



University of Venda

Masters Dissertation

**Evaluation of community based irrigation scheme: The case study of Tshiombo
irrigation scheme**

By

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Declaration

I, Mudau Mafulo Stenley, hereby declare that the research for the Master of Environmental sciences degree (MENVSC) at the University of Venda, hereby submitted by me, has not been submitted for a degree at this or any other university, and that it is my own work in design and execution and that all reference materials contained have been duly acknowledged.

Student: Mr MS Mudau

Signature..... Date:

Dedication

I sincerely dedicate this Masters Dissertation to my parents, siblings, entire family at large and university of Venda community. Their presence played a vital part in this study. They have been the motivation behind the completion of this dissertation. In fact, there are my God's greatest gifts.

Acknowledgements

To claim that I bore this alone would be unfair. I am obliged to a number of people and institutions for their priceless, moral and material support during the period of my Masters studies. The University of Venda provided inspiring environment for this project. Dr NV Mudau and Mr MJ Mokoemo deserve special thanks and appreciation. They did not only guide me as my supervisors and mentors; they went beyond the call of duty to provide me with parental advices. I am gratefully acknowledging the financial support of the University of Venda (work study), and hand-outs from friends during desperate times. Again, I am indebted to Vhembe Department of Agriculture officials who worked tirelessly with Tshiombo irrigation scheme extension officers and its farmers for allowing me to interview them and also for letting me to use their resources in realising this project.

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Abstract

Agricultural abandonment is a challenge in areas of South Africa more especially in rural areas. The study employs both qualitative and quantitative methods of in sampling and collection and analysis. It adopted a case cross-sectional study design. This design is a case study in nature, hence this study compared the active and none active farmers in identifying the causes and effects of the phenomenon studied. Comparatively, the study sought to find out if there are factors influencing farm abandonment and its consequences in Tshiombo village. The study was based on field surveys allowing for observation and with respect to agricultural abandonment. In addition to observation open ended questions together with questionnaires were administered to extension officers. The data collected from open ended questions and questionnaires was recorded and subjected to descriptive analysis. Several factors have been identified influencing farm abandonment. The challenges ranges from needs prioritization, infrastructure and capacity. It was recommended that government should reinstate its support to small scale farmers prioritize the maintenance of irrigation canals. The prioritisation of agriculture will attract many into agricultural practice with the aim of reducing poverty and starvation in rural communities.

Acronyms

AC	: Active Farmers
AB	: Abandoned farmers
AIDS	: Acquired immunodeficiency syndrome
EXT	: Extension officers
EU	: European Union
FAO	: Food and agriculture organization
FEWSNET	: Famine early system network
HIV	: Human immunodeficiency virus
HNV	: High nature value
N	: Total
PTO	: Permission to occupy
WHO	: World health organization

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CHAPTER ONE: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1. Introduction

Agriculture is one of the most important economic activities in the world. It provides people with basic products that are essential for life. Farming as we know it today, developed gradually from hunting and gathering to crop production and the rearing of animals. Crop production and animal rearing meant that people were now permanently settled in specific areas. Due to the uncontrolled land use, and poor soil management by the land users, this resulted in land degradations. Once land became unproductive, it was abandoned. The environmental impacts of abandoned farmland could be either a chance for the ecological restoration of the state of the land to its original state prior to agricultural activities, or the failure of the land management process that potentially threatens the surrounding biodiversity (Haddaway *et al.*, 2013). The threat posed by the abandoned agricultural land depends on the ecological opportunity in the context of the agricultural history and the presence of the ecological systems that depend on land management for their existence (Haddaway *et al.*, 2013).

According to Bedeke, 2011, Community-based Irrigation is the collective management of irrigation water to improve human well-being and poverty reduction. It aims to devolve authority of irrigation water management to the local (community) level, thereby empowering communities to manage their own resources without permanently damaging, depleting or degrading them. According to Braimah et al, 2014, local users of irrigation resources, if empowered as a group to participate actively in the management of water resources, have the incentive to manage it more efficiently and sustainably than a wholly centrally financed government agency.

According to Pointereau *et al.*, 2008, farmland abandonment can be defined as the cessation of agricultural activities on a given surface of land. Farmland abandonment occurs when a particular stretch of land becomes unproductive, hence ceases to be economically viable or sustainable (where changes in farming practices have been

expanded and failed) (MacDonald *et al.*, 2000). It should be noted that there is a lack of standardised definitions of this concept. Another problem is the difficulty of matching the concept with available data for an accurate estimate of abandoned areas. Ramankutty and Foley (1999) concluded that the abandoned global cropland was estimated to be over 1.47 million km² between the years 1700 and 1992.

The abandonment of land has a number of well-studied causes which include environmental (for example, reductions in soil fertility), economic (for example market globalization) and, social and political (for example rural depopulation) (Hobbs and Cramer, 2007). Pointereau *et al.*, 2008, suggest that the abandonment of intensive agricultural land often results in the ecological benefits for the affected piece of land, while the abandonment of low-intensity agricultural land is more likely to result in a negative ecological impact, owing to the role of such agricultural practices in maintaining systems classified as high nature value (HNV). From a social and economic perspective, an abandoned agricultural land is usually regarded as detrimental owing to the implication of the loss of employment and income in the rural areas. Resilience and the adaptability of farming systems are controlled by a number of factors, including remoteness, climate and physical constraints, traditional cultural values and the limited skills among the local population (MacDonald *et al.*, 2000). The limitations to adapt may be compounded by a historical paucity of agricultural practices in these areas (Jodha, 1990).

The number of environmental factors such as climate, soil, topography, economic, social and political have influenced farm abandonment both globally, especially in South Africa (FAO) 1999. In this country, for instance, the land redistribution policy has left some formerly productive farms abandoned in certain areas (Kirsten, 2011). The noted examples include, among others, farms in Tzaneen (Limpopo Province) and others in the Eastern Cape Province (Mbanga, 2012). The same applies to other African states that have embarked on a radical land reform policy, with Zimbabwe a typical example here. The country was once Africa's bread basket due to its agricultural production. Zimbabwe's radical and politically driven land policy resulted in mostly white-owned agricultural land being abandoned by its owners who fled the country in fear for their lives (Moyo, 2007).

Those who took over (mostly former liberation struggle guerrillas), unfortunately, failed to productively utilise the swathes of land they had occupied (Munyoro, 2006). The results were devastating hunger, chronic starvation and an unstable economy as Zimbabwe could no longer produce enough food for its population, and export.

1.2. Problem Statement

The increase of abandoned agricultural land since 1994 is a serious challenge to South Africa's rural communities as it includes both the traditional and government owned pieces of land. Agriculture is the backbone of this country's economy, hence an essential part of rural dwellers' subsistence. Be that as it may, certain rural areas have shot themselves in the foot as they have vast tracks of abandoned land. A case in point is that of Tshiombo irrigation scheme where farmland has been abandoned. That is, much of the land that used to be very productive now lies fallow. This implies that there are factors that contribute to this negative state of affairs in our farms. Equally concerning are the consequences that follow farm abandonment in South Africa, especially in the Limpopo Province. Thus, the abandonment of agricultural land has serious implications for food security in this country, if not the region as a whole.

Given this dichotomous situation, the study's problem is the under researched abandonment of agricultural land and its inherent consequences at the Tshiombo Irrigation Scheme.

1.3. Aim of the Study

The aim of this study is to investigate the impact of the abandoned agricultural land at the Tshiombo Irrigation Scheme, in the Vhembe District of Limpopo Province, South Africa.

1.4. Objectives

The following make up this study's objectives;

- To find out why some agricultural land was abandoned in Tshiombo Irrigation Scheme.
- To identify the social and economic impacts of abandoned agricultural land.
- To identify suitable supportive strategies that can help the remaining small-scale-farmers to survive in Tshiombo.
- To find out how farm abandonment can be reduced in Tshiombo.

2. Research Questions

The study answered the following main research question;

- Why do farmers abandon their agricultural land in Tshiombo and what are the consequences for this?

In order to fully answer the above question, the study answered the following secondary questions as well;

- What are the social and economic impacts of abandoning agricultural land in Tshiombo?
- What are the suitable supportive strategies that can help small-scale-farmers to continue practising their agricultural activities in Tshiombo?
- How can the abandonment of agricultural land in Tshiombo be reduced?

3. Description of the Study Area

The purpose of this section is to provide a geographical outline of the Tshiombo Irrigation Scheme, where its social and physical settings are prominent here. Tshiombo Irrigation Scheme is situated at 22^o 48 South and 30^o 26 East, and about 30-45 km from Thohoyandou. Mutale River borders it to the north, and to the east, there is Mudaswali River. The southern side of the irrigation scheme has the village's main road as its boundary. The area lies approximately 648 to 650 meters above sea level. The total area is about 110.596 hectares, with 931 fields, of which each one is approximately 1.286 hectares in size. According to the 1996 census, there were approximately 2500 people resident in the seven villages that make up Tshiombo Community. These are, Matangari, Tshiombo, Maraxwe, Mianzwi, Muhotoni, Mbahela and Mutshenzheni.

There are several factors that influenced the turning of this area into an irrigation scheme. The area is arable and fertile, and is endowed with plenty water, what with the perennial Mutale River. The soil is dark-brown loam, sand, most suitable for agricultural purposes. Its structure is crumbly with medium porosity. The infiltration capacity is high and the texture is fine. This type of soil promotes the growth of crops because it is rich in plant nutrients. Farmers here practise crop rotation as a natural way of conserving and preserving soil and its nutrients. The commonly grown crops are, *inter alia*, sweet potatoes, maize, and groundnuts. To maintain soil fertility and moisture, these farmers use cow dung manure, hand plough, and crop fields in the process. These are cultural practices that have been passed from one generation to the next heir. The area is good for both crop and fruit production, hence potentially good business opportunities. The irrigation scheme is furrow-fed from the Mutale River.

3.1. Climate

The Thulamela municipality falls within the sub-tropical climate, with an average rainfall range of between 300-1000 mm per year (Kabanda and Munyati, 2010). Most of the rain falls during summer (between October and March). However, the mountainous areas receive an enormous amount of rainfall yearly, with an average of about 1329 mm (Marete, 2003). Annual evaporation increases gradually from 1400 mm in the west, to 1900 mm in the east.

The daily temperatures vary, with an average range of between 17° and 27° C in summer and 4° C in winter. Some parts of this area could be extremely hot during summer, with temperatures rising to as high as 45° C in certain days. The average seasonal humidity within the area is about 80% during the summer, and 38% in winter (Kabanda and Munyati, 2010).

3.2. Topography and drainage

The Thulamela topography is gentle and undulating, with prominent mountains. The municipality area is composed of granite gneiss of the Precambrian Age, which is referred to as the 'golden plate gneiss'. This is a high grade metamorphic rock, which is not easily eroded. The current landscape has been largely moulded due to the process of weathering, while faults and intrusions of competent dolerite dyke sills have influenced the formation of hills and scarps (Mucina and Rutherford, 2006).

