are required to visit at least 83 smallholders for support which is the target of the district. Respondents further indicated that training and information on sustainable agricultural practice is provided by extension officers. Table 4.20 displays the role of extension officers in terms of providing training and information to smallholders.

**Table 4.20: Displays who provides information and training on sustainable agricultural practice**

Responsibility of providing information and training	Frequency (n=45)	Percentage (%)
Extension officers	41	91.1
Not applicable	4	8.9

According to Akpalu (2013), South Africa has a large proportion of extension officers with the average ratio of 1:487 farmers almost equal to her European counterparts. Furthermore, Akpalu (2013) indicates the important role of extension officers in agriculture, as the key role players in agricultural development. They bridge the gap between researchers and farmers, since they know the needs of farmers as they are in constant contact with them, and inform researchers about the needs of farmers (Akpalu, 2013). In South Africa, the quality of extension support by officers is indicated as low, and extension officers lack group supervision by managers, and their morale is low as there are no incentives for good performance (Akpalu, 2013). Sikwela (2013) cites data from Stats SA (2010) in explaining the challenges faced by small-scale farmers in South Africa, in relation to accessing extension and training services. Aliber et al. (2010) and Aliber and Hall (2011) indicate the reasons

why smallholder farmers in South Africa have poor access to extension services, their argument is based on 2008 data from Department of Agriculture that showed that South Africa has only one-third of the required number of extension officers to meet its development goal. They further indicate that the current 80% of extension staff are not trained adequately in technical and farm management skills that benefit smallholder farmers. This implies that smallholders in South Africa do not get adequate information and the quality of information from the extension officers is problematic. Nonetheless, Akpalu (2013) indicates that South Africa has largest proportion of extension officers in Africa and this is almost equal to her European counterparts. The majority of the respondents (91.1%) in the study area indicated the availability of agricultural extension services in their areas. During the focus group discussion respondents indicated that they receive training on sustainable agriculture and soil fertility restoration from extension officers. One respondent indicated that they were taught to use lime for a period of three months before any planting to restore soil nutrients. During the focus group discussion, although the presence of extension officers might have influenced the discussion, respondents indicated that they were given information on “wise” farming as they are faced with soil infertility. The discussion did not focus on the quality of training and this needs further research attention. Table 4.21 indicates the type of agricultural extension service smallholders receive in the study area.

**Table 4.21: Agricultural extension services respondents received: multiple responses**

Agriculture extension service they received	Frequency (n= 45)	Percentage (%)
Crop diversification	44	97.8
Growing new crops	15	33.3
Minimum tillage	40	88.9
Green manure	32	71.1
Soil conservation	41	91.1
Animal nutrition	11	24.4
Intercropping	21	46.7
Irrigation	23	51.1
Integrated crop management	32	71.1

Almost all respondents (97.8%) indicated that they received extension support on crop diversification, 91.1% received information on soil conservation, 88.9% received support on

minimum tillage, 71.1% were supported on how to use green manure, 71.1% were supported on integrated crop management, 51.1% received information on irrigation, 46.7% were supported on intercropping, 33.3% received extension support on growing new crops and 24.4% received information on animal nutrition. All respondents stated that they did not receive incentives for engaging in sustainable agricultural practices. In countries where sustainable farming has been considered successful, such as in the Republic of Slovakia as highlighted by Palsova et al. (2014), government increased its commitment to implement sustainable agriculture. The authors state that the practice of sustainable farming is regulatory by the state that stimulated the development of sustainable agriculture, including financial support to farmers that practice sustainable farming. This suggests that incentives for the practice of sustainable agriculture can promote it eventually. Kassie and Zikhali (2009) suggest that at the government level there should be policy changes that put sustainable agriculture on par with conventional agriculture. They suggest that sustainable agricultural practices should be remunerated with stable market prices, to enhance the economic viability of adopting sustainable agriculture and that would provide safety nets for resource-poor farmers.

