THE ROLE OF BROADCAST MEDIA ON COMMUNITY ADAPTATION AND MITIGATION OF CLIMATE VARIABILITY AND CHANGE IMPACTS IN IRINGA RURAL DISTRICT, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL DEVELOPMENT OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

Actions associated with building mitigation and adaptive capacity may include communicating climate change information, building awareness of potential impacts, maintaining well-being, protecting property or land, maintaining economic growth, and exploiting new opportunities. Over the past two decades, radio has been the major medium in rural areas of developing countries as a source of news and music. This study was carried out to assess the role of broadcasting media on community adaptation and mitigation to climate variability and change in Isimani Division simply because the division is relatively most affected by drought due to environmental degradation. A Cross-sectional research design was adopted and involved a sample size of 120 respondents. Data were collected through questionnaires, key informant interviews and Focus group discussions. Data analysis was done using Statistical Package for Social Sciences (SPSS). Binary logistic model confirmed that access and usage of broadcast media had effect on farmers' adaptation and mitigation to climate variability and change. However, low income, language barriers, unreliable broadcasting network low education level, lack of environment related programmes; and lack of electricity were confirmed as barriers to accessibility and usage of broadcasting media for adaptation and mitigation of climate variability and change impacts. It is recommended that government should reduce taxes imposed upon equipment for broadcasting media. Broadcast media should be used to disseminate information on good farming practices as a measure of adapting and mitigating to climate change.

DECLARATION

I, MARTINA DAVID KAPINGA, do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my own work done within the period of registration and that it has neither been submitted nor being concurrently submitted for degree award to any other institution.

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The above declaration is confirmed

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DEDICATION

This work is dedicated to my beloved parents: My father, the late Macharious David Kapinga and my mother, the late Martha David Ngusa.

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LIST OF ABBREVIATIONS AND ACRONYMS

BBC	British Broadcasting corporation
CI	Community Informatics
ComDev	Communication for Development
DALDO	District Agricultural and Livestock Development Officer
DFID	Department for International Development
FAO	Food and Agriculture Organization
FGDs	Focus Group Discussions
FM	Frequency Modulation
ICTs	Information and Communication Technology
IPCC	Intergovernmental Panel on Climate Change
ITV	Independent Television
KI	Key Informants
MDGs	Millennium Development Goals
NBS	National Bureau of Statistics
NGO	Non-Government Organization
OLS	Ordinary Least Square
PAS	Package for Analytical Software
SACCOs	Savings and Credit Cooperative Organizations
SNAL	Sokoine National Agriculture Library
T&V	Training and Visit
TACAIDS	Tanzania Commission for AIDS
TBC	Tanzania Broadcasting Corporation
TCRA	Tanzania Communication Regulatory Authority

TV	Television
TVT	Television ya Taifa
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational Scientific and Cultural Organization
UNFCCC	The United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VICOBA	Village Community Banks

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Climate change and variability are some of the most serious environmental and human threats undermining the achievement of the development goals and communities' efforts to reduce extreme poverty (IPCC, 2007; Hepworth, 2010). According to Hepworth (2010) climate variability as the way climate fluctuates yearly above or below a long-term average value and climate change as a long-term continuous change (decrease or increase) to average weather conditions or the range of weather. Understanding relationships between climate variability and change is made difficult by mutual interactions between these two characteristics of climate.

According to Wiggins *et al.* (2001), both effects of climate variability and change magnify the changes in the probability of extreme events on the tails of the distribution. It has, therefore, emerged as one of the major challenges to human development in the 21st century (Sarkar *et al.,* 2012). According to Fischer *et al.* (2005) and Nnamchi *et al.* (2009), developing countries are more vulnerable to climate variability and change than developed countries. This situation is aggravated by the interaction of multiple stresses because of the predominance of rain-fed agriculture in their economies, the scarcity of capital for adaptation and mitigation measures, their warmer baseline climates and their heightened exposure to extreme events.

Apart from global variation of climate, analysis of observational data in Tanzania carried out by New (2006) show clear evidence of decreasing numbers of cold days and nights and a decrease in cold waves. Daily temperature observations show only small increasing

trends in the frequency of hot days, but much larger increasing trends in the frequency of hot nights, especially in the months of December to February (New, 2008). Similarly, Kijazi *et al.* (2012) observed that rainfall trends in Tanzania show significant decrease in annual rainfall, notably in the 'long' rains (March to May). Annual rainfall has decreased at an average rate of 2.8 mm per month per decade (3.3%).

Thus, it is projected that by 2100 Tanzania will have a decrease in rainfall of between 0 and 20% (Mwandosya *et al.*, 1998). Such major changes in rainfall patterns will inevitably have severe consequences to the society. Some of those observed changes such as repeated droughts and floods are already happening in many parts of the country such as parts of the southern highlands (Mwandosya *et al.*, 1998). For instance, Kijazi *et al.* (2012) depict that birds such as *Mbungu* (*Crocuta*) and trees such as *Misombe* (*Mangifera indica*) that were used as rainfall indicators by local communities in Ismani Division in Iringa region have disappeared due to repeated draughts.

