

**ACCESSIBILITY OF AGRICULTURAL INFORMATION IN SUPPORTING
CLIMATE CHANGE ADAPTATION IN TANZANIA**

A Case Study of Chamwino District, Dodoma Region

Nicholaus Mwalukasa

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**MA (Information Studies) Dissertation
University of Dar es Salaam
September, 2011.**

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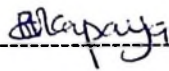
Nicholaus Mwalukasa

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the
Degree of Master of Arts (Information Studies) of the University of Dar es Salaam.**

**University of Dar es Salaam
September, 2011**

CERTIFICATION

The undersigned certifies that she has read and hereby recommends for the acceptance by the University of Dar es-Salaam a dissertation entitled: *Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Tanzania: A case Study of Chamwino District, Dodoma Region*, in partial fulfillment of the requirements of the Degree of Masters of Arts (Information Studies) of the University of Dar es Salaam.



Dr. Chausiku M.O. Kapaya

(Supervisor)

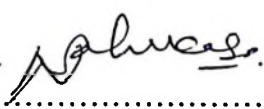
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DECLARATION

AND

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I, **Nicholaus Mwalukasa** , declare that this dissertation is my own original work and has not been presented and will not be presented at any other University for a similar or any other Degree award.

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DEDICATION

This work is dedicated to my father the late Amoni Mwalukasa, my mother Tungulilege A. Mwamlima, my brother Richard, my beloved young brothers: Isaac, Raphael, Mwisile, Leonard, Aswile and my lovely wife Elizabeth Landa.

ABSTRACT

This study aimed the exploring to access and use of agricultural information by farmers in supporting climate change adaptation in Chamwino District, Dodoma Region. Data was collected from the two villages of Kilangali II and Mvumi Makulu from Buigiri ward and Mvumi Makulu wards respectively. The sample of 100 respondents was used, that included farmers, village Executive Officers and Agricultural Extension Officers. Frequencies, percentages, Chi-square and multiple linear regressions were employed. The study identified that radio, relatives, friends, neighbours and fellow farmers were the most useful sources of agricultural information about climate change. The conveyed sources of information were types of seeds resistant to drought, mixed crops, soil management, water management, irrigation system, planting trees and changing planting dates. However, only growing drought-resistant and early maturing crops, intercropping and planting trees were the major agricultural practices adopted in the study area. Income of respondents has a significant influence on accessibility to agricultural information supporting climate change adaptation.

The study concludes that accessibility of agricultural information about climate change and the adoption of recommended agricultural practice in the study area is low.

The study recommends that strategies for increasing access to information supporting climate change includes the establishment of rural agricultural libraries and information centres, employing committed and adequate competent Agricultural Extension Officers, provision of printed material, in a language and content relevant to rural farmers and giving more time to agricultural information on radio and television programmes.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATV	Abood Television
ITV	Independent Television
SPSS	Statistical Package for Social Science
SUA TV	Sokoine University of Agriculture Television
TASO	Tanzania Agricultural Society Organization
TBC	Tanzania Broadcasting Corporation
TCRA	Tanzania Communications Regulatory Authority
TLS	Tanzania Library Services
URT	United Republic of Tanzania
VEO	Village Executive Officer

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents background information on the Accessibility of Agricultural Information to Support Climate Change Adaptation in Tanzania: A Case Study of Chamwino District, Dodoma Region. The chapter includes the following components: background to the study, statement of the research problem, objectives of the study, research questions, significance of the study, definition of the key terms (operationalisation) and limitation of the study.

1.1 Background to the Study

The term agriculture is defined by ILO (1999) as “production, processing, marketing, and use of foods, fibers and by-products from plant crops and animals”. Paavola (2003) defined climate change as “a systematic change in the key dimensions of climate, including average temperature and wind and rainfall patterns over a long period of time”.

Tanzania like other countries is experiencing climate change. Agriculture is identified as one of the areas most vulnerable to climate change (Mwandosya *et al.*, 1998). The effects on agriculture are predicted to be a lower yield of crops that contribute to a high percentage of food crops, particularly maize, resulting in increased food security and low incomes among farming communities (Paavola, 2003; Hackner, 2009). Empirical studies show that

Tanzania experienced 37 occurrences of drought between 1972 and 1990 (URT, 1998). This has serious implications for food security and people's livelihoods. Drought occurred mostly in semi-arid areas and represents 33% of all disasters that occurred in Tanzania during that time (Morris *et al.*, 2003). Tanzania is predicted to warm by "2 to 4 degrees centigrade (C°) by 2100, and rainfall is predicted to decrease by 0 to 20 percent in the inner parts of the country, with the result that the maize yields may decrease by 80 percent in the Dodoma Region" (Mwandosya *et al.*, 1998). Gowing *et al.*, (2003) stated that "Dodoma Region, as other semi-arid areas relies on rain-fed agriculture, and is characterized by inadequate soil moisture and low soil fertility".

Agriculture is the backbone of Tanzanian's economy. 80% of Tanzanians depend on agriculture as the source of food requirements (URT, 2006). Agriculture contributes 25.8% to the gross domestic product (GDP) of the country (URT, 2008). This implies that the progress in reducing poverty, malnutrition and food insecurity largely depends on the performance of the agricultural sector. Improving agricultural production to adapt to climate change depends on timely access to agricultural information. Agricultural information is one of the most valuable resources in agricultural production (Meyer and Boon, 2003). Farmers should be enabled to make choices on the production practices and crops that adapt to climate change. According to Manda (2002) "Access to agricultural information enables people to make informed decisions". The emergence of the climate change, which has an impact on agriculture, indicates that farmers need access to agricultural information which will enable them to make appropriate decisions for adapting to climate change. Aina (1991)

also states that “the provision of agricultural information that is relevant to users is very strategic in the overall increase in food production in Africa.”

From what has been explained above, there is no doubt that Tanzania requires accessibility of agricultural information that suits farmers vulnerable to the impact of climate change. This can be achieved when one is information literate and can be aware of the constraints faced in sourcing for information for supporting climate change adaptation in Tanzania.

1.2 Statement of the Problem

Information is an important aspect concerning adaptation to climate change. In order to adapt to climate change, information about the different adaptation measures need to be accessed by farmers. According to Paavola (2003), one of the causes of the vulnerability to climate change is lack of access to information. This means that, despite the availability of information with regard to adaptation measures supporting climate change adaptation in the agricultural sector, information is not being used or optimally accessed by farmers.

Ludi (2009) stated that “Among the adaptation options in agriculture is adequate information and knowledge about the availability and suitability of resources to promote sustainable agriculture.” Little is known about the accessibility of agricultural information in enabling people to adapt to climate change in Chamwino District.

1.3 Objectives

1.3.1 General Objective

The general objective of this study was to explore access to the provision and use of agricultural information by farmers in supporting climate change adaptation in Chamwino District.

1.3.2 Specific Objectives

This study was guided by the following specific objectives:

1. To identify the types and sources of agricultural information about climate change available in Chamwino District.
2. To examine farmers' access to and use of agricultural information under climate change for climate change adaptation.
3. To identify the challenges encountered in accessing agricultural information about climate change.
4. To propose the way forward and solicit suggestions for overcoming the identified challenges in accessing and using agricultural information about climate change by farmers.

1.3.3 Research Questions

Specifically the investigation in this study was guided by the following research questions:

1. What types and sources of agricultural information about climate change are available in Chamwino District?

2. How do farmers in Chamwino District access and use agricultural information about climate change to adapt to climate change?
3. What challenges are encountered by farmers in accessing agricultural information about climate change?
4. What strategies can be used to overcome the identified challenges in accessing and using agricultural information about climate change?

1.4 Significance and Limitation of the Study

1.4.1 Significance of the Study

The relevance of this research lies in the following areas:

1. The study will help to determine accessibility of agricultural information in supporting climate change adaptation.
2. The identification of challenges to agricultural information will help to design better information systems that will enable farmers to access agricultural information to enable them to adapt to climate change.
3. The findings of this study will help to identify the research gaps in this topic; it will contribute to the existing literature and provide a point of reference for other researchers.

1.4.2 Limitation of the Study

This study was confined to Chamwino District only, because of lack of funds and time constraints. It covered only two selected wards, namely Mvumi Makulu and Buigiri in

Chamwino District. That means other wards in Chamwino were not surveyed. Mvumi Makulu and Kilangali II villages was selected from Mvumi Makulu and Buigiri wards respectively.

1.5 Operational Definitions of Basic Concepts

The following terminologies and concepts were adopted in this study:

1.5.1 Information Source

Choo (1999) defined Information sources as the point at which information can be accessed. In the context of this study an information source is any document, person, newspaper, Extension Officer or posters that provide the agricultural information required by farmers.

1.5.2 Agricultural Information

Agriculture is too broad. For the purposes of this study, 'agriculture' can be defined as the science or art of cultivating the soil, growing, harvesting, processing and marketing crops (ILO, 1999). In this study 'agricultural information' refers to information on agriculture aimed at imparting knowledge and skills with regard to climate change.

1.5.3 Climate Change

Climate change has been defined by Paavola (2001) as "a systematic change in the key dimensions of climate, including average temperature and wind and rainfall patterns over a long period of time."

1.5.4 Climate Change Adaptation

According to Paavola (2003), Climate change adaptation means “initiatives and measures taken to reduce the impact of climate change effects.”

1.6. Summary

This chapter has covered the introduction, background to the study, statement of the problem, research objectives, research questions, limitation and scope of the study, significance of the study and definition of the key terms.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature relating to the general and specific objectives of the study. The literature discusses information as the most valuable resource in agricultural development to adapt to climate change. It includes both current and retrospective sources. The literature review is arranged according to the five main themes of the study: agricultural information in Tanzania, farmers' information needs to reduce the impact of climate change, sources of agricultural information, the role of information in agricultural development, climate change adaptation measures and the conceptual framework which guided the study.

2.1 Agricultural Information in Tanzania

Information is a critical element for agricultural development but it does not seem to be relevant in Tanzania (Manda, 2002). A study in Arumeru found that there is limited use and access to various sources of agricultural information among farmers (Häckner, 2009). Sources that were used originally include Extension Agent, Village leaders, magazines and newspapers (Mattee and Mollel, 1990). The information that flows into rural areas is often irrelevant to the specific needs of local farmers. A large percentage of rural people have a relatively low level of literacy characterized by their inadequate social and economic status, which makes it hard for them to understand the information provided. Frequently used sources of information of the rural population include radios, newspapers and people. Due

to advances in technological development, videos and television programmes can reach a wider audience and convey information to people who are relatively illiterate, although understanding the content may still be a problem among people who do not have formal education.

2.2 Farmers' Information Needs to Reduce Impact of Climate Change

According to Aina (1986), Kaniki,(1991), Matovelo (2008), farmers need agricultural information found in the category of, technical/scientific information, which arises from research and development work carried out in various agricultural research institutions, including universities. The results of such research are aimed at increasing agricultural production by providing high yielding seeds and controlling major pests and diseases. This type of information is needed by researchers, extension officers, agro-based industrial staff and farmers. In addition, social/cultural information encompasses traditional information on agricultural practices, local cultures, background information on farming communi the types of crops to be grown in the regime of climate change, modern systems of farming and new innovations in storage facilities for harvested crops.

2.3 Sources of Agricultural Information

Information sources refer to the point at which information can be accessed (Choo, 1999). It can be a primary, secondary or tertiary source. Farmers access information from various sources, such as agricultural demonstrations, printed materials including leaflets, brochures,

newspapers and magazines, broadcasting media, such as radio and television, extension services, oral or group discussions, visual aids and using fellow farmers

2.3.1 Extension Services

Extension services refer to the kind of education provided by agricultural extension officers/workers by visiting and providing agricultural demonstrations to convey useful information to them. Mntambo (2007) points out that “extension services have been defined as the furthering and popularizing of knowledge, and providing farmers with access to information and training.” Sheba (1997) states that “In most of the developing countries the farmer’s sources of agricultural information depend to a large extent on agricultural extension services offered free by the government through extension officers.” However, Rivera (2007) stated that “in developed countries such as Europe, agricultural information is becoming a price commodity and the provision of agricultural knowledge is increasingly becoming information transfer.” The purpose of extension officers is to reach out to farmers through extension services. Extension staff visit individual farmers, conduct demonstrations on demonstration farms and at agricultural exhibitions and produce, radio and TV programmes and printed agricultural materials. However, there are an inadequate number of agricultural officers. The extension officers are few and cannot make visits to an individual when required to do so (Sheba, 1997). The ratio of extension workers to farmers is 1:2800 (Sheba, 1997). The ratio of extension workers to farmers is generally low.

2.3.2 Printed Materials

Printed materials such as newsletters, leaflets, brochures, newspapers, books and many others are good sources of agricultural information for farmers to make them informed of new ideas and innovations and to provide them with general information about agricultural practices (Manda, 2002; Matovelo, 2008 and Mchombu, 2003). However these sources of information are expensive and their effectiveness depends upon the level of literacy and communicative nature of the people. In areas with a high rate of literacy this medium is very effective if certain pre-conditions including a good level of education among farmers are met (Wambura, 1992). In Tanzania, printed materials are important for explaining and interpreting news and developments. According to Mbwana (1994), in Tanzania, “*Ukulima wa Kisasa*” (Modern Agriculture) is the main agricultural monthly magazine for farmers. It is further noted that as a national agricultural magazine it is a vital source of information pertaining to modern methods of cultivation, price trends, and processing etc. Mbwana (1994), further noted that most farmers benefit from “*Ukulima wa Kisasa*” the monthly Kiswahili magazine. However, production and distribution barriers affect the usefulness of “*Ukulima wa Kisasa*.”

In Nigeria, however, the use of printed materials has not been effective in imparting agricultural information to rural farmers because the messages it carries are of limited use in reaching illiterate farmers because the language used in communicating information is incomprehensible to farmers (Ozawa, 1995).