#### **4.8 Agricultural constraints faced by respondents in relation to farming**

As noted previously, smallholders are faced with numerous constraints, including natural disasters. Musvota et al. (2015) indicate that in South Africa a major challenge that is faced by the agricultural sector is degradation of land, soil and water resources. It is argued in the literature that smallholder farmers are resource-poor. They are at high risk of being affected by natural disasters. Musvota et al. (2015) indicate that South Africa has relatively low rainfall, they further indicate that climate change projections for South Africa indicates an increase in precipitation in some parts of the country and increase in extreme events such as floods and droughts. The respondents in the study area indicated that they have been affected by drought and floods. Table 4.21 shows that the majority of respondents (93.3%) indicated that they have been affected by floods, 84.8% were affected by droughts and only 4.4% of respondents were not affected by droughts and/or floods. The results clearly indicate that climate variations (specifically floods and droughts) affect smallholder farming in the case study area. Siulemba and Moodley (2014) highlight that climate change has affected smallholder farming in Africa, where the impacts are felt differently on the continent but



floods and drought have been the experienced phenomena in the continent. This means that adaptation to climate variations is fundamental to sustainable farming practices.

**Table 4.22: Respondents affected by droughts and floods: multiple responses**

Respondents affected by drought and floods	Frequency (n=45)	Percentage (%)
Drought	38	84.4
Floods	42	93.3
Not applicable	2	4.4

**Table 4.23: Measures taken by respondents against the effects of droughts**

Measures taken against the effect of drought	Frequency (n=45)	Percentage (%)
Stopped farming	5	11.1
Use rain water to irrigate	1	2.2
Use river water to irrigate	20	44.4
Wait for rain to come	19	42.2

Most of the respondents (44.4%) indicated that they used river water to irrigate, 42.2% of the respondents waited for the rainy season, 11.1% indicated that they stopped farming during drought and one respondent used rain water harvested during the rainy season. These results suggest that floods and droughts affect food security of smallholder farmers. All respondents indicated they mitigate against flooding by opening water ways. Respondents in this research indicated various other constraints that hinder their farming practices and this is indicated by Table 4.24 below.

**Table 4.24: Agricultural constraints faced by respondents in relation to farming: multiple responses**

Agricultural constraints	Frequency (n=45)	Percentage (%)
Lack of fertiliser	27	60.0
Lack of farm labour	23	51.1
Infertile soils	40	88.9
Lack of land	16	35.6
Shortage of tractors	1	2.2
Wild pigs and moles	22	48.9

The majority of respondents (88.9%) indicated soil infertility as a constraint, 60% of respondents indicated lack of fertiliser, 51.1% indicated lack of farm labour, 48.9% indicated wild pigs and moles, 35.6% indicated lack of land and 2.2% indicated shortage of tractors. It emerged in the group discussion that there was problem of wild animals such as moles and monkeys destroy crops. Although this was managed by the environmental section of the Ugu Municipality by the programme called “animal problem management” where animals were removed, one respondent indicated that the problem is still persistent.

#### 4.9 Mitigation strategies

Smallholder farmers in South Africa are faced with a number of challenges that are institutional and structural such as the lack of adequate support by extension officers, lack of access to the factors of production, access to market, lack of agricultural inputs and climate change. The table below displays measures taken by respondents against the lack of fertiliser.

**Table 4.25: Measures taken by respondents to mitigate against lack of fertiliser: multiple responses**

Measures taken against lack of fertiliser	Frequency (n=45)	Percentage (%)
Borrow money	9	20.0
Remittances	16	35.6
Use animal manure	6	13.3
Buy little fertiliser	7	15.6
Plant without fertiliser	5	11.1
Not applicable	2	4.4

Table 4.25 above shows actions taken by respondents to mitigate against the lack of fertiliser. Thirty six percent indicated that they used remittances to buy fertiliser, 20% borrowed money to buy fertiliser, 15.6% indicated to use/buy little fertiliser, 13.3% indicated to make use of animal manure and 11.1% of the respondents indicated that they planted without fertiliser. The responses reveal that although respondents had shown high levels of sustainable agricultural practice, they still use minimal chemical fertiliser. Butler (2010) indicates that conservation farming is one type of intensive sustainable agriculture that contributes to economic, environmental and social sustainability for smallholders. The author further

highlights that the key principle is to create a balanced system than simply substituting one input for another but a systems approach that could include improved seed and selective fertiliser use. This is in line with current practices among smallholders in this study.