Agricultural production in rural Tanzania is prone to risk due to changes in mean and variance of rainfall and temperature since production relies mainly on rainfall and is severely compromised in many parts of the country, particularly for subsistence farmers (UNFCCC, 2007). Though farmers have developed several adaptation and mitigation options to cope up with current climate variability and change, such adaptations and mitigations may not be sufficient for future changes of climate (Boko *et al.*, 2007). However, Falaki and Adegbija (2013) depict that the best response to climate change and variability is a combination of these two strategies namely adaptation and mitigation.

In addition, Farm Radio International (2009) noted that farmers can prepare for mitigating and adapt to the negative effects of climate change only if they understand it and know its

impacts. Adapting and mitigating to climate variability and change involves cascading decisions across a landscape made up of various agents and involves different actions (Adger *et al.*, 2005). Actions associated with building mitigation and adaptive capacity may include communicating climate change information, building awareness of potential impacts, maintaining well-being, protecting property or land, maintaining economic growth, and exploiting new opportunities (Adger *et al.*, 2005).

Human activities are sensitive to climate in one way or another; thus there is a need to devise strategies and coping mechanisms that enhance their capacity to adapt to and participate in mitigation of climate variability and change. According to Sachsman (2000), public awareness building through mass media has played a major alternative role in shaping people's perceptions and awareness of environmental issues since the 1960s.Thus, there is evidence that broadcast media such as television and radio are amongst the most accessible sources of information that can bring the reality of climate change and variability impacts directly into people's homes. These sources have helped to raise public attention on various issues including climate variability and change impacts over the years.

The wind of change that swept Tanzania in the late 1980s and early 1990s did not spare the media sector. Liberalization policy on various sectors of the economy has seen the influx of private and public radio and television stations in the country. The growth of the broadcast media is expected to bring about sustainable development by addressing poverty, ignorance, food insecurity, conflict, environmental degradation and gender disparities.

1.2 Problem Statement

Over the past two decades, Tanzania witnessed growth in the broadcast sector in terms of increased radio and television stations. A survey conducted in 2013 revealed that 2

television stations increased from 24 stations in 2007 to 26 in 2012. Furthermore, radio stations increased from 46 stations in 2007 to 86 stations in 2012 (NBS, 2013). One important function of the broadcast media is sensitizing and undertaking various education programmes on environmental issues thereby cultivating public interest, commitment and awareness on adaptation and mitigating climate variability and change impacts (UN, 2012). On the other hand, there has been an increasing rate of climate variability and change impacts in different parts of the country including Iringa Rural District. Gunther and Mughan (2000) claimed that broadcasting programmes were simply giving people only entertainment and simple stories. However, there is plenty of evidence that people can be taught to appreciate serious news.

Although much research (Paavola, 2003; Shemsanga *et al.*, 2010; and Ngaira *et al.*, 2012) has been conducted on various aspects of climate variability and change, there is scarcity of empirical research on the role of broadcasting media on community adaptation and mitigation to climate variability and change impacts in the country. Available studies (Mpehongwa, 2009; Sife, 2010; and Seidu *et al.*, 2011) on broadcast media in Tanzania have largely focused on the relationship between broadcasting media and livelihood improvement. As such, this study was set out to assess the role of broadcasting media on community adaptation and mitigations of climate variability and change impacts in Isimani Division. This focus was necessary because in Tanzania, the agricultural sector is among the most affected sectors by climate variability and change with special focus on climate variability and change impacts in agriculture.

1.3 Justification of the Study

The findings of this study would be beneficial to different stakeholders including farmers, television and radio stations, journalists and Tanzania Communication Regulatory

Authority (TCRA). In case of farmers, applying knowledge obtained from these broadcast media would minimize environmental problems such as repeated flood and draught. Results of this research would augment/add knowledge gaps on climate variability and change to policy makers by taking appropriate actions toward facilitating the establishment of comprehensive and sustainable environment institutions for the development of the agricultural sector. Further, the result would be beneficial for policy maker in increasing credible radio and television programmes on climate variability and change impacts. Therefore, it might be possible to build awareness for adaptation and mitigations among the farmers who otherwise might have gone for evacuation and end up as climate refugees.

Furthermore, information from this study would be used to formulate policies that enhance local community mitigation and adaptation strategies as a tool for managing risks related with climate variability and change. These findings would also complement and act as a reference point for other similar studies.

1.4 Research Objectives

1.4.1 General objective

To assess the role of broadcast media on community adaptation and mitigation of climate variability and change impacts in Isimani Division, Iringa Rural District, Tanzania.