2.3.3 Broadcasting Media

Broadcasting media such as television and radio are also good at transmitting agricultural information. However, there are some drawbacks with regard to these sources of information. First the broadcast media such as television and radio are expensive and most farmers cannot afford to buy them. Second, timing of the information is another problem. To access the information, farmers have to be listening or watching at the same time the programme is broadcast. In Tanzania radio are popular and useful for the dissemination of agricultural information. They have a good coverage, they are affordable and they use Kiswahili language in order to disseminate agricultural information. Mntambo (2007) also points out that radio is the most important way of reaching farmers in developing countries. According to TCRA (2005), radio is still the most appropriate communication technology available for most people, particularly rural communities. Ozawa (1995) mentioned that, when used effectively, radios can provide general information about agriculture quickly and accurately to a large number of farmers, making them aware of agricultural information which aims at improving agricultural production.

Emmanuel (2008) stated that...

"Radios play a great role in disseminating information in rural areas as there are a limited number of information providers and media, such as television and printed materials".

In Tanzania, the state TV (TBC) is the leading TV station, followed by ITV, Star TV and many religious networks (TCRA, 2005). In addition, there are local area TV networks such as SUA TV and Abood TV in Morogoro. Many of these TV networks broadcast

programmes on agricultural issues. TV networks broadcast agricultural programmes such as ASDP on TBC1 and Inuka “Wake Up” and Kilimo Bora “Good Agriculture” on Star TV.

Despite the fact that radio and TV networks have wide coverage on the dissemination of agricultural information, Ozawa (1995) argues that television and radio are not adapted to the agricultural information needs of farmers and the rural population, because effectiveness depends upon the ability of broadcasters to win their listeners’ confidence by basing their programmes on local problems and by using the language of the farmers (Van de Ban and Hawkings, 1996).

2.3.4 Oral or Group Discussions

Conversation about different agricultural innovations/technology comes about through spoken words. A large percentage of rural people have relatively low level of literacy characterized by their inadequate social and economic status, which hinders them from understanding the information provided in written forms. They prefer to obtain their information through oral discussions. In a study carried out by Bembridge and Tshikolomo (1992); Leach, (2001) as cited by Stefano *et al*, (2005) , they found that oral forms are clearly favoured by rural communities because of long oral traditions and relatively low levels of literacy.

2.3.5 Visual Aids.

Visual aids are presentational tools that appeal to the sight and are used for illustration and demonstration for the purpose of disseminating agricultural information to farmers. It involves the use of aids such as charts and slides during the presentation. According to Ofuoko and Agumagu (2008), visual aids include film shows, posters, video tapes, agricultural shows and chalk boards.

2.3.6 Contact with Fellow Farmers

Contact with fellow farmers involves the exchange of the views, ideas and innovation from one farmer to the other. This is supported by the study carried out by Banmeke and Ajayi (2007), who found that fellow farmers are among the sources of agricultural information. In Tanzania, a study carried out by Bilokwanamagara (2008) revealed that almost all villages in Tanzania have centres which farmers attend and whereby they interact informally to discuss various issues prevailing in their area, including agriculture. Mbwana (1994) asserted that in Tanzanian villages, farmer-to-farmer contact have served as an instrument for diffusing technological knowledge. Manda (2002), mentioned, in order of importance, that the sources of agricultural information most often used are: peer farmers and the radio. On other hand, the major negative aspects of farmer-to-farmer contacts in relation to information flow are their social and personal characteristics and lack of education that have an impact, especially in developing countries.

2.3.6 Library and Information Centres

The community information centre is very important, as it will serve as a place where information can be organised, stored, accessed and utilized, either manually or electronically. It has frequently been recommended by various scholars in developing countries, including Manda (2002) Sheba (1997) Okiy (2003). Kaniki's study in Zambia demonstrated the good position that libraries were in to develop appropriate services to meet the information need of farmers (Kaniki, 1991). However, studies show that the provision of library and information services in Africa to date has focused more on urban areas; hence there a serious neglect rural areas which comprise of most of the people who are engaged in agricultural activities (Adimorah, 1986). Kamba (2010) stated:

“Connecting the rural communities to the global network is made possible through the establishment of Innovative Community Information Centre (ICIC). When carefully designed and implemented, community information centre can promise great potential in establishing a dynamic network for preserving, ordering and transmitting information to the rural communities.”

Research has shown that in other parts of the world like Thailand, Malaysia, Singapore, Philippines, South Korea, India and Russia, rural library services have been successful through the deployment of Information and Communication Technologies (ICTs) to bridge the information and digital gap of the rural communities, which virtually lead to their development [Cheunwatanna, 1998, and Yusof, 2004 cited by Kamba (2010)]. In Tanzania, the need to bring knowledge to rural through libraries has long been recognized by the Tanzania Library Services (TLS) which had plans for a rural and mobile libraries to serve farmers who form the majority of the rural population (Mwasha, 1985). However, this has

still not been unsuccessfully carried out. Among the reasons attributed to the failure were the lack of permanent structures, dependence on donor funding and the absence of relevant materials (Kilindo, 1989).

2.3.7 Field Demonstrations

Field demonstrations are the most widely used technique for imparting farm information. Van de Ban and Hawkins (1996) asserted that demonstrations may stimulate farmers to try out innovations for themselves. They can show the causes of problems and possible solutions without complicated technical details. For example, farmers can be shown the results of applying fertilizers at different times, as well as seed spacing. Demonstrations allow farmers to observe, hear and learn by doing. In countries where the mass media play a limited role because of illiteracy or limited access to media outlets, demonstrations are very important for making people aware of innovations (Van de Ban and Hawkins, 1996). Studies show that even where demonstrations are used, they seem not to have succeeded in convincing farmers, because extension workers have failed to secure and use the necessary inputs due the economic hardship they face (Ozawa, 1995).

2.4 The Role of Information in Agricultural Development

According to Ozawa (1995), “there are many technological innovations such as new ideas and the information that are meant for farmers use, such as improved seeds, food processing techniques, storage facilities, animal husbandry techniques and animal breeds as well as market and weather information.” This information has an important

role in decision making. There are different areas in which agricultural information can contribute to the agricultural sector, such as improved agricultural practices regarding seeds, weeding, spacing, the use of fertilizers and improved marketing. The study by Rivera (2007) found that the provision of agricultural technology to farmers improves agriculture. In Tanzania, the study by Manda (2002) found that among the factors that lead to low agricultural production is lack of adoption of technology. It was found that the majority of farmers do not necessarily make critical agricultural decisions on the basis of scientific and technical information.

2.5 Climate Change Adaptation

Climate change is a concept that has become an important part of development in recent years. It has emerged due to climate change which is occurring in the world. Climate is continuously changing and it is getting worse over time. The amount of rainfall has been decreasing over time while temperatures have increased. Bad years are becoming more frequent than before, resulting in food shortages in the area. A number of adaptation strategies have been identified. Adaptation measures as outlined by Olmos (2001), include irrigation to boost crop production, introducing crops that use a low amount water and adopting sustainable water resources management (seasonal harvest and water quality control), as well addition increased capital investment in reservoirs and infrastructure, reducing of water loss through water conservation techniques and better water and risk management (Eriksen *et al.*, 2007).

A study carried out in Babati by H  ckner (2009) found that irrigation is a primary adaptive step; as small scale farmers use irrigation systems, switching to drought-resistant-crops, short term crops, planting trees and traditional diversification. According to Andrew (2009) adaptation measures taken by people in Bagamoyo to adapt to climate change are intercropping, growing-drought resistant and early maturing crops, expanding farm size, increasing the harvesting of rainwater and soil conservation.

Mongi (2010) found that “farmers in semi-arid land responded to the impact of climate change and variability through various local adaptations, including expansion of areas under cultivation to compensate for reduced yields during drought, partly by reducing fallows.” Farmers switched to more drought-resistant crops such as sorghum and cassava. Some farmers reported growing alternative crops such as sunflowers, but that, increased number of pests and diseases has hindered such efforts.

Less developed countries, Tanzania being one of them are already struggling with combating climate change impacts. They have made efforts in making the public aware of climate change with regard to vulnerable sectors, including agriculture. One of the proposed adaption is to ensure farmers access to agricultural information supporting climate change adaptation. URT (2007) identified the following strategies to combat the impact of climate change on the agricultural sector: Alternative farming systems; Promote indigenous knowledge; Change planting dates in some agro ecological zones; Increase irrigation to boost maize production in selected areas; Drip irrigation for specific regions; Reduce reliance on maize as the staple food by growing short-season and drought-tolerant crops

such as sorghum and millet; Shift crop farming to more appropriate agro ecological zones; Change crop rotation practices; Integrated crop and pest management; Make better use of climate and weather data; weather forecasts and other management tools; Create awareness of the negative effects of climate change; Sustainable water management to boost food crop production; Strengthen early warning system; Follow standard agronomic practices; and Promotion of annual and short-term crops.

Furthermore, Onyeneke and Madukwe (2010) delineated six broad categories of adaptation to climate change. These are portfolio diversification, soil conservation, changing planting dates, changing tillage operations planting trees and irrigation. The details of these broad categories are as follows:

- i. Portfolio diversification: Specific categories encapsulated in this category which are using improved crop varieties, intercropping, and using different crop varieties that survive in adverse climatic conditions.
- ii. Soil Conservation: Farmers' specific adaptation options are mulching, planting cover crops, applying fertilizer and organic manure.
- iii. Changing planting dates: This covers early planting and late planting options.
- iv. Changing Tillage Operations: The options in this category are using minimum tillage operations, full tillage operations and digging ridges across slopes in the farm to prevent erosion.
- v. Planting trees: This specifically involves planting trees in the farm to serve as shade from the hot sun

- vi. Irrigation: As the name implies, irrigation involves supplying water to the farm.

2.6 Challenges Encountered in Accessing Agricultural Information

There are various challenges encountered in farmers on accessing agricultural information. Banmeke and Ajayi (2007) found that lack of education and the language barrier are two important constraints affecting farmers access to agricultural information. Furthermore, Abubakar *et al* (2009) state that barriers to information accessibility are caused by language barriers, the high cost of purchasing and maintaining media sources, power failure in the case of those sources that use power to work and also poor signal of the media.

According to Williamson (1998), the challenges encountered by farmers in accessing agricultural information include societal, institutional, psychological and physical ones.

Societal factors are responsible for blocking the availability of the resources necessary for satisfying the information needs of the farmers within society, whereas institutional barriers are due to the unwillingness of the information providers to provide information to the farmers. Physical barriers to information accessibility are caused by poor information infrastructure in the community, while psychological barriers are due to the failure of individuals to perceive their information needs or the failure to obtain appropriate information from appropriate providers.

According to Stefano *et al*, (2005), illiteracy has been cited as a major challenge in accessing agricultural information when it comes to using printed information materials. Aina (2006) contends that farmers in Africa are largely illiterate, so they cannot use printed materials as a vehicle for obtaining agricultural information. Thus, use of printed materials that is leaflets and newsletters, as message carriers are of limited use for reaching illiterate farmers.

The inadequate number of Agricultural Extension Officers is another challenge to accessing information by farmers. For example, Ozawa (1995), Isinika and Mdoe (2001) and Aina (2006) noted that because of the low numbers of Agricultural Extension Workers, farmers hardly ever obtain new agricultural information. This is because the ratio of Agricultural Extension Workers to farmers is low. In Tanzania, the ratio of extension workers to farmers is 1:2800 (Sheba, 1997). Bilonkwamanagara (2008) points out that Agricultural Extension Workers do not reach every farmer and few farmers receive agricultural extension services. Hence there is a limited flow of information about the latest agricultural technologies to the farmers by Agricultural Extension Officers.

Another challenge facing farmers in accessing agricultural information is the lack of agricultural libraries/information centres in the farmers' place of living (Aina and Dulle, 1999). For that reason, farmers are hindered for using agricultural libraries as a source of

information because of the distance between the source and the information user. This means that, even if someone knows about the existence of information, it may be difficult to obtain it. This is attributed to the distance from places where information can be obtained

2.7 Conceptual Framework

Based on the specific objectives of this study, a modified Berlo Model (1960) was adopted for the study. This model was adopted because it focuses on the four fundamental elements of communication, which are source, message, channel and receiver. The receiver in this study is the farmer, the message being the agricultural information being delivered and the last element is the source which is the sender of the agricultural information. The information accessed by farmers will impart to them the knowledge and skills which will enable them to adapt to climate change. Included in the framework are the farmer's attributes and environment because they influence access to and use of agricultural information for climate change adaptation. The farmers' attributes are indicated by age group, literacy, gender, socio-economic category, knowledge of existing innovation and attitudes towards the agricultural innovations while the environment is indicated by infrastructure and geography that enable farmers to access information.

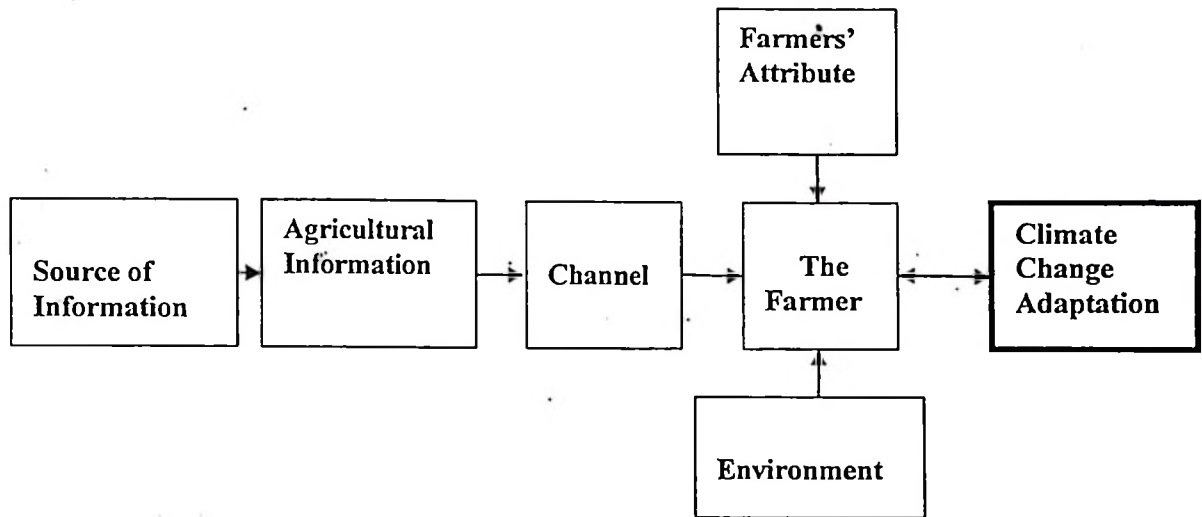


Figure 1: Diagrammatic Representation of the Conceptual Framework

Source: Berlo's Model (1960) with Slight Modification by Mwalukasa (2011)

2.8 The Research Gap

From the literature reviewed, it is evident that agricultural information plays an important role in agricultural development. There is, however, little scientific evidence specifically from other studies about the accessibility of agricultural information to support climate change adaptation in Chamwino District. This is the gap that this study intends to fill.