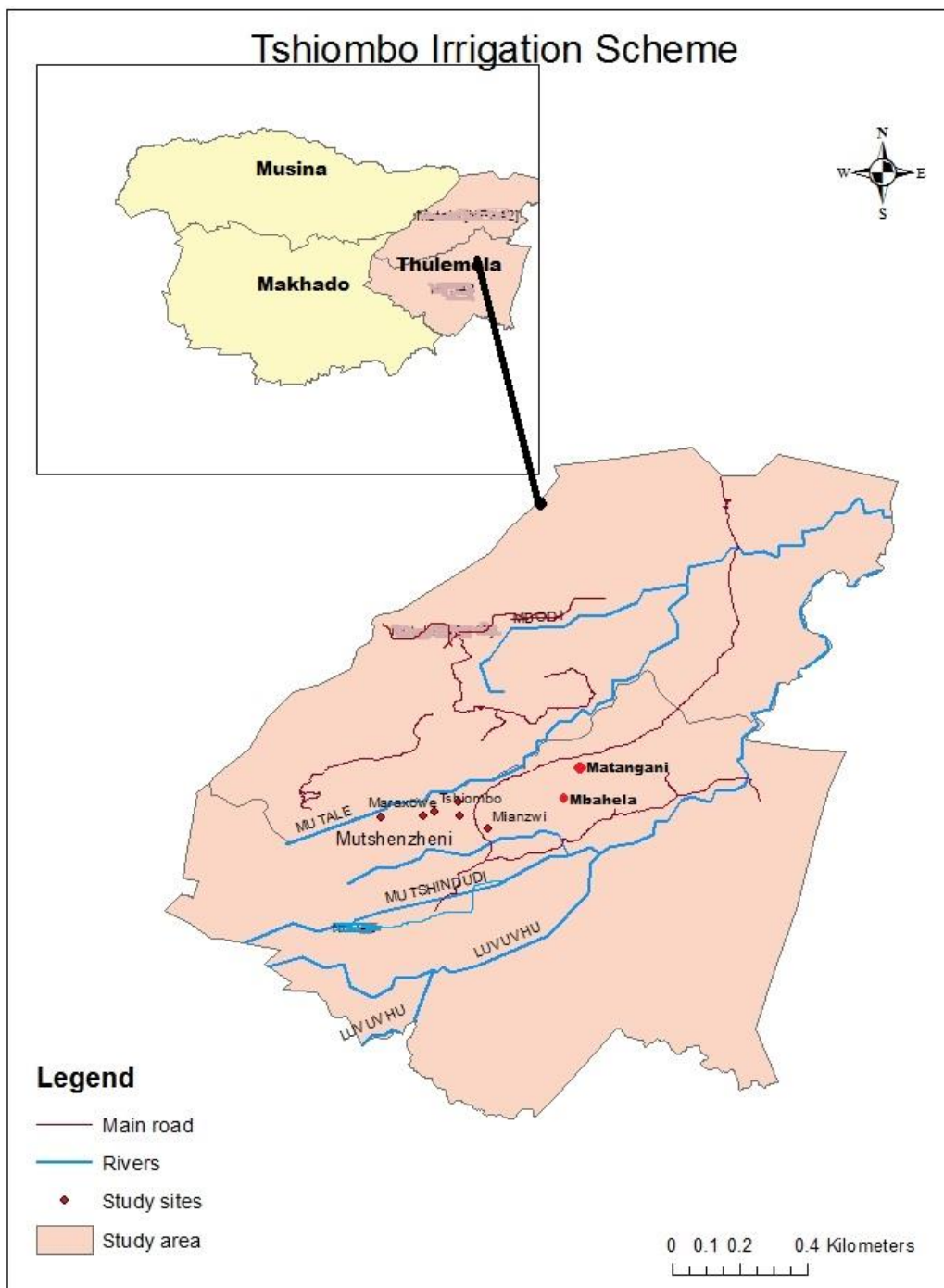


Figure 1: Thulamela Local Municipal Map, shows the study areas.

Source: The researcher

The Thulamela Municipality area is well-drained due to dendritic perennial rivers. These are Mutale, Mutshindudi, Mutangwi and Tshinane, in addition to Luvuvhu River. All these rivers empty their waters into the Limpopo River to the north, which borders South Africa and Zimbabwe. Also located within this municipality is Phiphidi Dam, which supplies water to the municipality's households as well as for agricultural purposes.

3.3. Soil and Vegetation

The area is mainly covered by soils derived from quartzite and sandstones. In this respect, the soil is generally shallow, gravelly, and is well-drained with low nutrient levels, and is acidic in nature (Mucina and Rutherford, 2006). Soils of the basaltic origin and diabase dykes are fine-textured, clayey and of considerable thickness. Soils of the Aeolian Kalahari are fine-grained. The areas along the northern slope of the municipality are devoid of soils, they are mainly rocky (Mucina and Rutherford 2006). The general soil types within the municipality are sandy soils, silt soils and clayey ones found within the river valley.

Diverse plant species are found within the area, and the Lebombo ironwood forests are noteworthy here. Several grasslands with scattered trees, baobab trees, short open woodland and bushes of different kinds cover the entire municipality. There are finger grasses, herbaceous plants, woody plants, grasslands and farmlands within the area (Mucina and Rutherford, 2006).

3.4. The Historical Development of the Irrigation Scheme

The Tshiombo Irrigation Scheme was initiated in June 1962, when the Chief, acting on instructions from the government, allocated Tshiombo residents with a plot of about 1.286 hectares each. Some residents were able to register more than one plot because of corruption and selfishness, although there is no evidence to this effect. During the plot allocations, men and women were treated equally.

The establishment of the irrigation scheme, however, compelled the government to relocate affected individuals to the foot of the mountain range. Fearing the unknown, a significant number of these villagers fled to the neighbouring villages. Their belief was that the government intended to exploit them to provide cheap labour. When they later returned to claim their land back, it was all in vain, however. Those who had remained were provided with agricultural inputs such as fertiliser and lime by the Department of Agriculture. Due to the lack of agricultural expertise in the form of ignorance, however, women used the lime to decorate their houses. In the mid-1960s, farmers received free services from the government. With the appointment of extension officers in 1968, these farmers were expected to pay 50 cents annually. Over the years, and due to inflation, this amount rose to R12. The government continued to provide tractors for these farmers to till the land. For the ploughing, farmers paid R181.28 per hectare, an undertaking that saw them roughly R234 poorer for an 1.286 hectares job in 2000.

The Tshiombo Irrigation Scheme is divided into eleven blocks. There are ten reservoirs, of which five are at Matangari, other blocks have one reservoir each. The Mutale River is the main supplier of water to these reservoirs. But, those with small plots within the irrigation scheme use the Mudaswali River for their water supply. The furrows or canals from the dams supply the fields with water. Each irrigation block has two extension officers and one supervisor, serving an average of 13 farmers. There are also auxiliary officers who assist extension officers in their work. These deal with the drawing up of watering timetables for an organised and efficient watering process by farmers within these eleven irrigation blocks. For any misunderstands between or among farmers, there is a standing committee that was specifically set up to solve such problems.

4. The Significance of the Study

The agricultural land abandonment culminates into a plethora of environmental, social and economic challenges. There is a need, therefore, to study its causes and impact in order to determine how the phenomenon could be reduced. This study would motivate rural developers and policy makers to evaluate and readjust policies so that they are at par with the agricultural sector's developmental needs in rural communities. South Africa, like many other countries in Africa, is faced with a host of challenges in its food production sector, hence its food security is threatened. The hardest hit are those living in rural areas, where there is an upsurge in land abandonment for whatever purposes. The research aims at determining the social and economic impacts and the causes of the abandonment of farm lands at Tshiombo irrigation scheme. The research aims at finding out why the activities were abandoned and what must be done to revive them, as part of rural development. There is a need to revive the irrigation schemes in order to reduce starvation, hence contribute towards the country's economic development.

5. Conceptual Framework

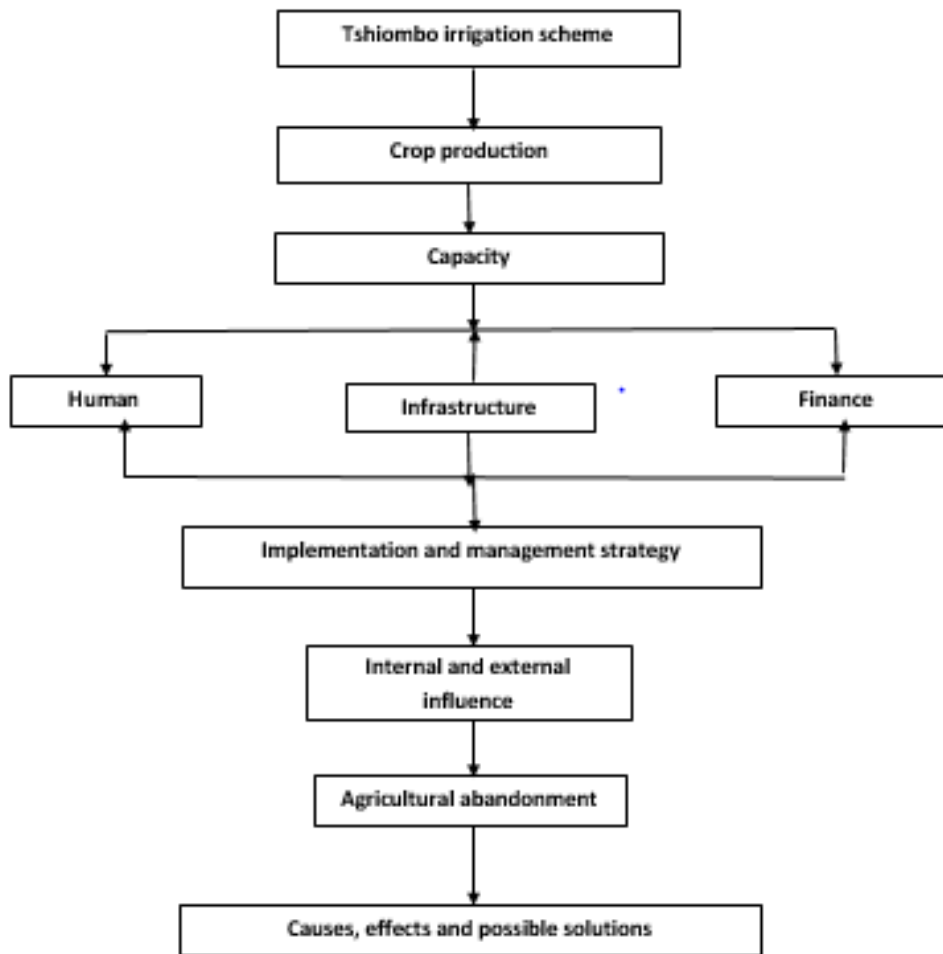


Figure 2: Conceptual Framework

Source: Formulated by the researcher.

Figure 2 illustrates the conceptual framework which guided this study. The structure indicates the problem at the top, and then breaks it down to capacity, factors and possible solutions. It focuses on the factors that cause the abandonment of agricultural farms, such as environmental, agricultural policies, farm management and climate change. These factors are influential towards the abandonment of agricultural land in Tshiombo Irrigation Scheme.

6. Structure of the Study

Chapter one provides the introduction and background to the study, the problem statement, the aim and objectives of the study, as well as the research questions. In addition, the study's significance is outlined, a section that defines the keywords is outlined, and the conceptual framework is also provided here.

The next Chapter is that of the review of the related literature. This Chapter mainly deals with literature that focuses on land abandonment as a phenomenon that affects the world. The section about the theoretical foundation for this study is included in addition to issues that are affecting the farming.

Chapter Three is that of the methodological aspects of this study. Here, issues such as the research design, the study's population, its sample and the data collection techniques are outlined. The ethical considerations section concludes this Chapter.

In Chapter Four, data collected during the field work are presented, discussed and analysed in order to ascertain whether the study's research questions are answered in the context of the study problem.

The last Chapter provides the study's findings. A section that concludes the study is also provided in order to lay the basis for its recommendations. These close the study.

7. Summary

This Chapter introduces the study and how it was done. Of note here is the study's problem, which provides the reader with an idea of why it is done. The study's significance is that not much has been done in terms of research on why the Tshiombo Community farmers decided to abandon their farming projects. It is interesting to note that most of the issues that pertain to the conduct of this study necessitated its production. As much as its objectives are concerned, the study managed to formulate them in such a way that they were achievable. Their achievability translate to its success.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Community Based Irrigation Scheme is derived from participatory management, a movement that for three decades has been sweeping across many parts of Asia, Africa and industrialized nations (Mam1996; Carson1999). Unique to its parent approach, which sees the government as key in facilitating participatory planning and decision making, it puts its core focus on local communities, which, according to ken(2005) the central role in identifying resources, defining development priorities, adapting technologies and implementing management practices. Theoretically, Community Based Irrigation Scheme aims to ensure livelihood security of local people by giving them easy, equitable and timely access to irrigation water, and at the same time promote resource sustainability from one generation to another through social sanction in the command area (Li 2002; Armitage 2005; Hibbard & Lurie 2006).

Agricultural activities have been a source of livelihoods since time immemorial (FAO, 1997). During the pre-new millennium period in Zimbabwe, for example, agriculture was the country's economic mainstay (Rukuni, 2003). However, this came to nought when privately owned white farms were invaded, thereby triggering the country's economic free-fall. The country suddenly turned into an African beggar's basket instead (Muchenje, 2007). According to FAO, the world's population is ballooning at a geometric rate, therefore, the need to sustain as well as to increase agricultural activities cannot be overemphasized. In addition to man-made farm land calamities, natural disasters such as recurrent droughts, floods, pests and landslides all contribute to farm land abandonment. In respect of the food security in the world, there is a need to increase agricultural activities so as to cover up for the shortfalls due to disaster areas (FEWSNET, 2008).

According to Koch *et al.*, (2005) agricultural production also leads to developments such as upstream and downstream industries, the employment of people, revenue to the fiscus through tax, and increases in the much-need foreign exchange through exports.