**Table 4.26: Measures taken by respondents against shortage of farm labour: multiple responses**

Measures taken against lack of farm labour	Frequency (n=45)	Percentage (%)
Hire labour	26	57.8
Use family labour	17	37.8
Reduce farming land	6	13.3
Not applicable	2	4.4

In mitigating against the shortage of labour, Table 4.26 shows that 57.8% of the respondents used hired labour, 37.8% used family labour in case of labour shortage and 13.3% of the respondents farmed on smaller pieces of land when they experienced labour shortages. The responses reveal that the shortage of labour hinders sustainable farming practices as it tends to be labour intensive. It affects production, as more money is needed to hire labour and reduction of farm land results in less production that affects the livelihoods of respondents, including food security. Marenya and Barrett (2007), Mazvimavi and Twomlo (2009), Tiwali et al. (2009) and Siulemba and Moodley (2014) identify labour as a factor that influences the adoption of sustainable farming. They argue that lack of labour may hinder the adoption of sustainable farming practices.

**Table 4.27: Measures taken by respondents to mitigate against infertile soils: multiple responses**

Measures taken against infertile soils	Frequency (n=45)	Percentage (%)
Natural fallows	5	11.5
Use of fertiliser	7	15.6
Use animal manure	7	15.6
Use lime	26	57.8
Not applicable	5	11.5

Smallholder farmers usually farm in marginal lands where soil infertility is a challenge. The table above shows the actions respondents take to revitalise soil with 57.8% using lime, 15.6% using fertiliser, 15.6% using animal manure, 11.5% using natural fallows and 11.5% did not respond.

**Table 4.28: Measures taken by respondents to mitigate against lack of land: multiple responses**

Measures taken against the lack of land	Frequency (n=45)	Percentage (%)
Borrow land	15	33.3
Use available land	30	66.6

The respondents indicated that in a situation where they lack land, they either borrow additional land or farm only the land they have. This is illustrated by the table above where 66.6% of the respondents used the available land, while 33.3% borrowed additional land.

**Table 4.29: Measures taken by respondents against lack of finances: multiple responses**

Measures taken against lack of finance	Frequency (n=45)	Percentage (%)
Remittances	20	44.4
Grants	27	60.0
Ask help from government officials	4	8.9
Borrow money from friends and relatives	2	4.4
Wait for salary	1	2.2

The respondents indicated that when they lack finances to pursue farming, 60.0% rely on government grants, 44.4% rely on remittances, 8.9% receive help from the government official with seeds and fertiliser, 4.4% borrow money from friends and relatives and 2.2% rely on their salaries. The results mean it is very difficult for smallholders interviewed to buy farming inputs such as hiring of labour as smallholder farming is labour intensive. The findings also mean it hinders sustainable farming practices as it is labour intensive. Respondents indicated lack of access to loans. In the focus group discussion respondents indicated that the lack of access to loans as banks do not support them as smallholders. Respondents indicated that the situation is discouraging to them to pursue farming. This eventually affects sustainable farming practice and may lead to food insecurity which

eventually results in hunger and starvation. Chisasa (2014) and Moyo and Coetzee (2002) highlight that smallholder farmers have a challenge in accessing loans from commercial banks in South Africa because they are considered as having high default risk.

This chapter has presented the results and the discussion of the findings of the study. From the study a key conclusion is that smallholder farmers practice both traditional methods of farming and farming using chemical fertiliser. Smallholder farmers are still using chemical fertiliser which results in soil acidification where they end up using lime to neutralise the soil. The results of this study show high percentages of sustainable agricultural practices amongst smallholders interviewed. The smallholders indicated that they used crop rotation, animal manure, green manure and integrated crop farming which are traditional farming methods. The use of traditional farming methods could be attributed to the fact that these smallholder farmers are resource-poor. This is indicated by the few assets they have. Among those who have access to tractors; these are tractors from the Department of Agriculture.

#### **4.10 Conclusion**

Considering the resource endowment of the respondents, it can be concluded that smallholder farmers are not in a position of pursuing and sustaining their livelihoods strategies because of lack of resource endowment. Although the smallholders interviewed have access to land, as indicated above, the majority of respondents have access to land that is more than 5 ha for agricultural purposes but none indicated to be beneficiaries of the land distribution programme of the government. Although this was not probed in detail in this study, it is important to understand that land redistribution is part of the government policy for rural development where smallholders are expected to play a major role. Respondents further indicated that they farm land that is infertile which affect production. Smallholder farmers stated that they do not have access to financial resources, including access to loans. In order to buy agricultural inputs, smallholders rely on their pensions, social grants, wages and remittances.