2.9 Summary

This chapter has covered the literature relating to the general and specific objectives of the study. The literature discusses information as the most valuable resource in agricultural development to adapt to climate change. The literature review is accordance with the main themes of the study which are agricultural information in Tanzania, information needs to reduce the impact of climate change, sources of agricultural information, the role of

information in agricultural development, climate change adaptation measures and the conceptual framework which guided the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter gives the details of the research methodology and procedures that were adopted in the process of conducting the study. The chapter gives details on the following components: the research design, area of the study, description of the study area, study population, sampling techniques and sample size, data collection methods, research instruments, data analysis and data quality control.

3.1 Research Design

Selltiz et al., (1976) define research design as follows: “A research design entails the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance of the research purpose with economy of procedure.” Bulmer and Warwick (1993) state that the criterion for choosing a research method to be used in a research include the appropriateness of the technique to the objectives of the study and its validity and reliability. This being the case, the research design chosen was based on the purpose and objective of the study.

The overall purpose of this study was to assess the provision and accessibility of agricultural information and the constraints faced in sourcing information for supporting climate change adaptation in Chamwino District. The study, therefore, examined the accessibility and use of agricultural information to adapt climate change by examining the sources of information

that are used to provide agricultural information about climate change that is taking place, the extent of the use of information in supporting climate change adaptation and the variables that determine access to agricultural information.

Due to the nature of this study the descriptive survey was considered to be the most suitable research design to be used. This is because the survey technique has the ability to determine the characteristics, opinions, attitudes, behaviour and beliefs of large a population (Sanders and Pinhey, 1974). The study integrated quantitative (questionnaire) and qualitative (Interview, Focus Group Discussion, observation) research methodologies. The combination of these methods enabled the researcher to obtain better findings.

Qualitative methods enable a researcher to go more into deeply than quantitative methods and they tend to be more broadly concerned with probing in depth into the reason for the phenomena as opposed to the frequency of their occurrence in quantitative methods. The qualitative approach fills the gap left by the quantitative design by giving more explanations of the particular subject (Shank, 2006).

3.2 Area of the Study, its Location and Justification

The study was carried out in two villages selected from two wards in Chamwino District in Dodoma (Figure 2). Chamwino District was chosen because it is found in a semi-arid areas, one of the hotspots of climate change in Tanzania (URT, 2003). Farmers in Chamwino District depend on rain-fed agriculture (Gowing et al., 2003), and so climate change has had

a significant impact on food production in the district. Also, this area was chosen because it was the most convenient area for the researcher due to time and financial constraints. The study was conducted in two randomly selected wards. In each ward one village was randomly selected which were these are Kilangali II and Mvumi Makulu from Buigiri and Mvumi Makulu wards respectively.

3.3 Description of the Study Area

Chamwino District is one of the six districts of Dodoma Region. The district is located in a central plateau in Tanzania which extends between latitudes 40° and 80° south and between longitudes 35° and 37° east. The district has five divisions, twenty eight wards and seventy seven villages. Geographically, the district is bordered by Mpwapwa and Kongwa Districts in the east, Iringa Rural District in the south and Bahi and Kondoa Districts in the west and north respectively. The district has the total area of 8,056 square kilometres, of which arable land is only 790,533 hectares.



Source: The GIS in Collaboration with Nicholas Mwalukasa, (2010)

Population is any precisely defined set of people or collection of items which are being studied (Babbie and Mouton, 2005). For this study, the population consisted of farmers, agricultural officers, village executives and agricultural information providers in the district. The agricultural officers, village executives and agricultural information providers in the

Population is any precisely defined set of people or collection of items which are being studied (Babbie and Mouton, 2005). For this study, the population consisted of farmers, agricultural officers, village executives and agricultural information providers in the district. The agricultural officers, village executives and agricultural information providers in the

district were selected because they are knowledgeable on different aspects of agricultural information and they are the ones who provide agricultural information to farmers.

3.5 Sampling Procedures and Sample Size

A combination of probability and non-probability sampling techniques was used to select 100 respondents that included 95 farmers, 2 Village Executive Officers, and 3 Agricultural Extension Officers. Statisticians have shown that a sample size of 30 or more will usually result in a sampling distribution that is very close to the normal distribution, and the larger the absolute size of a sample, the closer its distribution will be to the normal distribution (Saunders *et al.*, 2007). With this sample size, a researcher can collect the data which enable him or her to draw conclusions in supported by statistical analysis.

3.5.1 Probability Sampling

Walliman (2006) describes probability sampling as “a key sampling technique that gives the most reliable representation of the whole population”. In the current study the multi stage simple random sampling technique was used to draw the sample of the wards and villages that were involved in the survey. This sampling is based on a model by Bulmer and Warwick (1993), who recommended such a technique in conducting surveys in rural and developing areas, where lists of wards and village are available from documents such as national and census report. The first sampling stage employed the random sampling techniques to select two wards from of 28 wards. A list of the names of all the wards in each

division was obtained from the national census document (URT, 2005). Buigiri and Mvumi Makulu wards were randomly selected. After selecting the ward the next stage was to select villages. From the list of villages in each ward, one village was randomly selected, namely Kilangali II from Buigiri ward and one village, namely Mvumi Makulu from Mvumi Makulu ward. The third stage was the sampling of respondents. The sampling process required the development of a sampling frame, which in this study was the current list of all farmers in the selected villages contained in the household list in the government office in collaboration with the Village Executive Officer (VEO) in each village. The simple random selection technique was used in order to increase validity and reduce bias. Based on the population of the villages which is 6,533 from Mvumi Makulu, 2,576 from Kilangali II , a sample of 95 farmers was selected, 50 from Mvumi Makulu and 45 from Kilangali II .

3.5.2 Non-Probability Sampling

This is the type of sampling over which the researcher has some control when selecting the elements for the sample. Purposive (judgmental) sampling was used because it enabled the researcher to select cases that would best answer the in-depth questions to fulfill the research objectives. This form of sampling is often used when the researcher wishes to select cases that are particularly informative (Newman, 2000). In this study the key informants selected were agricultural officers, village executives and an information provider from a Non Government Organization (NGO).

3.6 Data Collection Methods

A combination of methods was used to collect data for this study, including self-administered questionnaires which were administered by the researcher, Focus Group Discussion (FGD), face-to-face interviews and observations.

3.6.1 Secondary Data

Creswell (2003) defined secondary data as “the data that have already been collected by and are readily available from other sources.” Such data are cheaper and more quickly obtainable than primary data and also may be available when primary data cannot be obtained at all. Secondary data were gathered from various sources including; government websites, government survey reports (e.g. population censuses), the media (e.g. television and radio), and various publications (e.g. books, journal articles, dissertations, theses and CD-ROMs) and other reports.

3.6.2 Primary Data

Newman (2000) defined primary data as “the data collected by the researcher directly from his own observation and experience.” The study involved multiple data collection methods. More than one method is used in order to provide checks and balances as regards any shortfalls in the other data gathering methods.

3.6.2.1 Questionnaire

This involved administering a structured standardised self-administered questionnaire with closed and open-ended questions to the respondents in order to get the required data. This enabled the researcher to collect data from a wide population scattered throughout the villages. The questionnaire was administered personally to the target groups. The researcher involved himself personally in order to avoid a low percentage return of the questionnaire and to provide guidance where needed in filling in and completing it because some respondents could not read or write. The advantage of the questionnaire method was that it involved several respondents who answered the set of questions. Additionally, questionnaires are relatively inexpensive to administer, hence enabling the researcher with inadequate funds to complete study. Also, it has a fixed format, hence, eliminating variations in questioning.

3.6.2.2 Interviews

This involved face-to-face interview with the respondents, who answered the questions asked and in order to provide the required data. Face-to-face interviews were conducted with the Village Executive Officer and Agricultural Extension Officer. This was considered essential not only to supplement the questionnaires in obtaining data and information, but also to offset the disadvantages associated with the use of the questionnaire as a data collection method. Contrary to questionnaires, interviews are normally flexible and provide an interviewer with an opportunity to probe and ask follow-up questions. In so doing,

further information and more depth can be obtained from the interview than from the questionnaire (Kothari, 1990). However, interviews are expensive to conduct especially when dealing with a large sample. That is why only a few respondents were included in the interviews.

3.6.2.3 Focus Group Discussion

This method of collecting data involved a discussion with some selected farmers. The discussion was led by the researcher based on the research objectives. 16 respondents, 8 from each village, including 4 men and 4 women, participated in the focus group discussion.

3.6.2.4 Observation

Creswell (2003) defined observation as “the method in which a researcher watches carefully the event in question.” This involves observing issues that were relevant to the study. They include sources of agricultural information, and the use of information for adapting to climate change.

3.7 Instruments

The researcher used the following instruments to get data:

3.7.1 Questionnaire Guide

A standardised questionnaire administered by the researcher was used during the survey. It contained both closed and open-ended questions. (See Appendix 1).

3.7.2 Focus Group Discussion Guide

A guide was used to guide the Focus Group Discussion with key informants, and contained the main themes related to the study objectives (See Appendix II).

3.7.3 Interview Guide

An interview guide was used to guide the discussion with the village Executive Officers and Agricultural Extension Officers (See Appendix III)

3.7.4 Observation Guide

This outlined the issues to be observed at the study area to get first hand information (See Appendix IV).

3.8 Data Analysis

The quantitative data collected was coded and summarized prior to analysis by using the Statistical Package for Social Sciences (SPSS), Version 16. The researcher utilized

descriptive statistics, such as frequencies, percentages, Chi-square, correlation and multiple regression in data analysis. Qualitative data was analysed using content analysis.

The multiple regression equation used for analysis was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon,$$

Where;

Y= Accessibility of the sources of agricultural information

β = Regression Coefficients.

β_0 = Intercept.

$X_1 \dots X_n$ are explanatory variables (Gender, Age, Marital Status, Education, Main Source of Income, Infrastructure).

3.9 Data Quality Control

3.9.1 Pre-Testing of the Research Instruments

In order to ensure that there were no inconsistencies and misinterpretation of the questions, a pre-test was conducted with 10 farmers in Chinangali II in Chamwino District, after which the questions were re-phrased or corrected where necessary in order to make them more understandable to the respondents.

3.9.2 Triangulation

Triangulation is the process whereby more than one method of data collection is used to collect the data (Saunders, *at al.*, 2009). This is also a way of ensuring that quality data is

collected. In this study, a combination of questionnaires, FGDs, interviews and observations was used to collect the data.

3.9.3 Ethical Issues

The respondents were assured of the confidentiality of the answers they gave so that they would be more cooperative and sincere in giving their answers. They were assured that the reason for collecting the information was strictly for academic purposes only and that the work would not be used for any unethical reasons.

3.9.4 Objectivity

The study sample was carefully selected using a combination of probability and non-probability sampling techniques as discussed earlier. Respondents were selected randomly at the start in order to increase validity and reduce bias. The sampling techniques ensured that each respondent had an equal chance of being selected

3.9.5 Rigorousness (Strictness)

The research design was conducted as planned to ensure that the data collected was accurate and unbiased. The assumption and derivation in data collection strictly and rigorously followed scientific procedures.

3.10 Summary

The major issues which were addressed in this chapter included the procedures and techniques used for conducting this study. The study areas were Kilangali II and Mvumi Makulu from Buigiri and Mvumi Makulu wards respectively. The topics covered included

the research design, area of the study, population of the study, sample size, sampling techniques, research instruments and data collection methods. Other components covered included data quality control, ethical issues and methods used for presenting and analysing the data. A combination of data collection methods was applied. These included questionnaires, observation, interview guide, Focus Group Discussion and documentary review. SPSS was used to analyse quantitative data. Descriptive and inferential statistics such as frequencies, percentages, Chi-square, correlation and multiple regressions were employed.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESEARCH FINDINGS

4.0 Introduction

This chapter presents, analyses and discusses the data following the four research questions which were used to address the research problem relating to climate change adaptation in Chamwino District in Dodoma Region, Tanzania. The objective of this study was to explore farmers' access to provision and use of agricultural information in supporting climate change adaptation in Chamwino District. This study was conducted in two villages which were randomly selected from two wards in Chamwino District. In each ward one village was randomly selected; these are Kilangali II and Mvumi Makulu from Buigiri and Mvumi Makulu wards respectively. The respondents were selected from the two villages within the two selected wards and these included farmers, Agricultural Officers and Village Executives and Agricultural Information Providers in the district. These were selected because they are knowledgeable on different aspects of agricultural information and they are the ones who provide agricultural information to farmers. The sample of 95 farmers was selected, 50 from Mvumi Makulu and 45 from Kilangali II respectively.

Questionnaires were used as the major instrument for data collection. Interviews, Focus Group Discussions, observations and documentary sources supplemented the questionnaires. Face-to-face interviews were conducted with the Village Executive Officers

and Agricultural Extension Officers. The researcher also attended some sessions involving discussions on climate change adaptation in order to observe the issues that were relevant to the study for example, sources of agricultural information and the use of information in adapting climate change. Most of the results are presented in figures and tables with frequencies and percentages.