Countries in West Africa, particularly enjoy this through exporting cocoa, an ingredient that is needed in the production of chocolate (Okpala *et al.*, 2011). Zimbabwe has had a share of this, through its flagship crop, the Virginia tobacco. It was for this reason that the crop is affectionately called the 'golden leaf' (Mutambi *et al.*, 2012). Agricultural activities also increase precipitation through evapotranspiration. Vast swathes of land covered by crops act as carbon sinks, thereby reducing global warming (Hatcher, 2009).

Based on the above, the need for continued agricultural activities is justified. However, it is quite disheartening to realise that these activities are being discontinued in some areas. In this Chapter, literature on the causes, impact and mitigating measures on the abandonment of agricultural activities is reviewed.

2.2 Causes of Agricultural Activities Abandonment

In this section, literature on the causes of the abandonment of agricultural activities is reviewed. According to FAO (1999) the abandonment of agricultural activities is due to factors such as agricultural policy, climate change, farm mismanagement, lack of skills, market-access failure, war and soil infertility, among others. These are discussed in detail below, in the order they appear above.

2.2.1 Agricultural Policy

Agricultural policy refers to the legislation(s) or laws governing agricultural land ownership, agricultural practices and marketing (Moyo, 2007). Agricultural policies have accounted for much of the land abandonment in many areas in Africa (Jodha, 1990). In South Africa, for instance, the land repossession policy has led to uncertainty, hence the abandonment of agricultural activities in some parts of the country, particularly those that used to be very productive (Kirsten, 2011). As stated earlier, notably examples here include farms in the Tzaneen area and others in the Eastern Cape (Mbanga, 2012).

In addition, Zimbabwe's radical land policy, fast-tracked at the beginning of the new millennium, resulted in agricultural-activity abandonment (Moyo, 2007). Here, the

beneficiaries, mostly former liberation struggle guerrillas, took over large patches of productive land, but dismally failed to maintain production, leaving such land abandoned (Munyoro, 2006). Commercial, agricultural land previously adorned with crops and livestock, have either been neglected or totally abandoned (Muchenje, 2007). Mahiya *et al.*, 2002 state that Zimbabwe's agricultural land policy is such that the land is state owned and farmers are provided with a 99 year lease contract, after which they have an option to renew. As a result, the farmer cannot use the land or part of it as a collateral to acquire capital from financial institutions (Rukuni, 2009).

2.2.2 Climate change

According to Haddaway *et al.*, (2013) climate change refers to a permanent shift from traditional precipitation levels and temperature. Agriculturally, this affects crops that have adapted to the traditional climate. Climate change has led to the abandonment of some agricultural activities (Moyo, 2007). This is particularly so in parts of Limpopo, Free State and the North West Provinces where maize farmers have abandoned their land, while some have scaled down their operations to a few hectares of this crop (Grain SA, 2013). This is due to climate-change induced erratic rainfall. In Zimbabwe, a similar trend is observed in parts of Masvingo and Matabeleland North and South Provinces (FEWSNET, 2008). The connection here is that South Africa's Limpopo Province and Zimbabwe's Matabeleland region fall under the same geographic zone (regions three, four and five of the Savannah), hence similar patterns of climate change (Gibb, 2004).

Ranchers in Matabeleland Province involved in extensive cattle ranching have either significantly reduced their herds or stopped business altogether, acts that amount to the phasing out of such agricultural activities (Gibb, 2004). Herd reduction is necessitated by diminished pastures, a product of climate change. Kenya's Masai pastoralists, well known for their nomadic herding tendencies, cull their herds to small sizes, then settle in mountainous areas with modest pasture, in the process abandoning other areas (Marete, 2003). The point is, the Masai's traditional grazing lands no longer produce sufficient pastures for their herds, hence the need to shift to those with good pasture.

2.2.3 Farm Mismanagement

Farm mismanagement relates to the inappropriate use of human, material and financial resources by those accountable to the farm (Kirsten, 2000). Du Toit *et al.*, (2010) argue that farm mismanagement goes beyond the farm to include the responsible authorities' failure to come up with or implement successful marketing plans for the farm produce. Farm mismanagement has by far been credited for the demise of most agricultural activities, leading to their abandonment (Munyoro, 2006). As part of farm mismanagement, financial misappropriation has been the most outstanding catalyst for farm failures, leading to farm abandonment. Financial misappropriation, in this case relates to the rewarding of or any form of remuneration by farm management without necessarily taking into consideration the farm's future financial needs (Bembridge , 2000).

If the expenditure is more than income, production is adversely affected and it ceases in that particular farm (Baudry, 2006). Financial misappropriation on the farm also occurs when financial resources are allocated to farm enterprises that do not perform well or are not profitable. It also involves the wrongful investment in non-essential equipment and vehicles (Du toit, 2005). Farm mismanagement may also be a result of misinformed cultural decisions on the farm, for instance, when a manager decides to use sprinkler irrigation when drip irrigation is more appropriate and highly productive (Gibb, 2004).

On the other hand, a farmer may choose to plant crops in a season or under climatic conditions that are not favourable to those types of crops. This may lead to crop failure, hence land abandonment (FAO, 1997). For example, the Savannah's regions four and five (Limpopo and Beitbridge areas) are known for their low rainfall due to low altitude, hence are suitable for drought resistant crops such as finger millet, rapoko and a certain type of sorghum. Thus, cultivating crops that require large amounts of rainfall such as maize, rice, wheat and sorghum is merely courting disaster. Similarly, a farmer may decide to keep livestock in conditions they have not adapted to, leading to a fall in production. Mac Donald *et al.*, (2000) argue that mismanagement also occurs when a farm fails to market its products properly. This leads either to its products perishing or

being affected quality wise, thus necessitating their sell at giveaway prices. If this becomes a trend, then the farm becomes unviable in the long run, and the subsequent discontinuation of farming becomes imminent (Rukuni, 2003). Mismanagement also happens when farms do not conduct adequate and informed market research for their products. The effect is that a farm may produce more than the market could absorb. In this case, excess products become waste, thus loss of investing capital. In short, the farm becomes unsustainable, forcing the owner(s) to stop production altogether (Beinart, 2001).

2.2.4 Lack of skilled manpower

The success of any agricultural venture is anchored on the availability of skilled labour (Moyo, 2008). That is, for any agricultural activity to take place successfully, there should be suitably skilled personnel (Moyo, 2007). Evidence abounds that a skilled workforce is the panacea for any viable agricultural venture. Much of the land that has been repossessed in South Africa by tribal authorities is either under utilised or production on it has since stopped. This is largely attributed to unskilled and inexperienced managers who have taken over the farm productions (Kirsten, 2011).

Reclaimed lands that show success in agricultural production are run by the former owners who are regarded as partners or mentors in some cases. These are skilled and experienced individuals, whose involvement in this sector spans over years (Van Averbek, 1998). Zimbabwe's land reform has not been spared the agricultural catastrophe of lacking skilled labour (Rukuni *et al.*, 2009). Beneficiaries of the land reform who are mainly liberation struggle stalwarts and cronies of the ruling elite, only fancied having productive farms, but lacked sufficient skills (Averbek *et al.*, 2006). Zimbabwe's agriculture, which was the cornerstone of the economy was thus brought to its knees. From the above, it is clear that the lack of skilled labour may lead to the abandonment of agricultural activities.

2.2.5 Access to market

Agricultural sustainability relies on a steady cash flow system. That is, cash inflow and outflow (Averbeke *et al.*, 2006). Ideally, the steady cash flow should be such that the inflow is superior than outflow (Rukuni, 2009). This desirable scenario can only be achieved when there is a ready market for agricultural produce and at a sustainable price. That is to say, if there is no market and sustainable prices, cash outflow will be greater than inflow, leading to business unviability and the subsequent halt of agricultural activities (Elbakidze and Angelistam, 2007). The lack of market access and unsustainable prices has led to the demise of agricultural concerns, particularly smallholder farmers.

Smallholder farmers are usually elbowed out of business by commercial farmers (Du toit, 2007). These big ventures usually have the financial muscle for marketing strategies. They are also naturally accepted by processors and other corporations such as chain-supermarkets. In Zimbabwe, many maize farmers abandoned their farming activities because of market uncertainties (Backeborg, 2006). The Grain Marketing Board (GMB) the sole official board for grain crops, offers low prices and does not pay on time, leading to unsustainable farming and the subsequent farm stoppages (Haddway *et al.*, 2013).

2.2.6 Soil infertility

The abandonment of agricultural activities in some areas has been attributed to the dwindling levels of soil fertility (McDonald, 2000). Farmers who depend on the natural soil fertility have a tendency to vacate their fields when they realise the reduction in soil fertility, and they relocate to virgin lands with fertile soils (Muchenje, 2007). Shifting cultivation is pronounced in many African subsistence societies, particularly in rural Zimbabwe, Botswana and the Congo (FAO, 1997).

2.3 Environmental Impacts of Abandoned Agricultural Activities

The abandonment of agricultural activities culminates into a plethora of positive and negative effects both environmentally and, social and economically (May, 2000). In this

section, literature on the impact of abandoned agricultural activities on the environment, social and economic spheres was reviewed.

2.3.1 Positive impacts of agricultural activities abandonment

Agricultural activities such as commercial farming, involve the use of nitrates in the fertiliser. Its use is known to cause eutrophication in water bodies. This has been the case in areas around the Vaal River (Du toit, 2005). Eutrophication reduces the amount of oxygen in water bodies and this put aqua life at risk, thus compromises the aqua ecosystem (Strauss, 2009). Abandoning agricultural activities in areas such as these could lead to the reduction in cases of eutrophication and certainly, the restoration of the aqua life. Agricultural activities are also known for loosening the soil structure and triggering of soil erosion (Khan, 2007). This causes the siltation of rivers and dams, in the process threatening aqua life.

Clevers *et al.*, (2011) argue that intensive livestock production has led to the production of much carbon and this has led or contributed to an increase in global warming. Stopping or reducing this form of farming reduces carbon dioxide production, hence a decrease in cases of global warming. WHO (2009) suggests that an increase in global warming has also been attributed to agricultural activities, particularly in the Congo and Amazon basins. This has been due to the shifting cultivation tendencies by the farmers in these regions who are in the habit of clearing massive pieces of land in search for new fertile land (Marius, 2008). By doing so, they remove trees that act as carbon sinks. The forest of the Congo and Amazon Basins are the world's largest carbon sinks, therefore, the abandonment of shifting agricultural activities would help global warming.

2.3.2 The negative impacts of agricultural activity abandonment

The stopping of existing agricultural activities may have a negative impact on the environment (Gibb, 2004). Vast swathes of agricultural land, especially those used in crop production, have acted as carbon sinks, for instance, the vast corn cultivation in Texas.

Cropping has also been credited for its contribution to precipitation as crops are a platform for the production of evapotranspiration (Averberke *et al.*, (2006). Crop plantations also reduce soil erosion as the crop roots aid in binding soil particles together.

2.4 The Social and Economic Impact of Agricultural Activity Abandonment

The abandonment of agricultural activities has social and economic consequences in the long run (Munyoro, 2006). A halt to agricultural activities leads to employee redundancy as those employed in these activities lose their employment. This triggers social ills such as, among others, theft, robbery and prostitution, when people seek other means to survive. Prostitution has the effect of increasing the transmission of deadly sexual infections such as HIV/AIDS and syphilis, *inter alia* (FAO, 2003). Some of these diseases are fatal, while some leave a person susceptible to other diseases that are fatal. The abandonment of agricultural activities also causes food insecurity in a country.

2.5 Farm Management and Mitigation Strategies

As a result of climate change, agricultural production in most parts of the world not only face less predictable weather conditions, but also weather extremes become predominant. Agriculture is not well prepared to cope with climate change, especially in Southern Africa and Asia (Kristensen, *et al.*, 2008).

Intensive agriculture has not encouraged the use of traditional skills and knowledge. Organic agriculture, on the other hand, has always been based on practical farming skills, observation, personal experience and intuition – traditional systems that function without relying on modern inputs. This practical adaptation “reservoir” of knowledge (Tengö and Belfrage, 2004) is important for manipulating complex agro-ecosystems, for breeding locally-adapted seeds and livestock, and for producing on-farm fertilisers (compost, manure, green manure) and inexpensive nature-derived pesticides.