## **CHAPTER FIVE: CONCLUSION AND RECOMMENDATION**

### **5.1 Introduction**

This chapter presents the summary of the research findings. The findings are discussed in relation to the aim and objectives of the study. The study examines the farming practices among smallholder farmers in the Ugu District, specifically looking at whether they practice sustainable agriculture. This is done using the SLA which is the conceptual framework against which the research is conducted. The pillars of sustainable livelihoods such as the availability of human, natural, financial, social and physical capital are the prerequisite for sustainable livelihoods in rural development. The SLA assists in examining the prevailing conditions against which sustainable farming can be possible. It is against this background that the conclusion and recommendations are drawn.

### **5.2 SLA, sustainable farming and sources of income**

The SLA is an approach as mentioned in the literature review that was crafted to address rural development from the 1980s. The approach seeks to address the root cause of poverty in rural areas not from the perspective of a top-down approach but from the perspective of a bottom-up approach. The focus was to look at the hindrances that limit rural people to have sustainable livelihoods. The SLA is based on the availability and the exposure of rural people to five pillars of sustainable livelihoods, that is, human, natural, financial, social and physical capital. In the study area all respondents indicated that they sell agricultural products as their main source of income. The main crops that respondents have grown in the last season were maize, beans and vegetables. The land that most respondents cultivated during the last season was more than 5 ha and the rest of respondents cultivated less than 5 ha. It has been established that not all land was cultivated during the last season of study. The total land cultivated was checked against the available land for cultivation, and only 33.3% of the respondents indicated that they have cultivated all the land available to them for cultivation. The main reasons cited by respondents for not cultivating all the land included lack of labour, fertiliser, seeds, acidic soils, shortage of equipment, poor rainfall, lack of grazing land and steep land. It was also established that respondents have other sources of income which

included government grants, pension, remittances, sale of livestock and others had full-time and part-time jobs.

### **5.2.1 Human capital**

Scoones (1998) refers to human capital as skills, knowledge, and ability to work and good health, which rural people should possess for sustainable livelihoods. Smallholder farmers possess human capital through education, training in sustainable farming practices and constant support. The findings in this research indicated that the majority of respondents have primary education and only a few indicated no formal education. This finding on the level of education has disadvantage when information is cascaded as it has been indicated previously that sustainable farming practices is knowledge intensive. Respondents indicated that they receive support from extension officers.

### **5.2.2 Financial/economic capital**

Access or availability of economic or financial capital is an important aspect for smallholder farmers in ensuring sustainable livelihoods. Financial capital includes access to cash, credit and savings (Scoones, 1998). The author further argues that financial capital includes basic infrastructure and production equipment and technologies which are valuable to pursue sustainable livelihoods. In this study area respondents indicated that they own few assets that are basic items for subsistence farming. Respondents owned the following assets; hand hoes, ploughs, slashes and axes. The respondents further indicated the lack of agricultural inputs such as farm labour and tractors. Furthermore, all the respondents did not have access to agricultural loans. This means that smallholders interviewed lack financial capital for sustainable livelihoods.

### **5.2.3 Social capital**

Scoones (1998) refers to social capital as networks, social claims, social relations, affiliations and associations upon which people draw from when pursuing different livelihood strategies. Social capital includes accessibility to information by smallholder farmers through agricultural extension services. Accessibility to information by smallholder farmers on sustainable agricultural practices is necessary to ensure productivity of farmers. It is

important for ensuring that natural resources are protected to sustain the very same smallholder farming to feed current and future generations. The majority of respondents indicated that they received information on sustainable farming from extension officers. According to Aliber et al. (2011), although South Africa has a substantial number of agricultural extension officers they are not adequately trained in technical and farm management skills. This means that smallholders interviewed have access to information from extension service providers but the quality of the services provided may not be adequate. This was not probed in this study and it is recommended that future research examine this aspect in relation to the support provided to smallholder farmers.

#### **5.2.4 Natural capital**

Scoones (1998) refers to natural capital such as soil, water, air, genetic services and environmental services. Respondents in the study area indicated that they have access to agricultural land and river water for irrigation. They further indicated that the land they have access to is infertile which hinders production and sustainable farming practices.