4.1 Composition of Respondents

Table 1: Composition of Respondents (N=100)

Category	Name of Villages					
	Mvumi Makulu		Kinangali II		Total	
	F	%	F	%	F	%
Farmer	50	52.6	45	47.4	95	95
Extension officer	2	66.7	1	33.3	3	3
Village executive officer	1	50.0	1	50.0	2	2
Total	53	53.0	47	47.0	100	100

Table 1 shows the composition of respondents and their categories, which are Village Executives, Farmers, Agricultural Extension Officers. In this study the unit of analysis was the farmer, but the research felt it important to include agricultural officers and the village executives because they work hand-in-hand with the farmers. In Kilangali II there is only one Agricultural Officer while Mvumi Makulu has two Agricultural Officers who both participated in the research. There were 50 farmers from Mvumi Makulu and 45 from Kilangali II due to the number of people in their village which is 6,533 in Mvumi Makulu, 2,576 in Kilangali II.

4.2 Demographic Information of Respondents

The researcher felt that it was necessary to get the background information of respondents because it can show the relationship between the use of information on climate change adaptation and the demographic variables. The background information included gender, age, marital status, educational level and respondents' annual income.

4.2.1 Gender

Table 2 shows the distribution of respondents according to their gender.

Table 2: Gender of Respondents by Villages (N=95)

Gender	Name of Villages					
	Mvumi Makulu		Kinangali II		Total	
	F	%	F	%	F	%
Male	25	50.0	27	60.0	52	54.7
Female	25	50.0	18	40.0	43	45.3
Total	50	100.0	45	100.0	95	100.0

Source: Field Data, 2010

Understanding who constitutes the study population helps one know the extent to which the provision of and access to agricultural information supporting climate change could be realized. For instance, both male and female participated in the study. The findings in Table 2 indicated that 54.7% were males and 45.3% were females. In Mvumi Makulu, 50% were men and 50% were female while in Kinangali II, 60% were men while 40 % were female. As the sample was randomly selected, it may be seen that men form the majority of the farmers in Kinangali II.

4.2.2 Age of Respondents

Table 3: Age of Respondents by Villages (N=95)

Age Category	Name of Villages					
	Mvumi Makulu		Kinangali II		Total	
	F	%	F	%	F	%
Below 20	0	0.0	2	4.4	2	2.1
20 – 30	3	6.0	7	15.6	10	10.5
31 – 40	21	42.0	18	40.0	39	41.1
41 – 50	20	40.0	9	20.0	29	30.5
51 – 60	0	0.0	5	11.1	5	5.3
Above 61	6	12.0	4	8.9	10	10.5
Total	50	100.0	45	100.0	95	100.0

Source: Field Data, 2010

The highest proportion of the study population (Table 3) was found to be in the 31 to 50 age group (71.6%). This is the age group of the majority of the population living in the rural setting with their families and who are fully engaged in agricultural activities.

The majority of rural people in Tanzania still depend on rain-fed agriculture, which is a challenge in this era of climate change, hence the need for appropriate sources of agricultural information to enable them to adapt to climate change.

4.2.3 Marital Status

Table 4: Marital Status of Respondents by Villages (N=95)

Marital Status	Name of Villages					
	Mvumi Makulu		Kinangali II		Total	
	F	%	F	%	F	%
Married	43	86.0	41	91.1	84	88.4
Single	2	4.0	2	4.4	4	4.2
Separated	2	4.0	0	0.0	2	2.1
Widowed	3	6.0	2	4.4	5	5.3
Total	50	100.0	45	100.0	95	100.0

Source: Field Data, 2010

The study findings revealed that there were single, married, separated and widowed participants (Table 4). The vast majority of respondents were married (88.4%) with a few (2.1%) separated respondents. The distribution of marital status confirms that farming activities in the study area attract mostly adults, whose main activity for their wellbeing is farming. The high variation in marital status could also have some implications with respect to the regular sources into which from farmers access agricultural information to support climate change, due to the reason that the researcher found that marriage is an institution that has a great influence on family matters (Mdoe and Macha, 2002).

4.2.4 Education Level

Table 5: Educational Level of Respondents by Villages (N=95)

Level of Education	Name of Villages					
	Mvumi Makulu		Kinangali II		Total	
	n	%	n	%	n	%
Never Attended School	12		10		22	
Primary Education	33		32		65	
Secondary Education	5		3		8	
Total	50		45		95	

Source: Field Data, 2010

Table 5 indicates that a significant proportion of the study population (68.4%) had received primary education, while 8.4% had the opportunity to receive secondary education, but 23.2% had never receive formal education. The finding that those who have primary education are the majority is not surprising, as basic education in Tanzania is regarded as basic right for every citizen.

The findings are in line with Freire's (1974) that education is believed to be a basic tool for the total liberation of a man as it can be neutral. It is designed to maintain the existing situation, imposing on people the values and culture of the dominant group or it helps them become critical, creative, free, active and responsible members of society. This therefore, confirms the country's commitment to Article 26 of the Universal Declaration of Human Right (UDHR) of 1948. The Article recognizes that basic education is an indispensable means of unlocking and protecting other human rights, by providing the scaffolding that is

required to secure good health, liberty, security, economic well-being and participation in social and political activities (Mugabi and Mueller, 2005). However, possession of the universal tools of basic education (writing, arithmetic and reading) does not necessary imply respondents' capability of accessing and using of agricultural information in adapting to climate change

4.2. 5 Respondents' Annual Income

Table 6: Respondents' Annual Income by Villages (N=95)

Annual Income (Tshs)	Name of Villages				Total	
	Mvumi Makulu		Kinangali II			
	F	%	F	%	F	%
Less than 100,000	11	22.0	8	17.8	19	20.0
100,000 - 200,000	18	36.0	13	28.9	31	32.6
200,000 - 300,000	11	22.0	11	24.4	22	23.2
300,000 - 400,000	3	6.0	4	8.9	7	7.4
More than 400,000	7	14.0	9	20.0	16	16.8
Total	50	100.0	45	100.0	95	100.0

Source: Field Data, 2010

According to Table 6, 20.0% of the study population earned an annual income of less than Tshs 100,000.00. Only 16.8% of the respondents earned more than 400,000.00(Tshs) per annum. Most of the respondents depend on agriculture, which is mostly rain fed, for their well-being. Buigiri, for instance, has an earth embankment dam which allows farmers to not only depend on rainfall but also on irrigation. Also in Kinangali II they had the grape irrigation project, which had been recently established. This is quite different in Mvumi Kikulu which experiences water scarcity that is attributed to climate variability. Because of

this line, 20.0% of the respondents from Kinangali II had an annual income of more than 400,000.00 compared with 14% from Mvumi Makulu. Moreover, 22.0% and 19.0% of the respondents had an annual income of less than 100,000.00 in Mvumi Makulu and Kinangali II respectively.

4.3 Sources of Agricultural Information about Climate Change

Table 7: The Most Useful Sources of Agricultural Information about Climate Change

Source of Information	F	%
Radio	80	84.2
Television	5	5.3
Library & Information Centre	26	27.4
Newspapers	24	25.3
Seminars and Workshops,	23	24.2
Training Programmes	18	18.9
Magazines	27	28.4
Relatives, Friends and Neighbours	91	95.8
Fellow Farmers	91	95.8
Agricultural Extension Officers	85	89.5
Leaflets	26	27.4
Agricultural Demonstrations	30	31.6
Posters	16	16.8
Cell Phones, Landlines	18	18.9
Village Meetings	79	83.2
Savings Cooperatives	8	1.2

Source: Field Data ,2010

Note: Respondents have more than one choice

The information sources available in principle to rural dwellers were listed and respondents were asked to tick whichever ones were available to them supporting climate change adaptation. The results shown in Table 7 that the major sources of agricultural information on the study area are relatives, friends and neighbours (95.8) %, fellow farmers (95.8) %, Agricultural Extension Officers (89.5%), village meetings (83.2%), radio (84.2%), and a few (5.3%) use television. Access to print sources of information is low as indicated by the number of the respondents: magazines (28.4%), leaflets (27.4%), newspaper (25.3%) and posters (16.8%). The research results indicate that rural dwellers do not have access to modern information technology such as the Internet, information centres or libraries. These results confirm the results of some earlier studies (Mbwana (1995); Ozowa (1995); Manda (2002); Anyanwu et al. (2002) ; and Matovelo (2008) that a wide range of agricultural information sources are available to farmers.

To ascertain the use of the various sources of information and channels that farmers mostly use to get agricultural information about adapting to climate change, a five-point likert-type scale with options ranging from “never”, “rarely”, “frequency”, “always”, and “Almost Always” scaled 1 to 5 respectively, was used. The results are indicated in table 7.

Table 8: Frequency of Using Sources and Channels by Farmers to Get Agricultural Information Supporting Climate Change Adaptation (N=95)

Source of information	Never		Rarely		Frequently		Always		Almost Always	
	F	%	F	%	F	%	F	%	F	%
Radio	15	15.8	32	33.7	15	15.8	12	12.6	21	22.1
Television	90	94.7	1	1.1	1	1.1	1	1.1	2	2.1
Library & Information Centre	69	72.6	16	16.8	10	10.5	0	0	0	0
Newspapers	71	74.7	22	23.2	1	1.1	0	0	1	1.1
Seminars and Workshops,	72	75.8	20	21.1	1	1.1	0	0	2	2.1
Training Programmes	77	81.1	17	17.9	1	1.1	0	0	0	0
Magazines	71	74.7	21	22.1	3	3.2	0	0	0	0
Relatives, Friends and Neighbours	4	4.2	7	7.4	7	7.4	13	13.7	64	67.4
Fellow Farmers	4	4.2	5	5.3	9	9.5	13	13.7	64	67.4
Agricultural Extension Officers	11	11.6	53	55.8	8	8.4	6	6.3	17	17.9
Leaflets	69	72.6	19	20.0	3	3.2	0	0	4	4.2
Agricultural Demonstrations	72	75.8	21	22.1	1	1.1	1	1.1	0	0
Posters	77	81.1	13	13.7	1	1.1	0	0	4	4.2
Cell Phones, Landlines	77	81.1	10	10.5	6	6.3	0	0	2	2.1
Village Meeting	17	17.9	64	67.4	14	14.7	0	0	0	0
Savings Cooperatives	87	91.58	2	2.1	4	4.2	2	2.1	0	0

Source: Field Data, 2010.

4.3.1 Library and Information Centres

As shown in Table 8, the majority of the respondents (72.6%) indicated that they did not use the library or information centre as a source of information about climate change. The major reason for not using this source, as noted by one respondent from Kilangali II in an interview is that “there is no library or information centre in our area.” In order for the respondents from Kilangali II to get to the agricultural library they have to travel to Dodoma Urban. This is where the non governmental researcher found the called INADES Formation that provides agricultural information to different people. However, INADES Formation provides training by correspondence in agriculture and other fields such as management and leadership. INADES Formation charges Tshs 3,000.00 for an individual for one stage and Tshs 5,000.00 for a group of not more than 6 farmers. As shown in the Conceptual Framework, farmers with low income could not afford to get such good services provided by INADES. But in Mvumi Makulu there is a community library that is used by the farmers found in the study area. During an interview with respondents in Mvumi Makulu, one respondent said that “there is some agricultural information supporting climate change adaptation in our library.” This conforms to the results of the study by Aina and Dulle (1999), who found that the lack of a library or information centre and the distance between the sources and an information user are obstacles in accessing agricultural information. This finding was also reported by Moshi (1992), who stated that “there are currently more than 3,000 rural libraries and 400 purpose-built libraries throughout Tanzania mainland open to everybody in the rural community.” These libraries are under the Ministry of Education and Vocational Training through the Directorate of Adult Education and National Literacy

Centre established in 1976. However, the performance of rural libraries is limited due to a number of problems, notably inadequate funds to purchase library materials and the poor distribution of reading materials to villages due to transport problems.

4.3.2 Agricultural Demonstrations

According to Table 7, the majority of respondents (68.6%) indicated that they never got agricultural information about climate change from agricultural Demonstrations. The result indicates that 1.1% of respondents receive agricultural information about climate change frequently. Field agricultural demonstrations conducted by Agricultural Extension Officers were lacking in the study area, because of the lack of them. Moreover, agricultural demonstrations, commonly known as Nane Nane, are an annual national event, conducted at regional headquarters. In the case of Dodoma, the demonstrations are organized by the Tanzania Agricultural Society Organization (TASO) at the Nane Nane Grounds, which are within Dodoma Municipality. For that reason, only a few farmers could attend the event for the purpose of getting agricultural information about climate change.

4.3.3 Training Programmes

The findings revealed that only a very few respondents (18.9%) have received agricultural training empowering them with knowledge with regard to climate change adaptation, while the majority of respondents (81.1%) have never attended agricultural training programmes.

The reason given by farmers in in-depth interviews was that training programmes were not conducted in the study area. Whenever there was a training session the number of attendees was very small.

4.3.4 Agricultural Extension Officers

The findings of this study in Table 7 also revealed that farmers seldom got agricultural information from Agricultural Extension Officers. More than half of the respondents (55.8%) who indicated that they rarely get agricultural information from Agricultural Extension Officers while 17.9% of respondents indicated that they received agricultural information from Agricultural Extension Officers almost always. The respondents indicated that they did not get information from this source because of the inadequate number of Agricultural Extension Officers. It was found that every village has one Agricultural Extension Officer who does not manage to convey agricultural information to the majority of the respondents. This is in line with Ozawa (1995), Manda (2002), Isinika and Mdoe (2001), Matovelo (2008) and Aina (2006), who noted that, because of the low number of Agricultural Extension Workers, farmers hardly ever obtain new information. This is because the ratio of agricultural extension workers to farmers is low.