Farming practices that conserve and improve soil fertility are important for the future of agriculture and food production. Erratic rainfall, droughts, floods and other natural disasters are expected to increase with rising temperatures. Soil organic matter can help mitigate or avoid these disasters' negative effects while increasing primary crop productivity. Soils under organic management retain significantly more rainwater, thanks to the sponge-like properties of organic matter. For example, due to the sponge properties in heavy loamy soils in the temperate climate in Switzerland, the soil structure, stability is 20 to 40 percent higher in organically managed soils than in conventional managed ones (Mäder, *et al.*, 2002).

In different long-term field experiments in the USA, organic matter was considerably higher in organically-managed soils than in conventional ones, and soil stability was improved (Marriott and Wander, 2006). In addition, higher organic-matter content and more biomass in soils make organic fields less prone to soil erosion (Reganold, *et al.*, 1987; Siegrist, *et al.*, 1998)

2.6 Irrigation Scheme

Backeberg (2006) estimated the number of South African smallholder irrigators to range between 200 000 and 250 000, but most of these practised in very small plots, primarily for subsistence purposes. The South African smallholder irrigation schemes are multi-farmer irrigation projects larger than 5 ha in size that were either established in the former homelands or in resource-poor areas by black people or agencies assisting their development. Using this definition, Gibb (2004) gave an estimate of about 287 smallholder irrigation schemes in South Africa in 2004. Estimates of the combined command area covered by the South African smallholder irrigation schemes range between 46 000 and 49 500 ha (Bembridge, 2000; Backeberg, 2003; Gibb, 2004; Denison, 2006).

2.6.1 The importance of irrigation schemes

The importance of smallholder irrigation schemes in South Africa arises primarily from the number of participants involved (Bembridge, 2000). In 2003, Gibb (2004) estimated that the land under smallholder irrigation schemes had about 31 000 plot holders, representing about 15% of the total smallholder population. By comparison, South Africa's large-scale commercial sector has about 1.2 million ha of irrigated land, owned by roughly 28 350 farmers (Backeberg, 2006a, 2006b). Most smallholder irrigation schemes are found in South Africa's former homelands areas, where poverty is rife (May, 2000; Aliber, 2003). Under these social and economic environments, smallholder irrigation schemes present an attractive opportunity for the development of local economies.

2.6.2 Periods of smallholder irrigation

I. The peasant and mission diversion scheme era

Available evidence indicates that irrigation was an innovation that was introduced after colonisation. The first era of smallholder irrigation development occurred during the 19th century and can be referred to as the peasant and the mission diversion scheme era. This is so in that it was associated with missionary activities and the emergence of the African peasantry (Bundy, 1988; Crais, 1992; Bruwer and Van Heerden, 1995). Situated within the broader history of irrigation development in South Africa, the peasant and mission diversion scheme era coincided with the early part of the individual diversion scheme era identified by Backeberg and Groenewald (1995).

II. The smallholder canal scheme era

Renewed smallholder irrigation development occurred several decades later in the form of canal irrigation schemes. Broadly speaking, this second era lasted from 1930 until about 1960 and can be referred to as the smallholder canal scheme era. It coincided with

the era of public storage schemes in the history of national irrigation development described by Backeberg and Groenewald (1995). More specifically the second phase of this era, referred to as the Great Depression and the Second World War by Bruwer and Van Heerden (1995).

Most of the smallholder schemes that were established during this era were constructed after the Second World War. They were primarily aimed at providing African families residing in the “Bantu Areas” with some form of subsistence (The Commission for the Social and Economic Development of the Bantu Areas within the Union of South Africa, 1955, hereafter referred to as The Commission, 1955). The “Bantu Areas” were created by the Land Act of 1913 and the Land and Trust Act of 1936, which largely restricted land owned by black people in South Africa in these territories. The Commission (1955) identified “smallholdings on irrigation schemes in the north of South Africa that were supervised by Europeans” as the most successful smallholder farm enterprises in the “Bantu Areas”.

The irrigation projects established during the smallholder canal scheme era obtained their water from a river by means of a concrete weir diversion, but schemes using dams were also established. Water for irrigation was brought to the edge of the field by means of the canal system. The size of the plots of these schemes ranged between 1.5 and 2 Morgen (1.28 to 1.71 ha). However, both schemes (smaller and larger plots) were also established here (Bembridge, 1997; Van Averbeke *et al.*, 2006).

On most smallholder canal schemes developed during this era, the land was detribalised and its ownership transferred to the state. Farmers under these schemes owned the land through the Permission to Occupy (PTO) land ownership system. This form of tenure provided the state with the necessary powers to prescribe land use, and to expel and replace farmers whose practices did not comply with the PTO regulations (Van Averbeke, 2006a). In selected cases, the state effectively used these powers to enforce the overall objective of the schemes by evicting poorly performing families (Van Averbeke, 2006a). A similar authoritarian and paternalistic approach by the state prevailed on white settler

schemes established during the Great Depression and WW II period (Backeberg and Groenewald, 1995).

III. The independent homeland era

The third period of smallholder irrigation development can be referred to as the independent homeland era. This era in the smallholder irrigation development, from 1970 to 1990, was deemed as an integral part of the economic development of the homelands. The post WW II apartheid policy made the black people citizens of specific independent homelands. These homelands had their origin in the “Bantu Areas”. Each homeland was to cater for a particular ethnic group. To give credence to the concept of independence, it became imperative that the economy of these different homelands be improved, because without exception, they were islands of underdevelopment and poverty (Beinart, 2001).

The establishment of new irrigation schemes with funding from South Africa formed part of the economic development strategy of the homelands (Van Rooyen and Nene, 1996; Lahiff, 2000). Agriculture was regarded as the main internal development opportunity for the homelands, because the resource base of these territories had remained essentially rural. Gibb (2004) indicated that at least 64 of the existing smallholder irrigation schemes, covering a total of about 13000 ha, were established during this era. The number of existing schemes that date back to this period is probably higher, because much of the 15 896 ha of the existing irrigation land that could not be dated was probably developed during the period 1970 to 1990.

The irrigation development during the independent homeland era was characterised by modernisation, functional diversification and the centralisation of scheme management. Technologically, this era coincided with the third phase of the public storage scheme era in the South African irrigation development as identified by Backeberg and Groenewald (1995), which Bruwer and Van Heerden (1995) referred to as the recent development phase. Typical examples of large schemes (>500 ha) developed during this era were

found mainly in the Eastern Cape and these included the schemes at Keiskammahoek, Tyefu, Xonxa and particularly Ncora (Van Averbeke *et al.*, 1998).

The irrigation and farming technology that was implemented on these larger schemes was amongst the most modern that was available at the time, but even on smaller schemes, pressurised overhead irrigation systems were used instead of surface irrigation. On larger schemes, economic viability was pursued by means of a strategy of functional diversification. Included here were a commercial function in the form of a central unit, which was farmed as an estate, a commercial smallholder function in the form of medium sized plots, also called mini-farms, of 5 to 12 ha in size, and a subsistence function in the form of food plots, ranging from 0.1 ha to 0.25 ha in size (Van Averbeke *et al.*, 1998).

2.7. Land Abandonment

Helming *et al.*, (2008) defined land abandonment as a complex multi-dimensional process with interlinked economic, environmental and social entities. Within this process, agricultural policy potentially plays a key role in determining whether or not land is utilised for agriculture. Understanding the nature of this relationship is, therefore, an important prerequisite for developing future agricultural policies.

Within the European Union (EU), for example, various concerns have been raised that reductions in support to agriculture and reforms of the trade policy will lead to widespread land abandonment across the EU, with negative environmental and social consequences (Keenleyside and Tucker, 2010). This case was made strongly during the 2003 reform process where, as noted by the European Commission, some Member States considered that the full decoupling of support from production could lead to several risks such as the abandonment of production, the lack of raw material supply for processing industries, or to social and environmental problems in areas with few economic alternatives.

Baudry (1991) defined land abandonment as a change towards “a less intensive pattern in land use or as the total termination of the use and managing of the soil such that the

soil is left to its own spontaneous dynamics”. The land abandonment occurs when the agricultural system is affected by external drivers or because of its own dynamics toward intensification, which is usually driven by economic conditions or the social environment (Baudry 1991 and Rudel 2009).

2.7.1. Causes of land abandonment

I. Improved access, and increasing shortage of labour

The construction of the Sidhartha Highway, linking Pokhara to Sunauli between 1964 and 1972, made it possible to import essential goods such as food at cheaper prices from the Terai plains of Nepal and India. As such, the increase in urban services and amenities such as education and health, and the investment opportunities in Pokhara attracted many families to migrate permanently from the study area. About 255 families emigrated permanently from these two settlements after the 1960s, which amounts to more than half of all families in the two villages of Sikles and Parche (Baudry 1991).

Pokhara was one destination for more than 213 families who emigrated from these settlements. Since the beginning of the 19th century, short-term emigration in search for jobs has been one of the strategies of people in Nepal, including those in the present study area, in order to minimise the risk of food shortage and rural indebtedness (Kansakar 1974; Khanal 2002). Many members of Gurung families were recruited for the British and Indian armies. However, employment opportunities at that time were limited to certain ethnic groups. The opening of employment opportunities in foreign countries, especially in the Gulf countries after 1970, attracted many young people from this area. As a result, the proportion of the absentee population increased from 5.8% in 1954 to 19.1% in 1999/2000 (Khanal 2002).

II. Land abandonment in Russia

Widespread agricultural expansion is a major driver of habitat loss and changes in the ecosystem functions (Vitousek *et al.*, 1997; Tilman 1999). However, many developed and

emerging economies are concurrently experiencing a decline of agricultural areas (Baldock *et al.*, 1996; Benjamin *et al.*, 2007 and Bergen *et al.*, 2007). This was also supported by Grau *et al.*, (2003); Meyfroidt and Lambin, (2008). The rapid social, economic and institutional changes may accelerate land-use and land-cover change (LULCC) or shift land use to a new mode.

A major recent and rapid social and economic change was the collapse of socialism and communism in the USSR and its Eastern Block countries, and the subsequent transition from state-controlled to market-driven economies in the early 1990s (Kontorovich, 2001; Shkolnikov *et al.*, 2001). However, the impact of this transition on LULCC are not well understood. They further argued that the dismantling of state-controlled economies, the withdrawal of governmental support, and the implementation of open markets has drastically changed economies, human welfare, and health in post-Soviet countries. For instance, from 1990 to 2000 in Russia, the average life expectancy declined from 69 to 65 years, and the male life expectancy in Russia's rural areas declined, even more rapidly – from 61 to 53 years (Rosstat, 2002).

During the same period, the World Bank, 2008 pointed out that Russia's GDP declined by 67%. The profound changes were particularly common in rural regions of Russia, where state support of agriculture ended and rural development ceased almost entirely (Rosstat, 2002). It was said that between 1990 and 2000, investments in the Russian agricultural sector declined from \$39 billion to \$2 billion (Goskomstat, 2000). The removal of fertiliser subsidies caused crop yields to decline and depleted the soil fertility (Fruhauf and Keller, 2010).

III. Effects of Agricultural land abandonment

Agricultural land abandonment substantially affects both environmental, social and economic processes (Vuichard *et al.*, 2009). For instance, reforestation of abandoned agricultural lands can defragment forests, sequester carbon and improve hydrological regimes (Sileika *et al.*, 2006). However, Dumbin *et al.*, (2010) and Smelansky, (2003)

argue that the early successional vegetation that grows on abandoned fields provides fuel for wildfires and increases the propagule pressure of weeds, pests and pathogens on the remaining agricultural fields.

The land abandonment may also cause spillover effects that lead to the economic marginalisation of agricultural landscapes (Elbakidze & Angelistam, 2007). In the globalised world, the widespread agricultural land abandonment in one area may shift agricultural production and land use elsewhere, potentially threatening vulnerable ecological systems (Lambin and Meyfroidt, 2011). For example, drastic declines in domestic meat production in post-Soviet Russia after 1990 resulted in a steep increase in meat imports from Brazil (Novozhenina *et al.*, 2009), and this contributed to deforestation in Amazonia (Kaimowitz *et al.*, 2004).

Conversely, a reduction of agricultural land abandonment and re-cultivation of abandoned areas may result in increased agricultural production and reduce the pressure on world food markets (FAO, 2010). In sum, changes in agricultural land use have multiple repercussions on the ecosystem services, biodiversity, and the economy. Therefore, a better monitoring and understanding of the determinants and drivers of agricultural land abandonment is important and can provide valuable guidance for land-use policies.

Ample knowledge exists about the determinants of agricultural land abandonment in the EU countries, where this was widespread during the 20th century, especially after the Second World War (Baldock *et al.*, 1996). There, the abandoned agricultural land is generally found in unfavourable environmental conditions (for example, higher elevations, steeper slopes, poorer soils, and poorly ameliorated agricultural fields) as well as in remote and isolated agricultural areas (Baldock *et al.*, 1996 and MacDonald *et al.*, 2000).