#### **5.2.5 Physical capital**

Scoones (1998) refers to physical capital as transport and communication systems, shelter, water and sanitation system and energy. Access to these physical assets is important for smallholder farmers to farm sustainably. Respondents during the focus group discussions indicated that roads are inaccessible in places where they farm. This eventually affects production. It can, therefore, be said that physical capital is a structural challenge that affects smallholder farmers to practice sustainable farming.

### **5.3 Findings with regard to the aim and objectives of the research**

The research findings indicate that smallholders interviewed practice both sustainable farming and conventional farming (where chemical fertiliser is used due to soil infertility and acidification). The research findings indicate that smallholders interviewed have high levels of sustainable agricultural practices which include crop diversification, growing of new crops, crop rotation, minimum tillage, use of green manure, soil conservation, intercropping, irrigation and integrated cropping. The study further looked at the attitude of smallholder



farmers towards sustainable agriculture. The research findings indicate that smallholders interviewed have positive attitudes toward sustainable agricultural practices for the restoration of soil fertility and improved production. Regarding the challenges faced by smallholders interviewed in relation to sustainable farming practices, the study found that they lack farm labour and adequate land, experience soil infertility challenges, they are faced with droughts and floods, there is a shortage of tractors, threats by wild pigs and moles that destroy their crops, and they lack access to loans.

#### **5.4 Recommendations**

The South African government intends to gradually transform smallholder farmers into commercial farmers as has been mentioned earlier on. The graduation of smallholder farmers to commercial farmers cannot be done to the detriment of natural resources. The emphasis should be placed on sustainable farming as it assists in the protection of natural resources such as land and water which are vital in sustainable farming. Aliber and Hall (2012) suggest that the government should ensure that right institutional environmental policies are in place to assist smallholders. The authors further suggest that there should be generic support and infrastructure in the region where smallholders are concentrated so as to access services such as tractors and overcoming high transaction costs. According to Andersson et al. (2013), the most critical challenges facing smallholder farmers in SSA is high rainfall variability and low soil fertility.

Soil quality and soil health is important for all agriculture, large or small. Underwood et al. (2011) highlight that soil biological properties and soil organisms are of great importance in monitoring soil quality. Underwood et al. (2011) state that the practice of organic farming such as crop rotation, cover crops, organic amendments, composts and green manure can improve soil microbial activity and biomass, increase soil organic carbon and increased levels of organic matter and the that the use of farmyard manure fosters natural enemies and biota (such as earthworms) needed for enhanced pest control and recycling nutrients.

The authors suggest the low-cost ecological sanitation (Ecosan) and water harvesting as a policy option to help smallholders in the SSA and beyond in fighting high rainfall variability and low soil fertility. According to the authors, Ecosan is the recycling of nutrients from human excreta to agriculture, and can simultaneously improve sanitation, prevent pollution

and enhance soil fertility. The authors further suggest that to minimise the impact of dry-spells in smallholder food production, water harvesting and conservation technologies should be used. They argue that the principal hydrological functions of water harvesting are to reduce surface runoff in favor of enhanced infiltration and soil moisture, and to reduce soil evaporation in favor of enhanced crop transpiration. In the study conducted by the authors in South Africa, the ability of Ecosan to meet some of the nitrogen demand of soils, increased yields in most conditions and Ecosan could be a useful policy option for generally improving smallholder food production in the SSA region, however, they indicate that side effects of Ecosan application could hamper food production if precautionary measures are not taken into consideration. They further argue that Ecosan requires social acceptance and adequate attention to avoid adverse impact on public health and water harvesting could be a policy useful alternative for improving food security in the most critical low yielding conditions.

#### **5.4.1 Recommendations linked to the study**

In this study when data was collected from smallholders, the greatest challenge as noted under limitation of the study was inaccessibility to roads where smallholders farm and reside. This affects communication and dissemination of information by interested parties including extension officers. This was reiterated by respondents during the focus group discussion that their roads were inaccessible and poor topography makes it difficult for them to farm. Accessible roads have to be constructed for farmers to access services such as tractors and markets. Respondents indicated in this research that they lack access to tractors. There is a concentration of smallholder farmers in Qoloqolo (Mthwalume). They need to be provided with tractors which they can share.