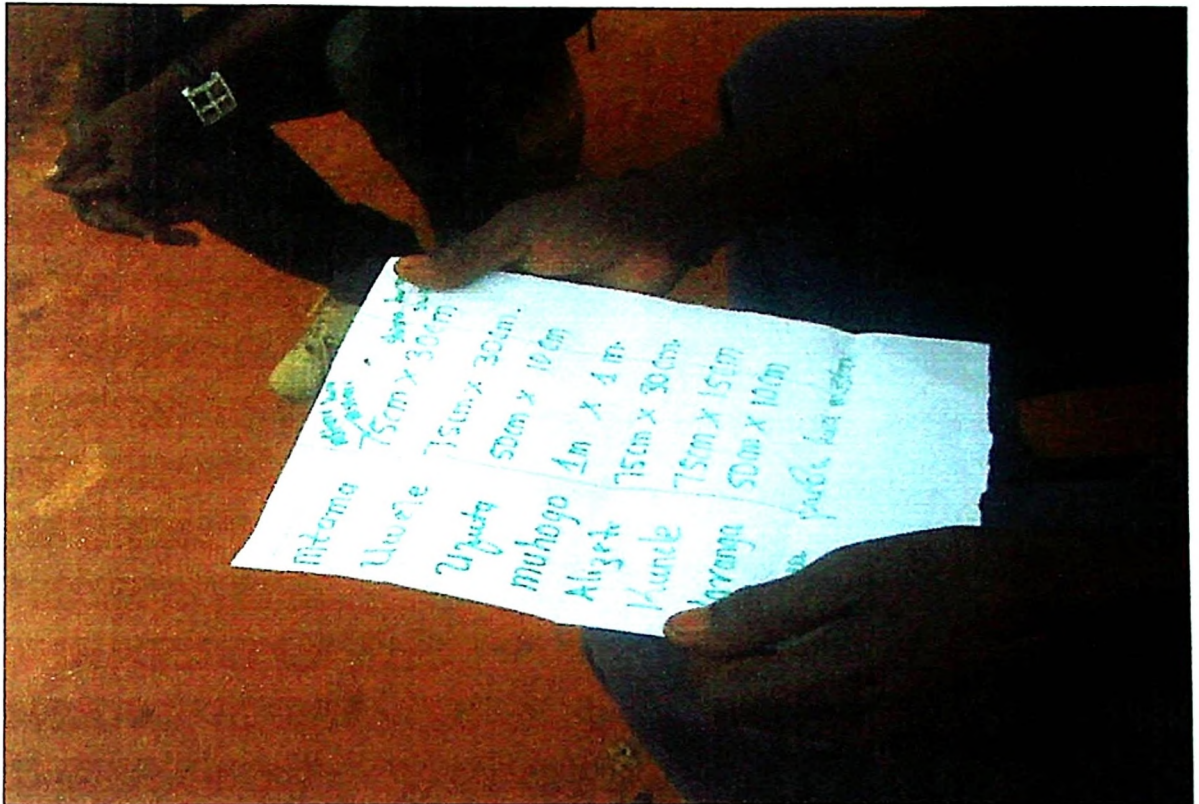


Figure 3: A Farmer Displaying the Appropriate Seed Spacing for the Crops that Resist Drought as Received from the Agricultural Officer
 Source: Field Data, 2010

4.3.5 Seminars and Workshops

The findings in Table 7 revealed that the majority of respondents (74.7%) had never attended a seminar or workshop. In one interview, a respondent in Kilangali II Village pointed out that “we like to attend seminars and workshops because we get enlightened. However a seminars and workshops are not conducted here. When there is a seminar village leaders are the ones who attend.” This is an indication that there is a lack of seminars and workshops in the study area for empowering farmers with the knowledge and skills with regard to climate change adaptation.

4.2. 6 Printed Materials

The results in Table 7 indicate that the majority of respondents (74.7%, 72.6% and 81.1%) did not use newspapers, leaflets or posters respectively for getting agricultural information supporting climate change adaptation. As pointed out by Mbwana (1994), printed materials such as newsletters, leaflets, newspapers, books and many others are good sources of agricultural information for farmers for making them aware of new ideas and providing them with general information about new agricultural practices. However, leaflets were lacking in the study area because they are expensive. In an interview with the farmers, one respondents reacted by stating that “We do not have printed materials in our area. A few of us manage to attend the agricultural exhibition (Nane Nane) which is when we get those printed materials”.

The findings in this study are in line with the studies by Agwu and Adeniran (2009) and Niyegila (2007), who found that farmers do not use newspapers, magazines, bulletins, reports, leaflets or any other types of written materials on agriculture, due to the lack of printed materials.



Figure 4: Printed Materials Containing Agricultural Information Captured in Chalula Community Library in Mvumi Makulu(Left) And INADES Formation (Right)

Source: Field Data, 2010

4.3.7 Farmers to Farmers Contact

The findings show that the majority of respondents (67.4%) use farmer-to-farmer contact as the source of agricultural information almost always. The results are in line with studies by Hulls,(1975), Mbwana,(1995) and Opara (2008) who found that informal contacts with neighbours and friends are regarded as an important source of information. An earlier study by Anyanwu *et al.*, (2002) reported that farmers received their farming information from non-professional inter-personal sources more often than from mediated professional sources. However, Mohammed and Wanaso (1993) pointed out that the choice of communication channels is to a large extent a factor of a farmer's circumstances. This means that the environment in the study area favours the use of farmer-to-farmers contact for obtaining agricultural information about climate change. Also Manda (2002) stated that, one of the sources of agricultural information that is most used is peer farmers.

4.3.8 Broadcasting Media

The results in Table 8 above indicate that the majority of respondents (94.7%) never use the television to get agricultural information about climate change, while only 15.8%, 12.6% and 22.1% use the radio frequently, always and almost always, respectively to get agricultural information about climate change. This is consistent with the findings of previous studies, such as those of Osuji (1983), Ikejimba and Alabi (1991), and Emmanuel (2008). The popularity of the radio among farmers is not surprising in view of the fact that many of the farmers surveyed acknowledged owning a radio using a battery while some use electricity. The fact that television was the source least used for accessing information by farmers points to the lack of facilities that would enable farmers to access agricultural information about climate change adaptation. Mbwana (1995) reported that the high prices of radio and television sets inhibit many rural people from purchasing them. Many rural areas in Tanzania cannot receive clear radio broadcasts in Tanzania because of poor reception. Also, the establishment of private radio and television stations in Tanzania, which does not seem to help rural in villages because media are confined to urban areas. Another problem is that radio and television programmes are mainly for commercial and entertainment purposes rather than for agricultural development.

4.4 Types of Agricultural Information Conveyed by Accessible Sources about Climate Change

Table 9: Types of Agricultural Information Conveyed by Accessible Sources about Climate Change (N=95)

Types of Agricultural Information	F	%
Type of Seed Resistant to Drought	95	100.0
Intercropping/Mixed Crops	80	84.2
Soil Management	58	61.1
Water Management	61	64.2
Irrigation System	82	86.3
Planting Trees	70	73.7
Early Warning System	33	34.7
Changing Planting Dates	44	46.3
Traditional Diversification	25	26.3

Source: Field Data, 2010

In order to get the types of information conveyed by the accessible sources of information, respondents were asked to point out the agricultural information meant for adapting climate change with regard to food production in the areas, which is accessible from the sources provided in the list. The purpose of this question was to help find out what kind of agricultural information supports climate change adaptation in the study area. Table 9 shows the distribution of agricultural information conveyed by accessible sources supporting climate change adaptation.

From the data presented in Table 9, all respondents mentioned that seeds resistant to drought is one of the types of information that is accessible. Furthermore, through an in-depth interview, respondents mentioned sorghum, bulrush millet, grape and sesame seeds as

the types of seeds should be planted in the study area, because they are resistant to drought and take a short time to mature.

In addition, the findings in Table 9 concerning the types of agricultural information about climate change revealed that the majority of respondents (86.3%) mentioned irrigation, (84.2%) intercropping/mixed cropping, 64.2% water management and (73.7%) planting tress but the least accessible information is changing planting dates and early warning system mentioned by (46.3%) and (34.7%) respectively

The findings from Table 9 revealed that less than half of the respondents (46.3%) access agricultural information with regard to changing planting dates. This means that the majority of the respondents do not access agricultural information on proper planting dates. This was verified through the researcher's observation in Mvumi Makulu Village that most of the framers plant before the rain commences. This is shown in Figure 5 below.:



Figure 5: Planted Land Before it Starts to Rain

Source: Field Data, 2010

In an interview, one respondent said “In the old days we used to plant early before it started to rain. We are doing the same nowadays”. It was found that failing to change the planting date leads to the loss of seeds due to reason that when farmers plant before it rains some of the seeds tend to lose their ability to grow due to lack of water and high temperatures. Consequently, farmers replant when it rains to replace the dead seeds.

4.5 Accessibility of Agricultural Information about Climate Change for Climate Change Adaptation

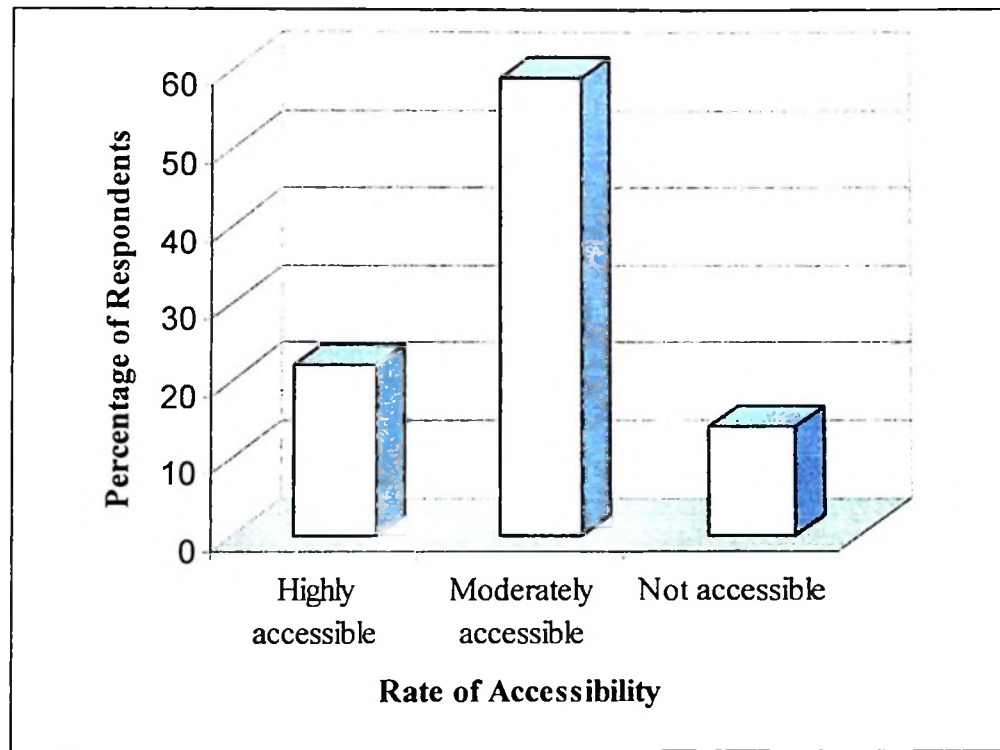


Figure 6: Accessibility of Agricultural Information about Climate Change for Climate Change Adaptation

Source: Field Data, 2010

The respondents were asked their opinions on the accessibility of agricultural information under climate change for climate change adaptation. The results in Figure 6 indicate that more than half of the respondents (62.1%) revealed that accessibility of agricultural information about climate change is moderate.

4.6 Influence of Selected Demographic Variables on Access to Agricultural Information Supporting Climate Change Adaptation

This section evaluates the influence of selected farmers' characteristics on their access to agricultural information supporting climate change adaptation. As shown in the Conceptual Framework of the study, it is assumed that demographic variables and the environment will influence farmers' access to agricultural information about climate change. Each individual variable, namely gender, age, marital status, level of education and income, is assessed separately to explore its influence on accessibility to agricultural information supporting climate change adaptation.

4.6.1 Gender

Table 10: Distribution of Respondents According to their Gender and Accessibility of Agricultural Information Supporting Climate Change Adaptation (N=95)

	Rate of Accessibility							
Gender	Highly		Moderately		Not Accessible		Total	
	F	%	F	%	F	%	F	%
Male	16	30.8	33	63.5	3	5.8	52	54.7
Female	6	14.0	26	60.5	11	25.6	43	45.3
Total	22	23.2	59	62.1	14	14.7	95	100.0

Source: Field Data, 2010 $\chi^2=9.711$; df=2; p =0.01 $r=0.299$; p= 0.03

There is a significant difference between gender categories ($\chi^2=9.711$; df=2; p =0.01) and the correlation analysis also confirms the existence of a relationship between the gender categories ($r=0.299$; p= 0.03) and farmers' access to agricultural information supporting climate change adaptation. The positive correlation mean that accessibility of agricultural information supporting climate change adaptation is low in the case of female farmers. For

example, 30.8% of the males responded that accessibility of agricultural information is high, as compared with 14.0% of females (Table 10).

4.6.2 Age

Table 11: Distribution of Respondents According to their Age Category and Accessibility of Agricultural Information Supporting Climate Change Adaptation (N=95)

(A-25)

Age Category	Rate of Accessibility							
	Highly		Moderately		Not Accessible		Total	
	F	%	F	%	F	%	F	%
Below 20	0	0.0	0	0.0	2	100.0	2	2.1
20 – 30	3	30.0	7	70.0	0	0.0	10	10.5
31 – 40	4	10.3	31	79.5	4	10.3	39	41.1
41 – 50	8	27.6	15	51.7	6	20.7	29	30.5
51 – 60	2	40.0	3	60.0	0	0.0	5	5.3
Above 61	5	50.0	3	30.0	2	20.0	10	10.5
Total	22	23.2	59	62.1	14	14.7	95	100.0

Source: Field Data, 2010

$\chi^2=26.337$; $df=10$; $p=0.03$;

$r=-0.171$; $p=0.098$

The results of bivalent correlation in Table 10 show that the age category was significant differently at 5 percent ($\chi^2=26.337$; $df=10$; $p=0.03$). The frequency distribution and negative correlation ($r=-0.171$; $p=0.098$) indicate that accessibility of agricultural information supporting climate change adaptation is low among young people, but also, based on the linear relationship, accessibility decreases with an increase in age.