Agricultural land abandonment is also associated with landowner characteristics (Baldock *et al.*, 1996). However, authors like Grinfelde and Mathis, (2004), Kristensen *et al.*, (2004), Van Doorn and Bekker (2007) state that part-time farmers and older landowners have a greater likelihood of abandoning agricultural land than any other type of landowner.

Farm structures also shape the abandonment patterns. That is, smaller farms throughout Europe have a greater likelihood of abandoning farmland than larger enterprises (Baldock *et al.*, 1996 and Kristensen *et al.*, 2004). Market access and the availability of better-paying jobs in urbanised areas also influence agricultural abandonment. For example, this process occurs in southern France (Van Eetvelde and Antrop, 2004) and in Switzerland, where agricultural land abandonment is more common closer to administrative centres and in areas with rapid population growth (Gellrich *et al.*, 2007).

2.8. Summary

Literature reviewed indicates that agricultural land abandonment is a world phenomenon. Several countries suffer from its negative effects as a result. The issue is, poor rural dwellers are the ones who bear the brunt of this. As such, both national and provincial governments should work tirelessly to find strategies whose implementation would see the reduction of this phenomenon. Given that South Africa, particularly the Limpopo Province is not spared this calamity, one is justified to conduct a study of this nature.

That is, as much as there is an abundance of literature on agricultural land abandonment, not much is known about this issue in Tshiombo Village. Literature that reflects on land abandonment in South Africa do so in the context of other areas, particularly those under white people's control. As such, the effects of land abandonment in Tshiombo remain hidden from the public. This then leads to the next Chapter.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This Chapter explains the systematic way this study was conducted. It covers methods used for sampling, data collection and analysis processes. The research design and methodology followed here are discussed. This is to reveal how the study was conducted. The following sections provide the detailed content of the above, starting with the study's design.

3.2 Research Design

Research design is a plan describing how the research was conducted. It provides the overall framework for collecting data, and outlines the steps to be followed in the data gathering process (Strauss & Corbin, 1990). The research was designed to utilize both qualitative and quantitative methods of data collection and analysis. It adopted a case cross-sectional study design. This design is case study in nature, hence this study compared the active and none active farmers in identifying the causes and effects of the phenomenon studied. Comparatively, the study sought to find out if there are factors influencing farm abandonment and its consequences in Tshiombo Village.

Table 1: The Research Design Matrix

Unit of analysis	Sampling method (quantitative)	Population size	Sample size	Data collection tools	Data analysis
Non active farmers	Random sampling	402	40	Focus group interview	Descriptive and narrative
Active farmers	Random sampling	623	64	Focus group interviews	Descriptive and narrative
Extension officers	None	8	8	Interviews	Descriptive and narrative

3.3 Population and Sampling Procedures

This research was conducted at Tshiombo irrigation scheme, which consists of seven villages namely; Mutshenzheni (47 farms), Mbahela (87 farms), Maraxwe (233 farms), Mianzwi (98 farms), and Tshiombo (1150). Matangari is the seventh village. This village is divided into sections, that is, Matangari main village (243 plots) and Matangari Matombotswuka (202 farms). The irrigation scheme is composed of 1025 farmers, each representing a household from the above villages. The total area of the scheme is 1197,332 hectares, each plot is 1,286 hectares, except Matangari with 1,284 per plot. The research's units of analysis were former plot owners who abandoned their land, and those who still own and work on their land.

The random sampling technique was applied using excel software. This is how the respondents were selected. The table below illustrates the villages, plot numbers and the sample size per village. In every village, only 10% of the total numbers of farmers, both active and non-active, were selected for interviews. That is, in Mbahela, out of 51 active farmers, only five were sampled as active respondents, while 36 non active farmers provided four interviewees. All extension officers in each village were interviewed. Plot numbers were put in excel in order to select the sample. The total number of non-active farmers was 402, and the sample size was 40, while active farmers were 621, giving a sample size of 64.

Table 2: Population Size

Village	Total active farmers	10% samples	Non active farmers	10% samples
Mbahela	51	05	36	04
Maraxwe	183	19	48	05
Matangari	130	13	113	11
Matombotswuka	101	10	101	10
Mutshenzheni	33	04	14	01
Mianzwi	58	06	40	04
Tshiombo	65	07	50	05
Total	N=621	N=64	N=402	N=40

3.4 Data Collection Methods

Both primary and secondary data collection tools were used to collect data. Secondary data were collected using census, journals and the government's Department of Agriculture materials, and the extension officers provided vital oral information in this regard.

Primary data were collected using face to face interviews and focus group discussions with farmers who abandoned their land and those who are still active. In this way, the researcher obtained the empirical data, which helped to answer the study's research questions. Focus group discussions, as a qualitative method of data collection, was used because it is effective in eliciting data from a group of people. It also generates a broad overview of issues of concern to the population represented. The focus group discussion was useful for exploring ideas and concepts as raised during the research. It also provides an insight into the participants' internal thinking. The researcher was able to examine how the participants reacted to each other during interviews. This allowed him to probe, as there were possibilities of tapping in for more content.

An interview guide was used, with open ended questions structured in such a way that they solicited for relevant information for this study. The advantage here was that questions could be asked in any order, in addition to their wording which could also be changed anyhow as well, depending on what the researcher deemed to be appropriate at that moment in time. All eight extension officers from each village were interviewed following the said interview schedule. An observation of the abandoned fields was done in order to ascertain their state. For an orderly observation process, an observation checklist was developed to assist the researcher with variables that were considered afterwards. These included variables such as the proximity to water sources and their flow direction and the distance from the main road in terms of marketing. Such factors were considered to have played a huge role in the abandonment of agricultural practice in the area.

3.5 Data Analysis

The data were analysed qualitatively, where the scrutiny of textual data sought to obtain an informed understanding of the density of the subject matter of the data obtained. The quantitative data analysis of the questionnaire responses and interviews from the sample was done using descriptive statistics. Descriptive statistical procedures and techniques were frequencies, standard deviation, cross tabulation and chi-squares. These enabled the researcher to make a detailed analysis of collected data. The results were presented in the form of pictures, tables, graphs and pie-charts. A brief discussion of each representing table was given as a summary of the analysed data. Data collected through interviews was analysed and coded in themes. Thereafter, data were presented in a simple, descriptive and narrative form. In addition, the content analysis approach was used in the study since its nature is descriptive and explanatory, thus the generation of themes is central to qualitative techniques.

3.6 Validity and Reliability

The research adopted the control question system on the questionnaire to test the authenticity of the results. That is, some questions were strategically asked in order to test how valid the information provided was. The control questions were put in questionnaires to obtain certain information from the interviewees' responses. Such questions were also inserted in the focus group's schedule. This assisted in finding out if the information or data collected from the respondents was valid.

The reliability of the results was checked against the way the informants responded to the questions asked. If the respondents skipped some of the questions, or if the respondents could answer some, but fail to answer others, this indicated the data's reliability. The way in which the questions were answered proved how reliable the data was.

3.7. Ethical Considerations

Ethics are defined as the principles governing the science of human behaviour and conduct in a research. The intention is to value and safeguard human dignity, promoting justice, equality, truth and trust. Ethics are associated with morality (Babbie, 1991). Professionalism is of importance in conducting any research because the researcher has an obligation to maintain personal and professional standards. In particular, the participants have to have confidence that privacy and anonymity would be observed and that the research would be conducted professionally.

The department of agriculture, granted me the permission to interview farmers and extension officers in the study area. The letter from the Head of Department of Agriculture was given to the researcher so that the respondents could see that their office was aware of this study. The university's research office granted an ethical clearance certificate to clear this research. The department of agriculture, after being shown this certificate, provided a letter to inform the extension officers and the farmers about this research. The participants' personal information was confidentially kept, hence their identities were withheld. Written consent letters, and the proof of identity from the university was

produced and shown to the participants to allay their fears and ensure their free participation.

3.8 Summary

Any successful study has to follow a particular path. This was the case with this research. It followed a mixed methods path that enabled it to collect both qualitative and quantitative data. The most important aspect here was the opportunity provided by this methodology for the researcher to visit the study area and observe for himself how the abandoned land affect the environmental, social and economic aspect of the Tshiombo Village. Tracks of once used land were everywhere like litter after a political rally. This brings us to the fourth Chapter where these consequences are revealed.

CHAPTER FOUR: DATA PRESENTATION AND THE ANALYSIS OF RESULTS

4.1 Introduction

This Chapter presents the analysed data obtained through field observations, focus group discussions and interviews. Those interviewed were active farmers and none active ones, as well as extension officers. Data were interpreted using graphs, tables, charts and images. Themes dealt with include demographic, social and economic variables. These have a reflective effect that influences the abandonment of agricultural land at Tshiombo Irrigation Scheme because the research adopted a mixed method approach. There are four identified geographical factors that affect agriculture at Tshiombo irrigation scheme. These are natural, economic, social and political factors.

4.2 Background of Tshiombo Irrigation Scheme

A total of seven extension officers and 104 active and non-active farmers provided information through open ended questions. Both active and non-farmers said that Tshiombo irrigation scheme was officially handed over to them by the Limpopo Department of Agriculture in 2009. These informants indicated that the scheme was formed as a strategy to eradicate hunger in underdeveloped rural areas, which were also affected by unemployment. The abandoned farmers indicated that villagers were assisted to start farming ventures through the allocation of pieces of land by the traditional leaders. The scheme predominantly produces maize, sweet potatoes, potatoes, ground nuts, carrots, tomatoes, chilies and other vegetables.

4.2.1. The Organogram structure of Tshiombo irrigation scheme

Figure 3 is a structural Organogram of the Tshiombo irrigation scheme that was obtained from extension officers. It indicates how the government provides knowledge and support to the scheme's farmers. The government used to provide farmers with resources such as seeds, tractors, water bailiffs and skilled personnel to monitor the water distribution

from one village to another. In addition, maintenance personnel to fix damaged irrigation canals were also from the Department of Agriculture. This was then, however, as such government support has been withdrawn for no clear reasons.

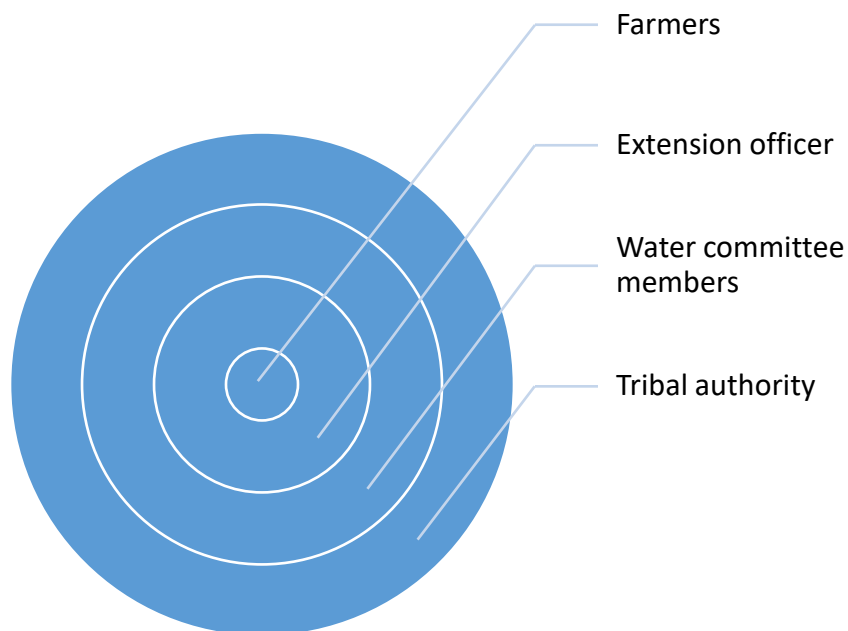


Figure 3: Organogram structure of Tshiombo Irrigation Scheme

The farmers rated the importance of each organisation by its distance from the centre of the chart. The further away, the less contact with the farmers, and the lower they rated its importance. The extension officers are located near the farmers because they are constantly in contact with them as they often move around monitoring the fields. When they are not doing their routine rounds, farmers who experience problems report these to their office. The water committee members are further off because they do not have regular contact with farmers as they do not frequent the fields. Their role is to monitor how the farmers use the water, and this is not done regularly. In other words, the farmers are the ones who take their water problems to the committee. Thus, their contact is mainly governed by the frequency of water problems encountered by farmers. The tribal authorities are the furthest from the farmers. This is because they do not have much

contact with the farmers as they do not even visit the farms. Traditional leaders mainly deal with social issues that are often divorced from farming activities.