Respondents further indicated that they access water for irrigation purposes from rivers and that rain water is not harvested. The local municipality should provide water tanks to smallholders so that they can harvest rain during rainy seasons to use for irrigation. Respondents indicated that the soil is not fertile where they farm, echoing that they farm in places that are fragile. Research indicates that the restoration of soil fertility in sustainable farming can be done through crop rotation, crop cover, use of composts and green manure, to name a few measures adopted. Extension officers have to provide information and follow-up on the practices of sustainable farming. Wild animals such as monkeys, wild pigs and moles remain a persistent problem since they destroy crops. Although the local municipality

undertook a programme to remove wild animals from the area, this remains a concern in the area. This problem has to be addressed differently from the previous initiative by the municipality.

## **5.5 Concluding remarks**

The greatest challenge in studying sustainable agriculture is that there are so many different types of sustainable agricultural practices including traditional agriculture. It is difficult to conclude that smallholder farmers in the Ugu District do not engage in sustainable agriculture or they practice it by accident as they lack necessary resources. Aliber and Hall (2012) indicate that in South Africa only four districts, that is, Vhembe in Limpopo, Ugu in KwaZulu-Natal, OR Tambo in the Eastern Cape and Ehlanzeni in Mpumalanga have smallholder farmers. The study conducted in the Ugu District cannot be generalised to other districts as they are run by different provinces with their own policies and strategies. It can be established that the practice of sustainable farming is influenced by the geographical location as well as the social and cultural conditions of the area. Nevertheless, a conclusion can be drawn that smallholders in the Ugu District practice both conventional and traditional farming methods which is indicated by respondents' responses that they use chemical fertilisers in planting crops such as maize. Respondents indicated that they have a vast knowledge of sustainable farming which is similar to traditional farming methods such as crop rotation, use of cover crops, use of compost and green manure. Sustainable farming in the study area is hampered by enormous challenges including soil infertility, labour and water shortages.

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## Appendix 1 Household questionnaire

### **Sustainable agricultural practices in smallholder farming systems in Port Shepstone, KwaZulu-Natal questionnaire**

Good day, I am undertaking a survey of sustainable agricultural practices in smallholder farming systems within your community on behalf of a student, Miss Dudu Cele for her Master's degree at the University of KwaZulu-Natal. May I ask you a few questions in this regard? Your answers will be treated confidentially and anonymously. If at any time during the interview you do not wish to continue, please feel free to do so. Thank you for your participation.

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#### Section A: Demographic profile of respondents

A1. Gender (Note, do not ask):

1. Male	2. Female
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A2. Age (in years)

A3. Are you the head of the household?

1. Yes	2. No
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A4. Marital status

1. Married	2. Single	3. Divorced	4. Widowed	5. Other (specify)
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A5. What is your highest level of education completed?

1. None	2. Primary school	3. Secondary school	4. Certificate/ Diploma	5. Undergraduate degree	6. Postgraduate degree	7. Other (specify)
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A6. How many people currently reside in your household?

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A7. How long have you been a farmer? No of years

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A8. Other than farming do you have other income paying job?

1. Yes	2. No
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A8.1. If yes, what is your occupational status?

1. Labourer/ unskilled	2. Sales/ marketing	3. Administrator	4. Business person	5. Professional	6. Artisan/ technician	7. Housewife	Other (specify)
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A9. What are the main sources of income in your household?

1. Government grant	2. Pension	3. Sale of livestock	4. Sale of agricultural produce	5. Full-time paid job	6. Part-time paid job	7. Own business	8. Remittances	9. Other (specify)
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A10. Do you employ people for labour or use family members in your farm?

1. Employ labour, how many?
2. Use family member, how many?

### **Section B: Land, Tenure, Land use and management**

B1. How much total land do you own (in hectares?)

1. Total land own	2. Don't know	3. No response
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B2. Do you have title deeds for your land?

1. Yes	2. No
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B3. How did you acquire your land?

1. Inherited	2. Tribal authority apportioned for me	3. Applied to department of Land and Rural Development	4. Land restitution	5. Don't know	6. No response	7. Other (specify)
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B4. Does your owning of land encourages you to engage in natural resource management? (Yes/no)

B5. What methods do you use to practice natural resource management?

1. Shifting cultivation	2. Agro-forestry	3. Minimum tillage	4. Planting cover crops	Other (specify)
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B6. Who is responsible for managing land resources in this community?