4.6.3 Marital Status

The results of the analysis to evaluate the influence of marital status on accessibility of agricultural information supporting climate change adaptation are summarized in Table 12.

Table 12: Distribution of respondents according to their Marital status and accessibility of agricultural information supporting climate change (N=95)

Marital Status	Rate of Accessibility							
	Highly		Moderately		Not Accessible		Total	
	F	%	F	%	F	%	F	%
Married	21	25.0	55	65.5	8	9.5	84	88.4
Single	0	0.0	2	50.0	2	50.0	4	4.2
Separated	0	0.0	0	0.0	2	100.0	2	2.1
Widowed	1	20.0	2	40.0	2	40.0	5	5.3
Total	22	23.2	59	62.1	14	14.7	95	100.0

Source: Field Data, 2010
 $\chi^2=20.373$; $df=6$; $p=0.02$
 $r=0.257$; $p=0.012$

There is a significant influence of marital status on access to agricultural information supporting climate change adaptation ($\chi^2=20.373$; $df=6$; $p=0.02$). Only 20.0% of widowed respondents said that their access to agricultural information supporting climate change is high. None of the separated and single respondents replied that access to agricultural information supporting climate change adaptation is high. The results revealed that married respondents have a higher chance of accessing agricultural information supporting climate

According to Table 13, education has a very significant influence on the accessibility of agricultural information supporting climate change adaptation ($\chi^2=16.321$; $df=4$; $p=0.03$). This implies that the educational level of respondents affects their level of access to agricultural information supporting climate change adaptation. However, the correlation results show that there is no significant relationship ($r=-0.089$; $p=0.393$) between farmers' level of education and access to agricultural information supporting climate change adaptation. This means that there is no linear relationship between educational level and access to agricultural information supporting climate change adaptation. This is contrary to the study by Okunade (2006), who found that education increases the ability of people to access agricultural information, because education gives people access to both printed and electronic agricultural information, and opens up avenues of communication that would otherwise be closed. The none-linear relationship between educational level and access to agricultural information supporting climate change adaptation might be attributed to the level of education of the majority of respondents, as shown in Table 13 that reveals that 68.4% have received primary education.

4.6.5 Respondents' Annual Income

Table 14: Distribution of Respondents According to Their Annual Income and Accessibility of Agricultural Information Supporting Climate Change Adaptation (N=95)

Respondents' Annual Income	Rate of Accessibility							
	Highly		Moderately		Not Accessible		Total	
	F	%	F	%	F	%	F	%
Less than 100,000	2	10.5	13	68.4	4	21.1	19	20.0
100,000 - 200,000	7	22.6	19	61.3	5	16.1	31	32.6
200,000 - 300,000	3	13.6	15	68.2	4	18.2	22	23.2
300,000 - 400,000	2	28.6	5	71.4	0	0.0	7	7.4
More than 400,000	8	50.0	7	43.8	1	6.3	16	16.8
Total	22	23.2	59	62.1	14	14.7	95	100.0

$\chi^2=11.009$; $df=4$; $p=0.201$

$r=-0.266$; $p=0.009$

Source: Field Data, 2010

The findings in Table 14 reveal that annual income has a very significant ($\chi^2=16.321$; $df=4$; $p=0.03$) influence on the accessibility of agricultural information supporting climate change adaptation. Only 10.5 percent of the respondents with an annual income of less than Tshs 100,000.00 responded that accessibility of agricultural information supporting climate change adaptation is high, while 68.4 percent said it is moderately accessible. Half of the respondents with an annual income of more than Tshs 400,000.00 responded that the accessibility of agricultural information supporting climate change adaptation is high. Very

few (6.3%) respondents with an annual income of more than Tshs 400,000.00 responded that agricultural information supporting climate change is not accessible. The relationship between the two variables is confirmed by the highly significant correlation ($r = -0.266$; $p = 0.009$), which implies that the more income farmers have, the greater their chance to access agricultural information supporting climate change adaptation. The results are in line with the study by Wambura (1992), who found that farmers with high socio-economic status are likely to have high access to agricultural information.

4.6.6 Total Influence of Demographic Variables on Accessibility of Agricultural Information Supporting Climate Change Adaptation

Table 15: Total Influence of Demographic Variables on Accessibility of Agricultural Information Supporting Climate Change Adaptation

	Beta	T	Significance.
(Constant)		4.919	0.000
Gender	.128	1.137	0.259
Age	-.182	-1.722	0.089
Marital Status	.183	1.774	0.079
Educational Level	-.041	-.386	0.700
Income Level	.222	2.181	0.032*

$R^2 = 17.9\%$; $p = 0.03$

*Significant at $p \leq 0.05$

Source: Field Data, 2010

This section assesses the total influence of all the selected farmers' characteristics on access to agricultural information supporting climate change adaptation. This was achieved by using the linear multiple regression, model where the farmers' characteristics were entered. They included gender, age, educational level and annual income, as it was assumed in the conceptual framework that they influence farmers' access to agricultural information

supporting climate change adaptation. The regression results are summarized in Table 15, Which confirms that the income level of the farmer makes a major contribution to accessibility of agricultural information supporting climate change adaptation. The positive coefficient of beta on income signifies that farmers with incomes below Tshs 100,000.00 had the least access to agricultural information supporting climate change adaptation. This implies that the higher the income the higher the chance of accessing agricultural information supporting climate change adaptation. The total contribution explains the variance in accessibility of 17.9, percent as reflected in the significant R^2 of 0.179. This relative low amount can be attributed to the fact that only income contributes very significantly to the explanation regarding accessibility of agricultural information supporting climate change adaptation.

4.7 Use of Agricultural Information about Climate Change for Climate Change Adaptation

Table 16: Types of Agricultural Information about Climate Change Used by Respondents to Adapt to Climate Change (N=95)

Types of Agricultural Information	F	%
Types of Seeds Resistant to Drought	93	97.9
Intercropping/Mixed Crops	56	58.9
Soil Management	7	7.4
Water Management	44	46.3
Irrigation System	17	17.9
Planting Trees	58	61.1
Changing Planting Dates	2	2.1
Traditional Diversification	25	26.3

Source: Field Data (2010)

Note: Respondents Have More Than One Choice

To ascertain the use of agricultural information for climate change, respondents were requested to tick the corresponding agricultural information they use to adapt to climate change. The results are summarized in Table 16. The findings revealed that adaptation measures adopted by farmers in the study area are switching to drought-resistant crops and the crops that took a short time to harvest (97.9%), intercropping (58.9%) and planting trees (61.1%), as shown in Table 16. This is in line with Olmos (2001), Häckner (2009), Mongi (2010) and Andrew (2009).

However, the following agricultural practices were adopted by a few respondents: changing the planting dates (2.1%), soil management (7.4%), traditional diversification (26.3%) and water management (46.3%). The respondents gave reasons for not using the agricultural information they access for adapting to climate change. Among the mentioned reasons are lack of seeds resistant to drought and lack of water for small irrigation schemes. It was observed that the water table is near the surface in a study area, but it is too expensive for the individual respondents to construct. In Kinangali II, the FUNEKA SACCOS in collaboration with the District Agricultural Office (DALDO), has established the grapes irrigation project, helping the farmers. So far it has helped about 250 farmers from 6 villages. During the focus group discussion in Kilangali II one respondent commented as follows:

We have been advised to use irrigation for agriculture in our village because the water table is not far from the earth's surface...but to construct the well is expensive, most of my colleagues and I can't afford to do.



Figure 7: Irrigated Grapes by Using Drip Irrigation in Kilangali II (Left) And Irrigation Skim in Buigiri(Right)

Source: Field Data 2010

Furthermore, the study sought to ascertain the opinions of farmers on the successful use of the accessible sources in providing information on supporting climate change adaptation. Five Likert Scale options ranging from “Vey Successful”, “Successful”, “Uncertain”, “Less Successful”, and “Not successful”, scaled 5 to 1 respectively were used. The results are shown in Table 17.

Table 17: Successfulness of Accessible Sources in Providing Information Supporting Climate Change Adaptation (N=95)

Category	Very Successful		Successful		Uncertain		Less Successful		Not successful	
	F	%	F	%	F	%	F	%	F	%
Types of Seeds	16	16.8	26	27.4	4	4.2	41	43.2	8	8.4
Soil Management	11	11.6	26	27.4	7	7.4	33	34.7	18	18.9
Water Management	9	9.5	25	26.3	7	7.4	38	40.0	16	16.8
Irrigation	4	4.2	2	2.1	0	0.0	8	8.4	81	85.3
Traditional Diversification	14	14.7	9	9.5	13	13.7	43	45.3	16	16.8
Planting Trees	6	6.3	6	6.3	5	5.3	39	41.1	39	41.1
Mixed Crops	8	8.4	26	27.4	5	5.3	41	43.2	15	15.8
Changing Planting Dates	2	2.1	1	1.1	1	1.1	8	8.4	83	87.4

Source: Field Data, 2010

The results in Table 17 indicate that the majority of respondents revealed that the types of seeds resistant to drought (44.2%) and soil management (39%) were the successful types of information conveyed by accessible sources, while changing planting dates, planting trees, traditional diversification were among the less successful types of agricultural information about climate change. During an interview in Mvumi Makulu one respondent commented as follows::

Information on when to plant is too confusing, we may hear on the radio that this year rain will commence on that month, but unfortunately it may rain in other part of Dodoma and not in our area.

This means that farmers are keen to know about the need to change the planting date, which involves early planting or late planting based on rain availability. Also, another respondent said:

They told us to plant “muarobaini” because this kind of tree is a drought resistant plant but its problem is that it destroys all the vegetation under its cover, hence if you grow it on the farm no crops will be grown around the “muarobaini”.

4.8 Challenges Encountered in Accessing Agricultural Information about Climate Change.

Table 18: Challenges Encountered in Accessing Agricultural Information about Climate Change (N=95)

Challenges	F	%
Language Barrier	33	34.7
Cost of Accessing Information	58	61.1
Access to Outdated Information	63	66.3
Time of Accessing Information	69	72.6
Lack of Information Services	79	83.2
Lack of Infrastructure	85	89.5
Lack of Power	5	5.3

Source: Field Data,

The respondents were asked to mention the challenges they encountered in accessing agricultural information about climate change. Their responses are indicated in Table 18, showing that the challenges faced by respondents in accessing agricultural information were lack of infrastructure (89.5%), lack of information services (83.2%), time of accessing

information (72.6%), access to outdated information (66.3%), cost of accessing information (61.1%), lack of power (5.3%) and language barrier (34.7%).

The majority of the respondents (89.5%) indicated that lack of infrastructure was one of the challenges in accessing agricultural information in their area. They further pointed out that in the study area they do not have an information centre and a place for selling their agricultural materials. In an in-depth interview with one respondent from Kilangali II Village, the respondent commented emotionally as follows:

If a library and information centre were extended to our area we would be able to access agricultural information in the form of printed materials such as books, leaflets, research reports, newsletters, and many others but we don't have any.

In an interview with respondents from Mvumi Makulu, one respondent stated that “Our library lacks agricultural information supporting climate change adaptation.” This is an indication that respondents were eager to make use of these resources, but unfortunately, they were not available.

Seventy nine (83.2%) respondents pointed out that no information has available from agricultural demonstrations or exhibitions because they were not conducted in their area. The exhibitions such as Nane Nane were conducted in Dodoma Municipality , to which farmers could not afford to travel to attend demonstrations. In an interview with respondents in Kilangali II one farmer said that “it is expensive to travel to Dodoma town to attend demonstrations because I would need enough money for transport, food and

accommodation.” This shows that rural people are interested in attending exhibitions, even those which do not take place in their locality, but they fail to attend them due to lack of funds.

4.9 Strategies for Reducing the Identified Challenges

Farmers were asked to provide their suggestions on possible strategies for reducing the challenges they encounter in accessing agricultural information. They had various views on reducing the identified challenges:

An information centre should be established. The respondents hoped that having a library or an information centre in their locality would help them access agricultural information more easily. Moreover, not only should a library or information centre be established, but it should also include materials that are relevant and appropriate for the respective community.

Extension officers should be committed to helping farmers. It was observed that at least each village has an Agricultural Extension Officer although his/her work has to cover a lot of farmers. Therefore he/she has to use appropriate methods for disseminating agricultural information to cater for such a large population, such as Farmers Field School and agricultural demonstrations. But all those need committed Agricultural Extension Officers.

Printed materials should be provided. It was observed that there used to be a magazine called, “*Ukulima wa Kisasa*” (Modern Agriculture). It was a monthly agricultural magazine for farmers, but farmers do not receive the current issues. When the researcher asked the Extension Officers at the district office with about the farmers not getting the magazine, they stated that “We don’t receive that material nowadays”. The government should produce relevant agricultural materials in a language and the format than can be accessed by farmers.

More time should be given to agricultural information on radio and television programmes. Radio and television are good media for the dissemination of agricultural information. The respondents said that to enable farmers to access agricultural information, radio and television stations should allocate more time to agricultural information programmes. In an interview, one respondent stated:

If radio and television stations were to broadcast agricultural information on climate change adaptation several times per week, I would not miss all the sessions, because if I miss one session there is a possibility of getting the others.

4.10 Summary

This chapter presented, analysed and discussed the major findings of the study based on the research objectives and questions. The major issues discussed were the sources of agricultural information supporting climate change adaptation, types of agricultural information conveyed by accessible sources about climate change, accessibility of

agricultural information about climate change for climate change adaptation, influence of demographic variables on access to agricultural information supporting climate change adaptation, the use of agricultural information about climate change for climate change adaptation, the challenges encountered in accessing agricultural information about climate change and the strategies for overcoming the challenges encountered.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.0 Introduction

This chapter presents a summary of the research findings of the study, draws a conclusion and makes recommendations. The chapter is divided into five sections, namely, introduction, summary of the study, the main findings, the conclusions of the study and the last section provides both policy-based recommendations and possible areas for further study.