The extension officers are government employees hired to assist local farmers. Their duties include, *inter alia*, providing information and recommendations to the farmers regarding the types of crops to grow. These officers also assist the farmers in establishing markets to sell their agricultural products.

Figure 4 below is of people involved in agricultural production at Tshiombo irrigation scheme. These are represented age-wise.

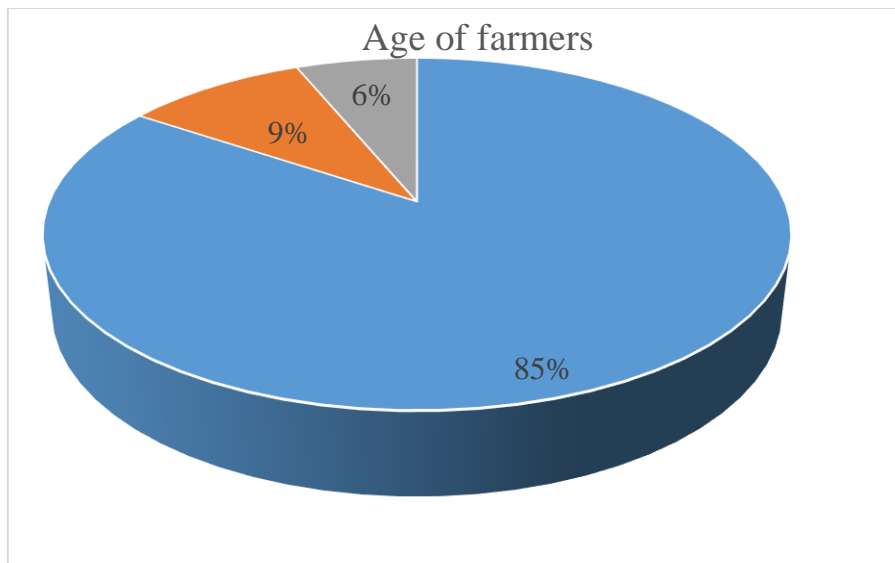


Figure 4: Age of participants

The information gathered from active farmers in the Tshiombo irrigation scheme indicates that out of 64 sampled active farmers, 54 (85%) are between the ages of 56 and 65, and 6 (9%) are between 46 and 55. Only 4 (6%) are younger than 45 years. These farmers pointed out that young and middle aged farmers abandon agriculture because it is not a profitable venture.

4.2.1. The extension officers' education and experience

Extension officers interviewed are between 45 and 65 years of age. These officers have work related experience of more than five years each. Due to their experience, they have managed to identify challenges that face smallholder farmers in Tshiombo. The identification of the problem has enabled both the extension officers and the farmers to come up with strategies to combat the said problematic issues. It should be noted that the bulk of the extension officers were involved with these farmers as early as the days of the government aid. Their assistance has boosted farm production here.

Retrospectively, the extension officers 5 out of 7 (71% of them) are of the view that farming in the area used to yield good crops in spite of the farmers' limited agricultural knowledge. Another noted fact was the government's earlier involvement in assisting the smallholder farmers. This was said to have motivated these farmers, as they had access to free seeds, tractors and other necessary farm implements. Conversely, the extension officers were of the view that the government's withdrawal crippled the moral strength and resource capabilities of most farmers. A consequence of this was the abandonment of farm land by those who could not survive the devastating effects of the government's action. These farmers' surrender could also be linked to their lack of basic agricultural skills and their economic vulnerability once the government withdrew its support. In another sense, by over relying on government support, these farmers became the victims of the path dependency syndrome (to borrow from the path dependency theory). As such, their being social welfare cases was exposed when the governmental assistance ceased. Given this, it is no surprise that a considerable number of them are no longer active farmers since then.

Education plays a crucial role in agricultural production. That is, for one to understand modern farming technics and the implications of the lack of applying them in modern agricultural production, one has to be educated. This is true in the context of the seven extension officers who all have tertiary qualifications in their field of operation. Four of these have university degrees, while the other three are diploma holders. This shows that

these officers are experts in the field of agriculture. As such, suffice, it to conclude that their tertiary qualifications enable them to provide expert advice to farmers. In Africa, particularly in its rural setting, uneducated people practice subsistence agriculture (Arshad and Coen, 1992). That being the case, the Tshiombo Irrigation Scheme farmers have also been observed to rely on agriculture in order to feed their families and to fund their children's education. Due to these basic necessities, it is obvious that rural dwellers resort to cheap farming as a survival strategy that has been passed from generation to generation.

4.3 The State of the Irrigation Scheme

The irrigation scheme was built in a good landscape that lies from Mbahela to Matangari Village. Both active and inactive farmers acknowledged that the government's maintenance of the irrigation canals was very helpful to farmers for their crop production business. The canals used to supply water from Mbahela to the low lying areas of Matangari Village.

- **Crop Production and marketing at Tshiombo Irrigation Scheme**

However, about 91% of these farmers produce sweet potatoes because they are less expensive to cultivate and maintain. Both the active and ex-farmers, in their production endeavors (it seems), tend to overlook crucial factors that could make them do well with other crops as opposed to relying on the production of sweet potatoes. The inherent weakness here is that the over production of one crop tends to flood the market, hence creates an intense competition for customers among the farmers. The effects of this are economically devastating, the collapse of agricultural ventures due to sustainability issues. Consequently, farms are inevitably abandoned thereafter. These farmers could, however, do themselves a great favour if they were to investigate different methods for cultivating a variety of crops in order to attract different customers at all times. This would definitely lead to the sustenance of their farms, in the process ensuring their prosperity and well-being.

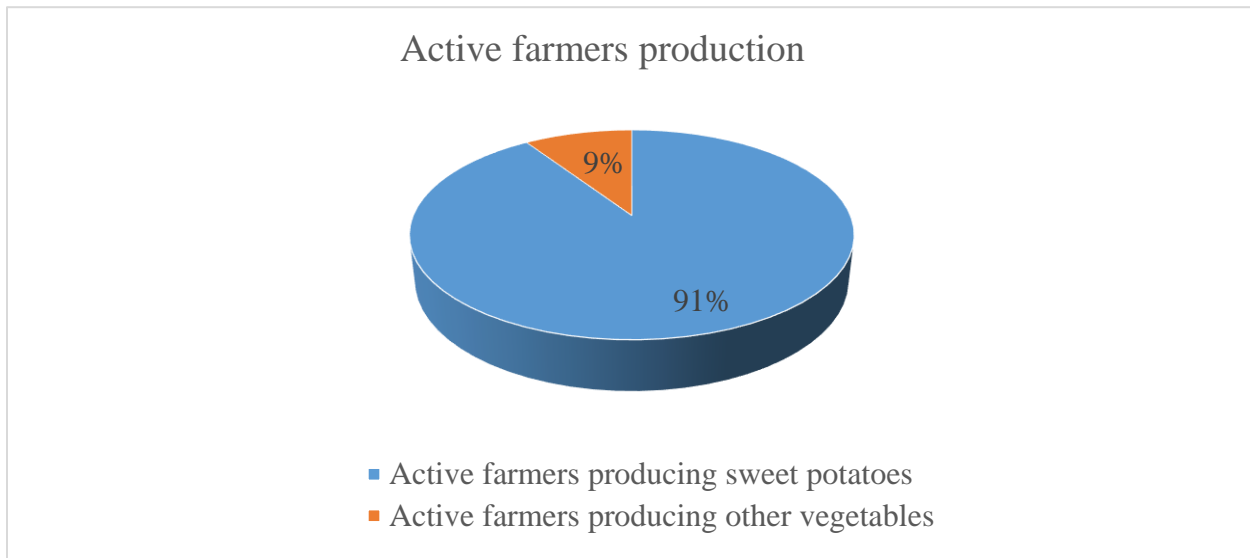


Figure 5: Crops that farmers cultivate in their farms

The farmers sell their agricultural produce either individually or supply the local market. Previously, they used to export their products to foreign countries, in addition to doing business with prominent companies that used to buy potatoes and maize from them. Since the scheme is no longer doing well, the farmers now sell their products to the local community. This has negatively affected production due to reduced profits, a culmination of retailing as opposed to wholesaling.

These include sweet potatoes, maize, and tomatoes. The farmers and extension officers indicated that they chose such crops because they require little water, less maintenance and their seeds are locally found. This has resulted in higher production of these crops. The majority of the farmers in the scheme produce the same types of crops. This has resulted in a tight competition for customers, and it is also the reason why the profits are low.



Plate 1: Sweet Potatoes, maize cabbages and tomatoes

Source: field work.

Plate 1 above is that of the maize crop taken from the fortunate active farmer who is at close proximity to the source of irrigation water. The maize was lush, strikingly attractive to the eye and under large scale production. It is evident from the above picture that Tshiombo irrigation scheme's produce used to be overwhelmingly encouraging. Farmers and extension officers indicated that the scheme was doing well compared to now. Due to the abandoned land, some people have invaded these farms, constructing houses on unattended land. Some are deliberately turning their farms into residential areas.



Plate 2: Canal for Irrigation and maize

Source: field work.

Another interesting scenario was that of dilapidated canals and new building structures that signified the new land use, informal settlements. This should ring alarm bells to the authorities as informal settlements are notorious for their crime, diseases and substance abuse. Through observations as well, the researcher discovered appalling living conditions under which ex-farmers survived. Their lives were a sorry state, a plain sight of cheer poverty and misery. Tying this together with information collected orally and materially, the study arrived at the conclusion that land abandonment has dire social consequences.

The picture below is testimony to this. In fact, this place has turned into a mixture of farming and residential areas.



Plate 3: Houses under construction in a productive piece of land

Source: field work.

The picture above shows some houses built by those who have invaded the scheme. The farmers attributed this invasion to long abandoned farms, giving the impression that people have no land to live on. This also means that people would rather have a place to live in than land to embark on subsistence agriculture.

In terms of the abandoned farm land, about 91% of the erstwhile farmers cultivated sweet potatoes, maize and potatoes. These farmers admitted that they abandoned their farming ventures due to bad climatic conditions, lack of canal maintenance, farms accessibility and also their proximity to the market or lack thereof. Another issue raised by farmers as leading to their ‘throwing in the towel’ was the lack of government support as it was withdrawn, leaving them hopelessly stranded in their farms. Many farmers have abandoned farming due to the lack of irrigation water. About 90% of the former farmers pointed out the issue of the shortage of water as a serious concern in their community, and it contributed towards their abandoning farming. Other contributory factors were said to be inadequate canals and a dysfunctional irrigation system. **Plate 4** below testifies to the above claim, the broken irrigation system.



Plate 4: Broken Irrigation systems

Source: field work.

4.5 Causes of Farm Abandonment

A total of 104 sampled active farmers and dormant ones provided information during field work. They provided different views on factors and causes of farm abandonment in ir areas. Their responses were given as follows:

4.5.1 Physical factors

Physical factors are known to be natural factors. They are neither man made, nor man controlled. The non-active farmers said that the physical factors include climate, precipitation, topography and soil.

I. Climate

A wide range of agricultural activities is controlled by climate and weather, temperature being the signature factor here. Areas deficient in heat are deficient in agriculture. Heat is one element of climate that man has failed to control for commercial purposes. The extension officers admitted that temperature determines the growth of vegetation naturally. They emphasised that farming is characterized by conditions such as fair radiation/sunlight and rainfall availability. About 73 farmers or 70% of the sample agreed that climatic conditions were prominent in destabilising agricultural production in the area.

All seven extension officers corroboratively stated that the lack of rainfall and the current drought are some of the prominent factors that influence farm abandonment. The consequence is the nonexistent water storage facilities in the area. These factors are observed to be negatively affecting practicing farmers as of now. If this persists, it is doubtful that many farmers would be in practice in the next few years.



Plate 5: Abandoned farm

Source: field work.

All 64 active farmers affirmed that rich soil is the chief requirement for a successful agricultural venture. They stated that rich soils are essential for the growth of plants, in addition to their being the medium through which water and all plant foods, except for carbon dioxide, are absorbed by the roots. However, the extension officers pointed out that soils that are poor, either chemically or in texture, have low productivity, both in amount and variety. This fact supports the view raised by 91% ex-farmers who indicated that the scheme is characterised by sandy soils. Such poor soils require fertilisers for decent production. The sandy soils are, therefore, an obvious factor that influences farm abandonment in the scheme. The extension officers elaborated that the soil quality determines the type of crops farmers could grow in a specific area. Since the scheme is composed of sandy soils, it forces farmers to produce a certain variety of crops as mentioned earlier. Those crops do not require much of the farm inputs such as fertilizers and pesticides, which these farmers cannot afford.