1. Chief/ traditional authority	2. Community-based organization/elected committee	3. Government official	4. NGO	5. Consultants	6. Other (specify)
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### **Section C: Economics and sustainable livelihoods**

C1. How much agricultural land did you cultivate last season (in hectares?)

1. 0.5-1.0 ha	2. 1.5-3 ha	3. 3.5 ha-5 ha	4. > 5 ha( specify)
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C2. How much of the total land available to the household for agricultural production did this make up?

1. 1- 20 %	2. 21-40%	3. 41-60%	4. 61- 80%	5. 80- 99%	5. 100%
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C3. If not cultivated all land available, what were the reasons for not cultivating?

1.Inadequate labour	2.Lack of fertiliser	3. Poor rainfall	4. Lack of seeds	5. Other(specify)
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C4. Did you extend the land or open new land for cultivation?

1.Yes	2. No
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C5. What were the reasons for opening up or extending land for cultivation (open ended question)

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C6. What crops did you grow last season? (Multiple responses)

Crop

Maize
Vegetables
Beans
Sugar-cane
Other (specify)

C7. Did you sell any of the agricultural produce you cultivated last season?

1.Yes	2.No
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C7.1 If yes, quantify the net gained in Rands

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C8. Did you fail to sell any produce?

1.Yes	2.No
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C9. What was your major reason for failing to sell crops? (Open ended question)

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C10. Where do you sell your agricultural produce?

1. Sell at the market	2. Sell within the community	3. Sell to local supermarket	4. Customers come to buy	Other(specify)
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C11. Does your household buy or grow most of the food needed for household consumption?

1. Buy	2. Grow	3. Both
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C11. Which of the following agricultural assets do you own? (Multiple responses)

1. Hoes
2. Ploughs
3. Tractors
4. Rippers
5. Slashes
6. Axes
7. Harrows
8. Ridgers
14. Other (specify)

C12. What is your main source of fuel for cooking?

1. Charcoal	2. Firewood	3. Paraffin	4. Gas	5. Electricity	6. Solar power	7. Generator	8. Other (specify)
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C14. What is your main source of fuel for lighting?

1. Charcoal	2. Firewood	3. Paraffin	4. Gas	5. Electricity	6. Solar power	7. Generator	8. Other (specify)
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C15. What is your main source of fuel for heating?

1. Charcoal	2. Firewood	3. Paraffin	4. Gas	5. Electricity	6. Solar power	7. Generator	8. Other (specify)
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**Section D: Sustainable Agricultural Practices**

D1. Do you know that agriculture depends on the natural resources and if not practised properly it can deplete the soils and destroy the way you live?

1.Yes	2.No
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D2. What sustainable agricultural practices do you know of?

1.Conservation agriculture	2.Crop rotation	3.Intercropping	4.Green manure	5.Integrated agriculture	6 Other (specify)
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D3. Do you engage in any of these farming practices?

1.Yes	2.No
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D4. If you do not engage in any of these practices, what are your reasons? List reasons for not adopting

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D5. Are there any incentives for engaging in any of the sustainable agricultural practices on your farm?

1.Yes	2.No
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D6. If yes, what are these incentives? List incentives

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D7. Have you ever received information or training about sustainable agricultural practices?

1.Yes	2.No
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D8. Who provided information or training? List

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D9. What percentage of your farm do you use sustainable agricultural practices?

1.1- 20%	2.21- 40%	3. 41- 60%	4. 61- 80%	5. 81- 99%	6.100%
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D10. Are there any organizations or institutions that encourage or promote sustainable agricultural practices in this community?

1.Yes	2.No
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D11. Please name the organisation mentioned above and sustainable agricultural practices/technology they promote

Organisation

Sustainable agricultural practice

1.	
2.	
3.	
4.	

D12. Are you a member of any organisation or farmer group?

1. Yes	2. No
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D13. Which organisation or farmers group do you belong to?

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D14. In your own opinion do you think the sustainable agricultural technologies are appropriate for use on your farm?

1. Yes	2. No
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D14.1. Give a reason for your response?

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D15. Do you know what integrated and diversified farming?

1. Yes	2. No
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D16. If yes, what is integrated and diversified farming? ?

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D17. In your own opinion would you say sustainable agriculture should be practiced?