5.1 Summary

This study attempted to investigate the accessibility of agricultural information supporting climate change adaptation: A case study of Chamwino District, Dodoma Region. The study had five specific objectives.

1. To identify the types and sources of agricultural information about climate change available in Chamwino District.
2. To examine farmers' access to and use of agricultural information about climate change for climate change adaptation.
3. To identify the challenges encountered in accessing agricultural information about climate change.
4. To propose the way forward and solicit suggestions for overcoming the identified challenges in accessing and using agricultural information about climate change.

In order to accomplish the study objectives, five questions were specifically set to answer the four specific objectives of the study. The research questions were as follows:

1. What types and sources of agricultural information about climate change are available in Chamwino District?
2. How do farmers in Chamwino District access and use agricultural information about climate change to adapt to climate change?
3. What challenges are encountered by farmers in accessing agricultural information under climate change?
4. What strategies can be used to overcome the identified challenges in accessing and using agricultural information about climate change?

The study employed multi-stage simple random sampling to obtain the surveyed villages and wards which were Chinangali II and Mvumi Makulu Villages from Buigiri and Mvumi Makulu Wards, respectively. Furthermore, the simple random sampling technique was used in order to increase validity and reduce bias, and 95 respondents comprising of 50 from Mvumi Makulu and 45 from Kinangali II were selected. The decision on how many people from each village should be included depended on the population size and their availability during interview. Questionnaires, interviews and observation were used for data collection. Quantitative data collected were organized and analysed using SPSS version 16, while qualitative data was analysed using content analysis. The researcher utilized descriptive statistics, such as frequencies, chi square, correlation and multiple linear regression during data analysis and the results were presented in Tables, Figures and Histograms.

The summaries of the study findings based on the research objectives are summarized below.

5.1.1 Sources and Types of Agricultural Information about Climate Change Available in Chamwino District

The findings of the study revealed that radio, relatives, friends, neighbours and fellow farmers were the most useful sources of agricultural information about climate change. Furthermore, the study revealed that important sources of agricultural information, such as Agricultural Extension Officers, Libraries, Information Centres, seminars, training programmes, workshops, Farmers' Field School and printed materials were lacking in the study area.

The information conveyed was about the types of seeds that are resistant to drought, mixed cropping, soil management, water management, irrigation system, planting trees, changing planting dates. However, growing drought-resistant and early maturing crops, intercropping and planting trees were the major agricultural practices adopted in the study area.

5.1.2 Farmers Access to and Use of Agricultural Information about Climate Change for Climate Change Adaptation.

The findings indicate that accessibility of agricultural information about climate change is moderate in the study area. Furthermore, in assessing the influence of demographic

variables on the accessibility of agricultural information about climate change, the linear regression model reveals that the income of respondents has a significant influence on the accessibility of agricultural information supporting climate change adaptation. This implies that the higher the income the greater the chance of accessing agricultural information about climate change adaptation.

It was further revealed that growing only drought-resistant and early maturing crops, intercropping and planting trees were the major agricultural practices adopted in the study area.

5.1.3 Challenges Encountered in Accessing Agricultural Information about Climate Change

The findings indicated that the challenges encountered in accessing agricultural information were the lack of infrastructure and information services, inadequate amount of time for accessing information, the information was outdated, the cost of accessing information, the lack of power and the language barrier.

5.1.4 Strategies for Overcoming the Identified Challenges

Finally, the suggested strategies for increasing access to information about climate change include the establishment of Rural Agricultural Libraries and Information Centres, the employment of enough, competent and committed Agricultural Extension Officers by the government, the provision of printed materials with the content in the format and language

that is relevant to the rural farmers and ensuring that more time is given to agricultural information in radio and television programmes.

5.2 Conclusions

Agricultural information is an acknowledged ingredient for development and the rate of development is directly related to good information about welfare. Agricultural information informs farmers about different agricultural practices that would improve agricultural production and hence livelihoods. Therefore, to adapt to climate change, crucial information needs must be met.

In order to be successful in agriculture in rural areas in Tanzania, there is an urgent need to improve accessibility of agricultural information in order to support climate change adaptation. This is because agricultural information plays an important role in agricultural development. In order to be successful, rural agricultural libraries and information centres in rural areas in Tanzania must be established, and the Tanzanian Government must ensure that there is relevant and suitable agricultural information to overcome the current problems, which include the impact of climate change on farmers, in terms of the language, content and format that can be accessed by the farmers. This is crucial because the majority of Tanzanians are peasants. On the other hand, it is also beneficial since Tanzania is struggling to promote Kilimo Kwanza (Agriculture First).

5.3 Recommendations

Various problems, which are barriers to the accessibility of agricultural information in order to support climate change adaptation in selected Villages and Wards in Tanzania have been discussed. If the problems are not solved, farmers in rural areas will continue to suffer. In this regard, there is an urgent need for the problems to be addressed thoroughly. Based on the study findings and conclusions, the following recommendations have been suggested by this study:

1. There is need to integrate area specific weather service dissemination into advice that is useful for responding to local conditions as well as scaling up the use of the existing extension system by providing timely and appropriate information.
2. The establishment of agricultural libraries and information centres in rural areas would ensure that suitable and relevant agricultural information concerning the impact of climate change is given to the farmers, in terms of its language, content and format so that it can be accessed by the them.
3. The Tanzanian Government should employ enough competent and committed Agricultural Extension Officers who will help the farmers in accessing and using the agricultural information to support climate change adaptation.
4. The Agricultural and Livestock Policy should be revisited and should incorporate the aspect of agriculture in relation to unpredictable weather with specific guidance on the provision of area-specific agro-meteorological services for farmers.

5. The Government should also assist farmers in the area of education, for instance, sponsoring adult education so that farmers can make use of the different sources of agricultural information effectively.

5.4 Recommendations for Areas of Further Research

This study recommends the following areas for further research;

1. To identify printed and electronic information on agricultural information supporting climate change adaptation that can be used by farmers in rural areas
2. A study is needed to determine the effectiveness of the useful informal sources of agricultural information, such as contact with fellow farmers and friends in supporting climate change adaptation in rural areas.

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APPENDICES

APPENDIX 1: FARMERS' QUESTIONNAIRE

Dear respondents,

My name is Nicholaus Mwalukasa., a Masters of Arts Student in Information Studies at the University of Dar es Salaam. I am doing research on “*Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District*”. Kindly, I would like to invite you to participate in this study by filling in this questionnaire. The information collected will be used for academic purpose only; confidentiality of information will be maintained.

Please express your honest opinion about the subject. Your views are valuable and of significance to the survey being conducted. The findings will help in improving ‘Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District in particular, and Tanzania in general. **Please use a ball point pen to fill in this questionnaire.**

District Profile:

Name of District: Chamwino

Name of Region: Dodoma

Name of Ward:

Name of Village

Personal information

1. Gender (1) Male (2) Female

2. What is Your Age Group? _____

- 1) Below 20 years
- 2) 20– 30 years
- 3) 30– 40 years
- 4) 40 - 50 years
- 5) 50 – 60 years
- 6) Above 50 years

3. Marital Status of Respondents:

- (1) Married (2) Single (3) Separated (4) Widowed.

4. What is your Marriage Type? (1) Monogamous (2) Polygamous

5. Did you get any formal education (1) Yes (2) No

6. Are you able to read? (1) Yes (2) No

7. What is your highest level of education?

- 1) Never Attended School (No Formal Education)
- 2) Adult Education
- 3) Semi(Memkwa)
- 4) Primary Education
- 5) Secondary Education
- 6) Post Secondary Education
- 7) Other (Please Specify):

8. What is your main source of Income?

- 1) Employee

- 2) Farming activities
- 3) Self Employment
- 4) Other (Please Specify):.....

9. Mention the main kinds of crops that you grow in your area:

- 1) Maize
- 2) Beans
- 3) Sorghum,
- 4) Bulrush,
- 5) Millet,
- 6) Paddy,
- 7) Groundnuts
- 8) Sweet potatoes.

Agricultural Information About Climate Change

10. Have you ever heard of new farming practices aimed at adapting to climate change?

(1) Yes (2) No

11. If your answer to question 10 is “No” how do you adapt agricultural practice to climate change ?

.....

.....

Sources and Accessibility of Agricultural Information Expressing Climate Change

Adaptation:

12. What Sources and Channels of Information are available in your area that provide agricultural information supporting climate change adaptation? Tick(✓) one from the list for all the categories that apply:

Category	
Radio	
Television	
Library & Information Centre	
Newspapers	
Seminars and Workshops,	
Training Programmes	
Magazines	
Relatives, Friends and Neighbours	
Fellow Farmers	
Agricultural Extension Officers	
Leaflets	
Agricultural demonstrations	
Posters	
Cell phones, landlines	
Others:	

13. What Sources of Information and Channels do you mostly use to get agricultural information supporting climate change adaptation? For each of the following sources and channels indicate if you use them by Circling against the following: **Almost Always**,

Always, Frequently, Occasionally, Rarely and Never. Circle the appropriate answers.

Circle the Source or Channel that applies (Indicate one answer only for each Source/Channel)

	Almost Always	Always	Frequently	Rarely	Never
Radio	(v)	(iv)	(iii)	(ii)	(i)
Television	(v)	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(v)	(iv)	(iii)	(ii)	(i)
Newspapers	(v)	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,	(v)	(iv)	(iii)	(ii)	(i)
Training Programmes	(v)	(iv)	(iii)	(ii)	(i)
Magazines	(v)	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(v)	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(v)	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(v)	(iv)	(iii)	(ii)	(i)
Leaflets	(v)	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(v)	(iv)	(iii)	(ii)	(i)
Posters	(v)	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(v)	(iv)	(iii)	(ii)	(i)
Others:	(v)	(iv)	(iii)	(ii)	(i)

14. How do you rate the accessibility of the available sources of information in your area that provides agricultural information supporting climate change adaptation?

(1) Highly accessible (2) Moderately accessible (3) Not accessible

15. What is your opinion regarding the reliability of the various sources of information in communicating agricultural information for supporting climate adaptation?

For each of the following sources and channels indicate if you use them by Circling the following; **not reliable, fairly reliable, reliable and very reliable**

	Very reliable	Reliable	Fairly reliable	Not reliable
Radio	(iv)	(iii)	(ii)	(i)
Television	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(iv)	(iii)	(ii)	(i)
Newspapers	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,	(iv)	(iii)	(ii)	(i)
Training Programmes	(iv)	(iii)	(ii)	(i)
Magazines	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(iv)	(iii)	(ii)	(i)

Leaflets	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(iv)	(iii)	(ii)	(i)
Posters	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(iv)	(iii)	(ii)	(i)
Others:	(iv)	(iii)	(ii)	(i)

16. What is your opinion regarding the appropriateness of the various sources of information in communicating agricultural information for supporting climate adaptation?

For each of the following sources and channels indicate if you use them by Circling the following; **not appropriate, fairly appropriate, appropriate, and very appropriate**

	Very appropriate	Appropriate	fairly appropriate	Not appropriate
Radio	(iv)	(iii)	(ii)	(i)
Television	(iv)	(iii)	(ii)	(i)
Library & Information Centre	(iv)	(iii)	(ii)	(i)
Newspapers	(iv)	(iii)	(ii)	(i)
Seminars and Workshops,	(iv)	(iii)	(ii)	(i)
Training Programmes	(iv)	(iii)	(ii)	(i)
Magazines	(iv)	(iii)	(ii)	(i)
Relatives, Friends and Neighbours	(iv)	(iii)	(ii)	(i)
Fellow Farmers	(iv)	(iii)	(ii)	(i)
Agricultural Extension Officers	(iv)	(iii)	(ii)	(i)
Leaflets	(iv)	(iii)	(ii)	(i)
Agricultural Demonstrations	(iv)	(iii)	(ii)	(i)
Posters	(iv)	(iii)	(ii)	(i)
Cell Phones, Landlines	(iv)	(iii)	(ii)	(i)
Others:	(iv)	(iii)	(ii)	(i)

17. How would you prefer to obtain agricultural information for adapting to climate change? Please rank the means below according to your preferences by assigning numbers (i) for the most preferred, (ii) for slightly preferred and (iii) for not preferred at all. Circle all items that apply to you.

Category	Most Preferred	Slightly Preferred	Not Preferred at all
(a)Through Extension Officers Visits/ Consultations	(i)	(ii)	(iii)
(b)Through Attending Agricultural Exhibitions	(i)	(ii)	(iii)
(c)Through Audio Programmes	(i)	(ii)	(iii)
(d)Through Television and Radio Programmes	(i)	(ii)	(iii)
(e)Talking to Friends , Relatives, Neighbours ad Fellow Farmers	(i)	(ii)	(iii)
(f)Reading About Them on Newspapers Magazines and Leaflets	(i)	(ii)	(iii)
(g) Through Field Demonstrations	(i)	(ii)	(iii)
(h) Other (Specify):	(i)	(ii)	(iii)

18. Which language do you prefer to use most each day in accessing agricultural information supporting climate change adaptation?