II. The study area's topography

The study area's topography affects agriculture as it relates to soil erosion, difficulty in cultivation and poor transportation system. All extension officers pointed out that the mechanisation of agriculture depends entirely on the land's topography. They indicated that Tshiombo irrigation scheme is situated in a flat land where the use of agricultural machinery is possible. They added that the location of the area makes it difficult to have soil erosion as the area is flat, hence little if no water-surface run-off. As such, the study area's topography favours agricultural practices. Providing uncorroborated information, the respondents argued that the low lying area of the scheme is sandy due to sand dumping. According them, more sand is being deposited into the area and this makes it difficult for agricultural activities to be done effectively. The soil erosion was raised as a serious factor, because in some farms, especially the ones in low lying areas, sand is all over. This is particularly so during the rainy season where sand is deposited in the area, making it difficult to conduct an agricultural business. **Plate 6** below shows an abandoned farm due to sand deposits.



Plate 6: Abandoned farm due to sand deposit

Source: field work.

4.4.2 None physical factors

I. Lack of maintenance

About 91% of the sampled farmers who abandoned farming, raised their concern about the absence of water bailiffs and the unmaintained irrigation canals. The lack of canal maintenance led to the drying up water in the storage dam. Water could no longer reach the storage dam due to broken canals that supply water to it. The dam has since been turned into a soccer field as **plate 7** illustrates below.



Plate 7: The storage dam that has now turned into a soccer field.

Source: field work.

The additional plate below represents the dysfunctional canals and irrigation system due to lack of maintenance.



Plate 8: Dysfunctional Canals

Source: field work.

II. Education and capacity

85% of the former farmers in Tshiombo irrigation scheme are old people with only primary education. These farmers relied on indigenous knowledge and advice from extension officers to run agricultural ventures during their farming years. The lack of qualified farmers led to lesser production. As such, this affected their agricultural practice. About 3% of these former farmers, however, did secondary education. Thus, according to information, seemed to be have been doing better compared to the ones with primary education only and those with no education at all. These ex-farmers, at later stages of their practice, once adopted the modern farming techniques before they abandoned farming as a business venture.

100% of the extension officers are adequately qualified, hence are the resource personnel and act as consultants for the farmers. The active farmers rely on these officers to provide them with new methods, skills and advice in terms of how they could improve their production. In contrast, out of all active and none active farmers, only 2% have tertiary qualifications. About 98% of the active farmers have no qualifications at all. They are an old aged group of people who use traditional subsistence farming methods. In turn, this negatively affects their production because they cannot adopt new scientific methods that could potentially double their agricultural production.

4.4.3 Economic factors influencing farm abandonment

The economic factors identified as responsible for the failure of the farm projects here were the market, transport facilities and labour. These are discussed in detail below.

I. Market failure

Extension officers pointed out that agriculture's relation to market generally determines the character of farming. The cost of transport to the market would generally affect the competitive power of the agricultural output. They also indicated that farms that are far away from the market would naturally grow crops in the context of the transport cost to the market. Those that are near large population centres produce perishable goods, which could be quickly transported to the market in short distances without much damage to the financial resources. Of the active farmers, 78% identified the lack of market as a factor that has greatly contributed to farm abandonment. The transport costs of agricultural produce to the Levubu marketplace (60Km away from the scheme), for example, are more expensive compared to the costs of selling to the local market. For this reason, the majority of the farmers opt to produce little for the local market. This has contributed to the lack of stability and growth of the scheme. Farmers who are further off the main road said that the issue of accessibility to markets is a contributory factor to their abandoning farming. They admitted that they do not have access to their farms because the government has not constructed proper roads to their farms. As such, the farms which are far from the main road are inaccessible, hence limit their production as well as market accessibility. This makes their ventures unviable in the long run, hence farm neglect.

II. Transport facilities

Extension officers admitted that in commercial type farming, the transport network is significant as it determines its genus. For farms far flung from the markets, and with poor road network, the success of commercial farming is a remote possibility. One extension officer indicated that the term 'truck farming' bears the unmistakable influence of transport on agriculture. The transport mode in farms affects production and the economic viability

of the concerned farms. Active farmers highlighted the poor access to their farms as a matter of concern. They lamented the limited and constrained access to their farms as problematic to their businesses. These farmers have to travel long distances to their farms. Consequently, potential clients are also affected as there are no proper roads. “This would be customers who buy in bulk”, decried one of the active farmers, suggesting that the lack of roads tends to discourage potential bulk buyers.

III. Labour

According to extension officers’, the labour supply determines the character of agriculture. For example, intensive agriculture is essentially labour-intensive. This indicates that agriculture requires skilled labour that can appreciate the subtle relations of seasons and soils with crops, and then adopt the necessary practices. Skilled labour, for example, determines the timely sowing, harvesting and other cultural practices, hence good returns. The 64 active farmers cultivate, harvest and sell their produce as they are self-employed. The extension officers revealed that these farmers do not have enough skills to practice agriculture for commercial purposes. They only produce for subsistence purposes. This has resulted in limited production.

Iv. Capital

Modern mechanised farming has become capital-intensive. A commercial farmer has to invest large amounts of money in agricultural machinery and other inputs. All the informants agreed that the lack of capital hinders agricultural production in the scheme. Farmers who are unemployed and old aged do not have enough start-up capital for commercial agricultural practice. Most of them rely on government grant(s) for survival.

4.4.4. Social factors influencing farm abandonment

Extension officers said that social factors affect farming in a number of ways. These factors also affect the type of crops that are grown. Social factors could affect agriculture

in the context of land ownership and inheritance. In the case of the Tshiombo irrigation scheme, farmers own the land. Some of them inherited it from their parents. From the seven extension officers' point of view, land inheritance has its own advantages and disadvantages. It is not in the best interest of this section to elaborate on either of these. The point is, families are guaranteed the ownership of their family land from generation to generation through this system. The following part presents the respondents' profiles. This determines the impact of abandoned agricultural land in Tshiombo irrigation scheme.

I. Age and interest

The data collected through focus group discussions show that youthful farmers inherited their plots from their parents upon their death. This practice has led to the lack of skilled farm owners, and this has negatively affected production. These unskilled farm owners rely on outsourcing. They hire unskilled people to do most of their work.



Plate 9: The majority female farmers

Source: field work.

The extension officers observed that the majority of the farmers are old, frail women who cannot do agriculture effectively. It is also difficult for them to read instructions on the equipment to be used. **Plate 9** above is that of the said aged female farmers. A total of 54 old aged farmers (between 56 and 65 years) farm for survival, and they sell extra produce to obtain cash for other needs. This study revealed that age is a contributory factor in farm abandonment.

II. Ownership / inheritance

The data collected from the study showed that the majority of the farmers do not have the total control or final say over their farms. The land belongs to the tribal authority. As a result, these farmers cannot sell their space if they are no longer interested in agriculture. Farmers indicated that if there is no other family member who wishes to continue farming, they are not allowed to sell their plots, a situation that leads to farm abandonment.

4.4.5. Political factors

Political factors play a role in the agricultural development of Tshiombo irrigation schemes. The extension officers agreed that the government policies on land, irrigation, marketing and trade have a direct impact on agriculture. Similarly, subsidies, loans, marketing and international trade, and the tax policy have a direct impact on agricultural production and its development. The lack of support from both government and private sectors was touted as prominent factors that lead to farm abandonment. Both active and former farmers were of the consensus that the lack of resource provision and assistance with farm implements negatively affect their production.

I. Lack of material support and equipment

The information from all the informants reveal that farmers abandoned their land due to the lack of government support. The respondents pointed out that farming involves the use of expensive inputs such as fertilisers, seeds, tractors, the proper water supply and

a ready market. Farmers indicated that their families are dependent on their production. They said that when production was good, the scheme used to supply nearby markets, in addition to Gauteng ones. On the other hand, extension officers acknowledged that ever since the irrigation scheme was abandoned, the local economy has been negatively affected.

4.6. The Social and Economic Impact of the Irrigation Scheme

The respondents confirmed that the scheme improved local people's lives. The data collected through focus group discussions revealed that farmers rely on the scheme for their children's education. During its highs, the scheme contributed a lot in alleviating poverty and reducing unemployment in Tshiombo. It can be concluded that due to the exports done, then, foreign currency was realised, and this led to the growth of the area's gross domestic product (GDP). Negatively, the scheme's collapse led to the suffering of people in Tshiombo.

4.7. Possible Strategies for preventing further Farm Abandonment

All active and inactive farmers provided possible strategies for the reduction of farm abandonment in their area. First, they advocated for the employment of water bailiffs by the government. Second, they raised the issue of the re-supply of inputs such as fertilisers and pesticides by the government to boost their farm productions. Most active farmers said that the supply of seeds and pesticides could boost their agricultural production. Third, the provision of low-cost government tractors and the availability of nearby markets would enable them to make enough profits for survival. The 40 ex-farmers indicated that if such issues could be sorted, many of them would return to farming. Meanwhile, extension officers indicated that providing economic and financial management education to the farmers could assist them in becoming independent commercial farmers.

4.8. Summary

The data discussed in this Chapter show that there are multi-problems that lead to the abandonment of farms in the Tshiombo Village. As much as these are many, the issue of the government's failure to assist farmers seemed to be the focal one. By virtue of being small-scale-farmers, these people do not have the capacity to sustain their farming ventures without any governmental support. This is compounded by the fact the financial institutions cannot lend them money as they do not have collateral. In addition, their lack of education seems to be problematic as well. Those who are not educated are also old, exacerbating their farming dilemma.

It cannot be overemphasised that extension officers have played a crucial role in keeping farming activities afloat in this community through their informed assistance on farm management and marketing strategies. Those who have managed to hang in there have reaped the fruits of their patience as some of them produce enough to survive without begging. On top of that, they are able to send their children to institutions of higher learning without much of a problem financially. The opposite is true of those who threw in the towel. Their lives have been turned upside-down by poverty. The following Chapter presents the study findings in addition to concluding this study.

CHAPTER FIVE: SUMMARY OF THE STUDY FINDINGS AND RECOMMENDATIONS

5.1. Introduction

This Chapter presents a summary of the study and that of its findings as analysed in Chapter Four. The Chapter also provides a number of recommendations to tackle the identified challenges. Thereafter, possible solutions are provided.

5.2. Summary of the Research Findings

This summary is based on the research objectives as outlined in Chapter One. The study's findings are discussed according to the research questions, starting with the first one below.

5.2.1. What are the causes of the abandonment of the agricultural activities?

The study found out that the lack of government support to small scale farmers is the root cause of farm abandonment in the area. That is, the suspension of government assistance to farmers collapsed their farming ventures as they could not afford to buy most of the farm implements necessary for productive farming. The result was that such farmers ceased operations, hence farms became idle.

The lack of education was also put forward as another contributory factor to the farm abandonment in the scheme. Here, extension officers alleged that farmers cannot grow and become independent commercial farmers without a proper educational background.

5.2.2. What are the social and economic impacts of the abandoned agricultural land?

The study revealed that the major challenge that farmers face here is the lack of government support. Farmers alleged that the government used to provide them with

equipment such as cheap tractors for cultivation and irrigation canals, which were also maintained by government officials known as water bailiffs.

However, the extension officers alleged that farmers lack economic background to grow themselves and become independent commercial farmers. The extension officers said that farmers were aided by support from the beginning as a start so that they could be able to grow and become strong commercial farmers. They also indicated that with proper economic background, one can grow rapidly and shift from being a subsistence farmer to a commercial one.

The findings indicated that there are challenges that influence farm abandonment in the area caused by both government and farmers themselves. The study noticed that the lack of support to small scale farmers such as the supply of seeds, cheap tractors and the maintenance of irrigation canals is one of the prominent causes of the farm abandonment. The redeployment of water bailiffs in the area was also noted as another important factor influencing the farm abandonment in the area. The study noted that agricultural abandonment in Tshiombo irrigation scheme affected the farmers' lifestyles. It found out that farmers are now able to feed their families as well as take their children to school. This was possible because the scheme was growing to such an extent that it now attracted both national and international customers. On the other hand, the dysfunctional scheme led to hunger and the escalation of poverty among villagers in the area.