1. Yes	2. No
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D18.1. If yes, list reasons

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D18.2 If no list

Reasons \_\_\_\_\_

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\_\_\_\_\_

**Section E. Agricultural Services**

E1. Are there agriculture extension services in your area?

1. Yes	2. No
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E2. Does your household receive any agriculture extension services?

1. Yes	2. No
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E3. In which areas does your household receive the agriculture extension services?

1. Crop diversification	2. Growing new crops	3. Minimum tillage	4. Green/animal manuring	5. Soil conservation	6. Animal nutrition	7. Inter-cropping
8. Irrigation	9. Integrated crop management	10. Other (specify)				

E4. Do you have agricultural information centres where you get information about agriculture in your area?

1. Yes	2. No
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E5. Have you ever accessed information about sustainable agricultural practices?

1. Yes	2. No
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E6. Has your household adopted any of the following technologies?

1. Crop diversification	6. Soil conservation
2. Growing new crops	7. Inter-cropping
3. Crop rotation	8. Irrigation
4. Minimum tillage	9. Integrated crop management
5. Green/animal manuring	10. Other (specify)

E7. If not adopted any technology, what are the reasons? List reasons

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Section F: Agricultural constraints**

F1. What constraints do your household face relating to agricultural productivity?

1.Lack of fertilizer	2.Lack of farm labour	3.Infertile soils	4.Lack of land	5.Draught	6.Floods	7.Other (specify)
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F2. How do these constraints affect your household's livelihoods?

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F3. Do you mitigate against lack of fertiliser?

1.Yes	2.No
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F3.1. If yes, how do you do it?

1.Sell household assets to raise money for fertiliser	2.Borrow money from friends and relatives	3.Remittances	4.Planted crops that do not need fertiliser	5.Other (specify)
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F4. Do you mitigate against lack of farm labour?

1.Yes	2.No
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F4.1. If yes, how do you do it?

1.Sell household assets to hire labour	2. Reduce land cultivated	3.Form working parties	4.Other (specify)
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F5. Do you mitigate against infertile soil?

1.Yes	2.No
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F5.1. If yes, how do you do it?

1.Plant agro-forest/ trees	2.Leave land as natural fallow	3.Slush and burn	4.Use fertilisers	5. Shifting cultivation	5.Other ( specify)
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F6. Do you mitigate against lack of land?

1.Yes	2.No
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F6.1. If yes, how do you do it?

1.Rent land	2.Migrate to other areas	3.Borrow land from relatives	4.Just use what you have	5.Other ( specify)
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F7. Do you mitigate against the lack of finances?

1.Yes	2.No
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F7.1. If yes, how do you do it?

1.Sale of assets	Look for jobs	3.Remittances from relatives	4.Government grants/ pension	5.Other (specify)
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F8. Have you ever received a loan to invest in agriculture?

1.Yes	2.No
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F9. Have you ever been affected by drought in your household?

1.Yes	2.No
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F9.1. how did you mitigate the effect of drought in your household? (Open ended question)

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F10. Have you ever been affected by floods in your household?

1.Yes	2.No
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F10.1. How did you mitigate the effect of floods in your household? (Open ended question)

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F11. Have you ever been affected by any other natural disaster in your household? If yes, indicate type of disaster.

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**THANK YOU!**

## **Appendix 2**

### **Focus group discussion guiding questions**

One focus group discussion will be carried out in the farming community. The group is envisaged to be composed of 8-10 small-scale farmers, purposefully chosen by the number of years involved in farming and their role in farming committees.

Aim:

To get an in depth understanding of the perceptions of small-scale farmers on the adoption of sustainable agricultural practices.

Questions to consider in relation to sustainability of agriculture among small-scale farmers in the community.

- What do they understand about agricultural sustainability? Is it an important issue to them?
- What are the characteristics of farming systems among farmers and how do these farming systems impact on natural resources?
- What measures do they take to mitigate against the impacts of soil infertility, droughts/floods (climate change effects) so that they remain productive?
- Are there institutions within the community to support adaptive response and are sustainable agricultural practices available, if available, are they suitable? Are these institutions working?
- How do they perceive the sustainable agricultural practices in terms of appropriateness to their agricultural system?
- What role do they play in the development and dissemination of sustainable agricultural practices?
- What are the main issues that impede agricultural growth in the community via-a-vis adoption of sustainable agricultural practices?
- What support do small-scale farmers need from government in order to farm sustainably?