(a) Local Language (Vernacular)

(b) Kiswahili

(c) Any Other Language (Please Specify):

Types of Agricultural Information Conveyed by Accessible Sources Supporting Climate Change Adaptation:

19. What agricultural information for adapting to climate change with regard to food production in the following areas are accessible from available sources? Please tick (✓)

(a) Types of Seeds Resistant to Drought	
(b) Intercropping/Mixed cropping	
(c) Soil Management	
(d) Water Management	
(e) Irrigation System	
(f) Planting Trees	
(g) Early Warning System	
(i) Changing planting dates	
(j) Tradition diversification	
(j) other (Please specify)	

Use of Agricultural Information to Adapt to Climate Change:

20. Have you ever practised or adopted any of the agricultural innovations you accessed?

a) Yes

b) No

21. If your answer to question 17 is 'No', Please give a reason why you have never adopted the innovation:

22. If your answer is 'Yes' to question 17 which ones you have practiced in your agricultural activities?

- a) Small-Scale Irrigation.
- b) Switching to Drought-Resistant Crops
- c) Short-Term Crops
- d) Planting of Trees.
- e) Water Management
- f) Traditional Diversification.
- g) Other (Please Specify): _____

23. Do you think you would like to have information and learn about adapting your agricultural production?

- a) Yes
- b) No
- c) Not Sure

24. If your answer to question 20 is "Yes" what subject areas would you like to know more about, please mention them:

- a) Small-Scale Irrigation.
- b) Switching to Drought-Resistant Crops

- c) Short-Term Crops
- d) Planting of Trees.
- e) Traditional Diversification.
- f) Changing plant dates
- g) Other (Please Specify): _____

25. Do you think the accessible sources of information have been successful in providing information on supporting climate change adaptation in the following areas? Please circle the appropriate answer accordingly by choosing each category identified below:

Category	Very successful	Successful	Uncertain	Less successful	Not successful
(a) Type of Seeds	(v)	(iv)	(iii)	(ii)	(i)
(b) Soil Management	(v)	(iv)	(iii)	(ii)	(i)
(c) Water Management	(v)	(iv)	(iii)	(ii)	(i)
(d) Irrigation	(v)	(iv)	(iii)	(ii)	(i)
(e) Tradition Diversification	(v)	(iv)	(iii)	(ii)	(i)
(f) Planting Trees	(v)	(iv)	(iii)	(ii)	(i)
(g) Mixed crops	(v)	(iv)	(iii)	(ii)	(i)
(h) Changing planting	(v)	(iv)	(iii)	(ii)	(i)

dates					
(i) Tradition diversification	(v)	(iv)	(iii)	(ii)	(i)
(i) Other.....	(v)	(iv)	(iii)	(ii)	(i)

Challenges Encountered in Accessing Agricultural Information:

26. What challenges do you encounter in accessing agricultural information supporting climate change adaptation?

- a) Language barriers
- b) Cost of accessing information
- c) Access to outdated information
- d) Time consuming
- e) Lack of information services
- f) Lack of infrastructure
- g) Others mention.....

Suggestions for Overcoming the Identified Challenges:

27. What strategies can be used to overcome the identified challenges in accessing and using of agricultural information to support climate change adaptation?

.....

.....

THANKS FOR YOUR COOPERATION!

Nicholaus Mwalukasa.

APPENDIX 2: FOCUS GROUP DISCUSSION GUIDE

1. What sources of agricultural information are available on Climate Change in Chamwino District?
2. What kind of agricultural information is conveyed by available sources under climate change adaptation?
3. How do farmers in Chamwino access and use agricultural information under climate change to adapt to climate change?
4. Which sources of information do you prefer most?
5. What challenges are encountered by farmers in Chamwino in accessing agricultural information under climate change?
6. What strategies can be used to overcome the identified challenges in accessing and using agricultural information under climate change?

APPENDIX 3: INTERVIEW GUIDE FOR EXTENSION/AGRICULTURAL OFFICERS

A. Researcher's Brief Introduction and Purpose of the Study.

My name is Nicholas Mwalukasa. I am a graduate student at the University of Dar es Salaam, pursuing a Masters of Arts in Information Studies. The Interview is part of a study being conducted for a dissertation which will be presented to the University in partial fulfillment of the Degree Programme.

The purpose of this Interview is to help to gather data that will be used to examine *“Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District”*.

May I have your attention on discussing several issues related to the topic. The information you give is strictly confidential, and the study is mainly for academic purpose only and not otherwise. Findings of this study will improve the quality of information delivery systems and services in supporting climate change adaptation for Small Scale Farmers in Chamwino District in particular, and Tanzania in general.

Thanking you in advance for the time you will spend and all the efforts you will make to respond to this Interview Session.

1. Name of your Institution.....
2. Designation.....
3. Gender

- (a) Married (Male)
- (b) Married (Female)
- (c) Single (Male)
- (d) Single (Female)

4. Level of Education :

- (a) Certificate
- (b) Diploma
- (c) Degree
- (d) Higher Degree
- (e) Others(Specify):.....

...

5. What are the sources of agricultural information available in Chamwino District?

.....

6. What type of agricultural information conveyed by the sources you mentioned in question 5 in supporting climate change adaptation at Chamwino? Mention them in order of priority:

.....

.....

.....

7. Mention sources of agricultural information on climate change which are frequently consulted by farmers in Chamwino?

.....

.....

8. What methods do you use to deliver agricultural information to Farmers in Chamwino?

- (a) Group Discussions
- (b) Visiting Farmers
- (c) Workshops, Training Sessions and Seminars
- (d) Audiovisual Aids
- (e) Demonstrations
- (f) Others: (Please Specify):

.....

.....

9. Do you think that the agricultural information Farmers get in Chamwino is enough to improve efficiency and productivity in the environment which needs climate change adaptation?

- (a) Yes
- (b) No

10. If your answer to question 9 is “Yes” explain thoroughly:

.....

.....

11. If your answer to question 8 is “No” explain thoroughly:

.....

12. Do you encounter any problems in disseminating agricultural information to
Farmers on climate change adaptation in Chamwino?

(a) Yes

(b) No

13. If your answer to question 11 is “Yes”, what are the problems? Mention them:

.....
.....

14. What should be done so that Farmers can get adequate, correct and timely
agricultural information on climate change adaptation in Chamwino?

.....

THANK YOU FOR YOUR COOPERATION!

Nicholaus Mwalukasa.

APPENDIX 4: OBSERVATION CHECK LIST

1. Sources of agricultural information
2. Farmers' access to agricultural information supporting climate change adaptation
3. Adaptation strategies adopted by the farmers in adapting climate change.



UNIVERSITY OF DAR-ES-SALAAM

OFFICE OF THE VICE-CHANCELLOR

P.O. BOX 35091 ♦ DAR ES SALAAM ♦ TANZANIA

Ref. No: AB3/12(B)

Date: 20th October, 2010

To: The Regional Administrative Secretary,
Dodoma Region.

UNIVERSITY STAFF AND STUDENTS RESEARCH CLEARANCE

The purpose of this letter is to introduce to you **Mr. Nicholaus Mwalukasa** who is a bonafide student of the University of Dar es Salaam and who is at the moment conducting research. Our staff members and students undertake research activities every year especially during the long vacation.

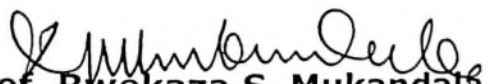
In accordance with a government circular letter Ref.No.MPEC/R/10/1 dated 4th July, 1980 the Vice-Chancellor was empowered to issue research clearances to the staff and students of the University of Dar es Salaam on behalf of the government and the Tanzania Commission for Science and Technology, a successor organization to UTAFITI.

I therefore request you to grant the above-mentioned member of our University community any help that may facilitate him to achieve research objectives. What is required is your permission for him to see and talk to the leaders and members of your institutions in connection with his research.

The title of the research in question is "**Accessibility of Agricultural Information in Supporting Climate Change Adaptation in Chamwino District**".

The period for which this permission has been granted is **October, 2010 to December, 2010** and will cover the following areas/offices: **Chamwino District.**

Should some of these areas/offices be restricted, you are requested to kindly advise him as to which alternative areas/offices could be visited. In case you may require further information, please contact the Directorate of Research and Publications, Tel. 2410500-8 Ext. 2087 or 2410743.


Prof. Rwekaza S. Mukandala
VICE-CHANCELLOR

VICE CHANCELLOR
UNIVERSITY OF DAR-ES-SALAAM
P.O. BOX 35091
DAR-ES-SALAAM

Direct +255 22 2410700
Telephone: +255 22 2410500-8 ext. 2001
Telefax: +255 22 2410078

Telegraphic Address: UNIVERSITY OF DAR ES SALAAM
E-mail: vc@admin.udsm.ac.tz
Website address: www.udsm.ac.tz

THE UNITED REPUBLIC OF TANZANIA
OFFICE OF THE PRIME MINISTER
REGIONAL ADMINISTRATIVE AND LOCAL GOVT.

Dodoma Region
Address REGCOM
Tel. No: 2324343/2324384
E-Mail No. rasdom2002tz@yahoo.com
Fax No: 255 026 2320046
In reply please quote:



Regional Commissioner's Office
S.L.P 914
Dodoma.

Ref. No. DB. 122/467/02/6

18th November, 2010

District Administrative Secretary,
Chamwino District.

RE: RESEARCH PERMIT

I am hereby introducing to you Mr. Nicholaus Mwalukasa who is a bonafide student of the University of Dar es Salaam and who is at the moment conducting research in Chamwino District.

The title of the research in question is **The Accessibility of Agricultural information in Supporting Climate Change Adaptation.**

The period for which this permission has been granted is October to December, 2010.

Please assist him accordingly.

A handwritten signature in black ink, appearing to read 'P. K. Masanja'.

P. K. Masanja

For: REGIONAL ADMINISTRATIVE SECRETARY
DODOMA

Copy to:- Mr. Nicholaus Mwalukasa

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA WAZIRI MKUU
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA DODOMA
Simu Na.: 026 2323322

Unapojibu tafadhali taja:



Ofisi ya Mkuu wa Wilaya
Chamwino,
S.L.P. 278,
DODOMA.

Kumb. Na. V 50/2/63

19 Novemba, 2010

Afisa Kilimo/Mifugo (W),
Halmashauri ya Wilaya ya Chamwino,
S.L.P. 1126,
DODOMA.

YAH: KIBALI CHA UTAFITI

Husika na somo hapo juu.

Namtambulisha Bw. Nicholas Mwalukasa mwanafunzi
wa Chuo Kikuu cha Dar es Salaam ambaye anataka kufanya
utafiti katika Wilaya yetu baada ya kuruhusiwa Mkoani.

Utafiti wake utahusu "***The Accessibility of Agricultural
Information in Supporting Climate Change Adaptation***"

Nimatumaini yangu atapata msaada muhimu kutoka
Idara yako.

Nawasilisha.

A handwritten signature in black ink, appearing to read 'A.J. Mushashu'.

A.J. Mushashu
**KAIMU KATIBU TAWALA WILAYA
CHAMWINO**

Nakala: Nicholas Mwalukasa.

HALMASHAURI YA WILAYA YA CHAMWINO

(Barua zote ziandikwe kwa Mkurugenzi Mtendaji)

IDARA YA KILIMO/MIFUGO

**S.L.P. 832
DODOMA
TANZANIA**

Nambari ya Simu Binafsi Ofisini

Kwa Mkurugenzi: 026-2321449

Fax Na. 026-2323299



Kumb.Na. KL/CH /S.10/1/100

30/11/2010

Afisa Mtendaji,
Kijiji cha Chinangali II
S.L.P. 1126,
DODOMA.

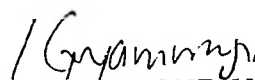
YAH: KUMTAMBULISHA KWAKO NDUGU NICHOLAUSI MWALUKASA

Husika na somo hapo juu.

Namtambulisha mtajwa hapo juu ni mwanafunzi wa Chuo Kikuu cha Dar es Salaam ambaye anataka kufanya utafiti katika kijiji chako.

Utafiti wake utahusu **"The Accessibility of Agricultural Information in Supporting Climate change Adaptation"**.

Naomba mpe ushirikiano wa kutosha.


DR. RICHMOND URASA
AFISA KILIMO/MIFUGO (W)
CHAMWINO

DISTRICT AGRICULTURE AND LIVESTOCK
DEVELOPMENT OFFICER
P. O. Box 832
CHAMWINO

HALMASHAURI YA WILAYA YA CHAMWINO

(Barua zote ziandikwe kwa Mkurugenzi Mtendaji)

IDARA YA KILIMO/MIFUGO

Nambari ya Simu Binafsi Ofisini

Kwa Mkurugenzi: 026-2321449

Fax Na. 026-2323299



S.L.P. 832

DODOMA

TANZANIA

Kumb.Na. KL/CH /S.10/1/101

30/11/2010

Afisa Mtendaji,
Kijiji cha Mvumi Makulu
S.L.P. 1126,
DODOMA.

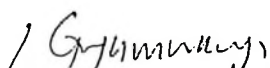
YAH: KUMTAMBULISHA KWAKO NDUGU NICHOLAUSI MWALUKASA

Husika na somo hapo juu.

Namtambulisha mtajwa hapo juu ni mwanafunzi wa Chuo Kikuu cha Dar es Salaam ambaye anataka kufanya utafiti katika kijiji chako.

Utafiti wake utahusu **"The Accessibility of Agricultural Information in Supporting Climate change Adaptation"**.

Naomba mpe ushirikiano wa kutosha.


DR. RICHMOND URASA
AFISA KILIMO/MIFUGO (W)
CHAMWINO

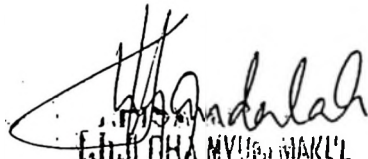
**DISTRICT AGRICULTURE AND LIVESTOCK
DEVELOPMENT OFFICER
P. O. Box 832
CHAMWINO**

WAKUNU WA VITONG'OGI WOTE
KIJISI CHA MVUMI MAKUL
MVUMI

KUNWA TAMBAULISHA KWENYI NBUGU NICHOLAS MWALUKA:

Mtajiwa hapa juu ni Mwanazwoni wa chuo
kikuu cha Dar-es-Salaam. Aimejika Kijiji'ni
kwa kuti kufanywa utafiti wa hali ya hewa na
upatikanaji wa Elini kuhusu hali ya hewa
hapa Kijiji'ni.

Nawambeni sana toeni ushirikiano pale atak
hutoji msaada kwenu.


KIJISI CHA MVUMI MAKUL
CHAMWINDO-ODUMA
TAREHE 06-12-2010

watafutana na SALOME MUKUNDA

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