The study also found out that the attraction of both national and international markets boosted the country's economic growth and development. Such growth was realised through the construction of roads to access the Tshiombo Villages. This improved people's standard of living, particularly during the past years when the scheme was in full operation. This also improved tertiary graduate output amongst the Tshiombo's youth because their parents have enough income to send them to school.

5.2.3. Which mitigation strategies can be implemented to re-activate the abandoned agricultural activities?

The re-employment of water bailiffs could be suitable to monitor the equitable water distribution to all farmers. The lack of water bailiffs led to the lack of control in terms of the irrigation schedule amongst farmers themselves. This has divided them and led to those owning the peripheral portions of the scheme not to receive water for irrigation because there is no one to monitor its fair and equitable distribution.

The reinstatement of government support in the form of the provision of seeds, fertilisers and cheap tractors for cultivation or the subsidisation of small scale farmers could help to solve this problem. The government should redistribute such resources in order to help these farmers to grow their industry. The cheap tractors and seed distribution, together with subsidies would attract ex-farmers back to farming. The maintenance of irrigation canals and dams would help to distribute water to all farms. Some of the farmers abandoned farming due to the lack of water for irrigation, and this is because dams have been abandoned as well. The fixing of irrigation canals would help to distribute water to all farms and as such farmers would be encouraged to go back to farming due to its availability.

The farmers lamented on the chronic shortage of irrigation water. Through observations done during field trips, the researcher realised that this problem could be solved by drilling boreholes in the area, a strategy that could see farmers guaranteed of continuous supply of irrigation water even during droughts. This could boost the morality of these farmers, hence continue practising agriculture. The drilled boreholes would assist in dry seasons, providing water for irrigation in the scheme. This would erode the problem of drought that has also played a role in the abandonment of farms in the area.

The government, through the provision of economic education to farmers, would help them to develop from small scale farming or being subsistence farmers to become independent commercial farmers. The economic education would help them manage their

finances or profits so that in future, they would not rely on the government, but run their farming ventures from their profits.

Markets in agriculture are a necessity if small scale farmers are to survive in this business. That is, the provision of markets nearby could boost the farmers' businesses as they would be in a position to sell their farm produce locally. The issue is, interviewed farmers indicated that they had been struggling with a market to sell their products, hence attract local customers. Many customers were unable to access their farm produce due to the lack of a central market, therefore, market availability would promote the farmers and this would help develop the area through the provision of employment for youth. In combination, these would lead to the country's economic growth.

5.3. Conclusion

This study examined the social and economic impacts of abandoned farmland in Tshiombo irrigation scheme, in the Vhembe District, Limpopo Province. In doing so, it investigated the factors associated with farmland abandonment. Whatever the cause, farm abandonment is a problem to both farmers and the Department of Agriculture as it threatens the country's food security. Through the analysed data, both the lack of government support and farming skills were identified as the major contributory factors to farm abandonment in the area. An observational field assessment was conducted in order to ascertain this assertion, and this proved to be the case. As a result, those farmers who abandoned their farms now live miserable lives. Poverty has reduced them to beggars who live off alms provided by the haves of Tshiombo Village. Given that these people's life of poverty is man-engineered, it is no surprise that their anger is directed at the government, which they accuse of turning a blind eye to their plight and dire situation.

Data was obtained through focus group discussions involving both active and inactive farmers. A sample size of 104 informants that included 40 ex-farmers and 64 active ones was used. In addition, seven extension officers were interviewed for their informed views on matters agricultural. The collected data was analysed using graphs and charts.

Conducting this study in this way made it possible for the researcher to immerse himself in the Tshiombo Community where he discovered for himself the dichotomous situation that now prevails there due to farm abandonment. There now prevails a two in one community, where on the one hand, there are active farmers who exhibit an affluent lifestyle, and on the other, there are poor miserable ex-farmers who live a lifestyle that reflect the full characteristics of a refugee camp. The irony here is that these two sets of sub-communities were once partners in agricultural production. What this means is that in spite of the challenges these ex-farmers encountered in their farming ventures, abandoning their farms was not a wise decision to make. Perseverance and hard work, despite the odds, have paid for those farmers who remained active. Based on these facts, the study concludes that farm abandonment leaves a trail of poverty, suffering and animosity among failed farmers, hence should be discouraged in every way possible. Instead, farmers should be encouraged to persevere for the sake of their families.

5.4. Recommendations

This study's findings were used to formulate recommendations. If followed, these recommendations would contribute towards reducing the abandonment of farms in Tshiombo Irrigation Scheme, hence promote farming here. There are a variety of issues related to farm abandonment at the Tshiombo Irrigation Scheme as noted when the study was conducted. The following constitute this study's recommendations.

5.4.1. Measures to influence farming and limit farm abandonment

- Re-employment water bailiffs to oversee equitable distribution of water to all farmers. This would ensure that all farmers, particularly those in the peripheral areas of the irrigation scheme, are adequately served with water for their crops.
- The government should reinstate its support of the small scale farmers in the Tshiombo Irrigation Scheme. This would ensure that these farmers have access to all the necessary farm implements and inputs for the successful agricultural ventures. The government should redistribute such resources in order to help small farmers to grow their industry.

- The government should reconstruct and undertake to maintain irrigation canals and dams so that farmers have easy access to irrigation water. This would encourage those who had abandoned farming to reconsider their decisions, hence come back.
- The government should drill boreholes in the area to help and support farmers with water during winter or drought. This would solve the problem of chronic water shortages often experienced by farmers in winter or during droughts.
- The government should educate farmers on how to run their business ventures profitable, through workshops, field trips or such informal gatherings. This would help these farmers to sustain their farming ventures. The economic education would help them manage their finances or profits properly for future use.
- The government should build a central market to cater for all farmers in the area. This would boost these farmers' customer base as many people would be able to access it. The markets' availability would promote these farmers, hence lead to the development of the area through employment provision.

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APPENDIX A

INTERVIEW QUESTIONNAIRES FOR ACTIVE FARMERS' FOCUS GROUPS AT TSHIOMBO IRRIGATION SCHEME

INTRODUCTION

Good morning/ afternoon/ evening, I am Mudau Mafulo Stenley a student at the University of Venda conducting a study about the impacts of abandonment agricultural activities of Tshiombo irrigation scheme for my master's degree. I would like to hear from farmers about their knowledge, experiences and constraints in leading to farm abandonment as well as how to improve the present situation.

Your answers are very important to both of us because they will help us to identify areas of intervention. This interview is confidential, nobody will be able to recognize you from your response and I am not going to take your name or anything that can identify you.

Your responses are extremely important in this study, but you are not compelled to respond if you chose not to.

Do you agree to be interviewed today?

1. Yes
2. No

Place _____ on _____ 2016

If no, appointment _____ date

Key questions directed to Active farmers

1. What are you cultivating?
2. Where are you selling your crops?
3. How are you selling the crops?
4. Some farmers are abandoning their plots, why are you still continuing?
5. What are the problems affecting your farming enterprises
6. How are you coping currently?
10. How are you benefiting from your farming?
11. Who is buying your products?
12. How are you coping with current farming system?
13. What assistance were you getting from government?
14. Are you still getting the same assistance?
15. What are the changes in your way of living due to current farming?
17. How are you dealing with the changes?
18. What are your dreams as a farmer?
19. How would you like to achieve them (wish)?

Thank you!

APPENDIX B

INTERVIEW QUESTIONNAIRES FOR NON-ACTIVE FARMERS' FOCUS GROUPS AT TSHIOMBO IRRIGATION SCHEME

INTRODUCTION

Good morning/ afternoon/ evening, I am Mudau Mafulo Stenley a student at the University of Venda conducting a study about the impacts of abandonment agricultural activities of Tshiombo irrigation scheme for my master's degree. I would like to hear from farmers about their knowledge, experiences and constraints in leading to farm abandonment as well as how to improve the present situation.

Your answers are very important to both of us because they will help us to identify areas of intervention. This interview is confidential, nobody will be able to recognize you from your response and I am not going to take your name or anything that can identify you.

Your responses are extremely important in this study, but you are not compelled to respond if you chose not to.

Do you agree to be interviewed today?

1. Yes
2. No

Place _____ on _____ 2016

If no, appointment _____ date

Key questions directed to none- active farmers

1. For how long have you been farming (years?)
2. Which crops were you cultivating?
3. Why are you no longer cultivating
4. Where were you selling your crops?
5. How were you selling the crops?
6. What are the causes of farm abandonment?
7. When did you start facing these problems?
8. How did the problem started?
9. How where you benefiting from your farming?
10. How does farm abandonment affect your daily livelihood?
11. How are you surviving after you have abandoned farming?
12. Which kind of support where you getting from the government?
13. What should be done to make sure that you farm again?

Thank you!

APPENDIX B
QUESTIONNAIRES DIRECTED TO EXTENSION OFFICERS AT TSHIOMBO
IRRIGATION SCHEME

INTRODUCTION

Good morning/ afternoon/ evening, I am Mudau Mafulo Stenley a student at the University of Venda conducting a study about the impacts of abandonment agricultural activities of Tshiombo irrigation scheme for my master's degree. I would like to hear from extension officers about their knowledge, experiences and constraints in assisting farmers at Tshiombo irrigation scheme.

Your answers are very important to both of us because they will help us to identify areas of intervention. This interview is confidential, nobody will be able to recognize you from your response and I am not going to take your name or anything that can identify you.

Your responses are extremely important in this study, but you are not compelled to respond if you chose not to.

Do you agree to be interviewed today?

1. Yes
2. No

Place _____ on _____ 2016

If no, appointment _____ date

DEMOGRAPHIC CHARACTERISTICS

001

(TICK ONE or FILL IN)

1. Age

<45	1
45-55	2
55-65	3
>65	4

2. Educational level

Never	1
Primary	2
Secondary	3
Tertiary	4

3. Numbers of years as an extension officer at Tshiombo irrigation scheme

	1
	2
	3
	4
	5

FARMING SYSTEM AND AGRICULTURAL KNOWLEDGE

002

(CROSS OR FILL IN)

4. What are the main agricultural products produced by the farmers?

.....

.....

.....

5. Rank them in order according the most planted

.....
.....

6. What are the causes of agricultural abandonment of some plots by the farmers?

.....
.....
.....

7. What kind of support do government provide to farmers?

.....
.....
.....

8. What kind of support is government no longer providing to the farmers?

.....
.....
.....

9. What are the challenges that are hindering agricultural production in the area?

.....
.....
.....
.....

10. How are you supporting existing small existing farmers?

.....
.....
.....

11. Which measures have been put in place to limit farm abandonment?

.....
.....
.....
.....

12. Which measures have been put in place to promote farming in these areas?

.....
.....
.....
.....

Thank you!

Appendix C: Feedback and Dissemination Plan

This study will be made available in the form of a bound document given to the University of Venda. Research papers from this study will be presented in and outside South Africa in both national and international conferences. A policy brief will be produced from the study to give guidelines on combating the conflict of interest among community leaders in relationship to agricultural activities. The results of the study will be shared with various stakeholders who contributed in whichever way to this study. Results from the first phase of the study will be shared with Tshiombo Community at Ward level. After wards, a detailed report will have been compiled. It will then be read in an organized meeting involving all interested groups within the Ward. A copy of the report will be given to the community leaders as evidence of work done and for future use. During agricultural workshops and conferences, reporters from local newspapers and radio stations will be invited to witness the feedback session. The findings will be published in the country's popular journals that will be helpful for the local community. By getting information on the implications of conflicting interests in rural development, the government could take necessary initiatives to clarify the roles of community leaders and government. Government organizations and different non-governmental organizations will also benefit from the research findings. The outcomes of the proposed research can also be used to find solutions and improve working relationship among community leaders.

Appendix E

Observation checklist

1. Types of crops planted
2. Active and non-active farmland
3. Irrigation system infrastructure
4. Marketing system

Appendix F: Permission letter

Pa. box 362

Makonde

0984

15 February 2016

Assistant director

Limpop department of agriculture and rural development

Private bag 2447

Sibasa

0970

Attention: Mr Mudzielwana

Receive greetings

I Mudau Mafulo Stanley of id no 8801085894080 I am a student at university of Venda under the school of environmental sciences. I am currently studying my master degree on the investigation of abandoned agricultural activities of Tshiombo irrigation scheme in the Vhembe district of Limpopo, South Africa. So I humbly request to be allowed to visit the area and also to be provided with relevant information for my studies.

I hope my request will be considered

Kind regards



Mudau MS 0794960958

*Moved
DIR Ramotha me kindly
assist me mudau mafulo humi
I had a discussion with him
and I agree with to contact
a study in our area of operation.
Mudzielwana OT.
15/02/2016.*