1.4.2 Specific objectives

The specific objectives of this study were to:

i) Establish access to and usage patterns of broadcasting media in the study area

ii) Identify adaptation and mitigation practices to climate variability and change impacts undertaken by small holder farmers in the study area

iii) Assess effects of accessibility and usage of broadcast media on adaptation and mitigations on climate variability and change impacts.

iv) Identify barriers on access and usage of broadcast media for adaptation and mitigations on climate variability and change impacts

1.5 Research Questions

i) How do people access and use broadcast media services in the study area?

ii) What are the various adaptation and mitigation practices on climate variability and change impacts by small holder farmers in the study area?

iii) What is the effect broadcast media access and use on the way people adapt and mitigate climate variability and change impacts?

iv) What are the barriers on accessing and using broadcasting media for adaptation and mitigation on climate variability and change impacts in the study area?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Operational Definitions

- **Climate variability** refers to variations (ups and downs) in climatic conditions on time scales of months, years, decades, centuries, and millennia including droughts and floods (Hepworth, 2010; Ramamasy and Baas, 2007).
- **Climate change** refers to statistically significant change in climate characteristics over a period of time. It can be a change in the mean, a change in extremes, or change in frequencies (Christensen *et al.*, 2007; UNFCCC, 2007)
- **Broadcasting media** refers as the kind of media which consists of a variety of communication channels such as radio, television, video and film, newspapers, magazines, pamphlets and posters; the internet, e-mail and telephones; theatre, dance, music and puppetry (UNDP, 2004). In this study, broadcast media refers to radio and television.
- **Mitigation** refers to the implementation of measures designed to reduce the undesirable effects of a proposed action on the environment (IPCC, 2001; USAID, 2008).
- **Adaptation** refers to the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which involves changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate variability and change (Adger, *et al.*, 2005; IPCC, 2007).
- **Usage** refers to the application of broadcast media (radio and TV) for accessing, exchanging and disseminating information.

- Access refers to the ability to obtain broadcast facilities and services including the availability of radio set, television set and broadcasting network coverage.

2.2 Access and Usage of Radio in Rural Areas

Over the past two decades, radio has been the major medium in rural areas of developing countries as a source of news and music. Radio's accessibility has been attributed to its effectiveness as a communication medium for populations with low literacy levels, low income and lack of access to other forms of media (FAO, 2001). Many developing countries including Tanzania began liberalizing airwaves in 1993 allowing for the development of privately and commercially run stations (Amienyi, 2004).

The level of household ownership of radio sets in Tanzania was 58% in 2004, with the ownership in urban and rural households being 76 and 52% respectively (NBS and ORC Marco, 2005). Another survey by InterMedia (2004) found that 68% of the population had access to FM signals and 92% of the population listened to radio at least once a week. Tanzania all media and products found that, in 2005, radio listenership was 95% in the areas they conducted a survey (Sife, 2010). A study by Bernard (2011) indicates that 71.4% of the population use radio as a source of information on agricultural information seeking. Furthermore, Siyao and Gowelle (2012) pointed out that radio ownership in Kilombero district was 78% while 53.9% listened to radio every day. Thus, radio is the most common mass medium through which farmers can get agricultural information.

Radio can provide information about agriculture quickly and accurately to a large number of farmers (Ozowa, 1997). Furthermore Majed (1990) reported that the radio stimulates learner participation, it provides a sense of immediacy, and communicates quickly and cheaply in various languages. This implies that the radio can be used to communicate

agricultural and environmental issues to farmers in any language which farmers can easily understand. Studies by Mbwana (1994) and Bernard (2011) found that the majority of small-scale farmers in Tanzania use the radio for most sources of agricultural information. Globally, people use radio primarily as a source of news and music. Radio is listened to almost equally for the news and entertainment. On average, 57% of listeners across nine Sub-Saharan countries listened to the radio daily for news, 58% for music, 29% for religion, 18% for call-ins, and 13% for information and nine for talk show (Balancing Act, 2008).

2.3 Access and Usage of Television in Rural Areas

Television is less widely available in Africa, especially in rural areas, although its access and availability are growing rapidly. It is well known that television gives quick, reliable and attractive information regarding various activities relating to agriculture (Acunzo, 2009) because both the listening and seeing senses are involved in television. Television provides information in a more convincing manner so that most of the observed information is adopted. A study by Acunzo (2009) in Bangladesh found that the highest percent of agricultural information was obtained from television. A survey carried out by BBC World Service Trust (2006) in 17 African countries depicts that more than 50% of population watched television at least once a week. According to InterMedia (2011) radio access is fairly widespread throughout the country, making it the most consistently available medium for Tanzanians across income levels and locations. 27% have household access, 41% watch weekly (InterMedia, 2011). However, rural viewers are more likely to watch TV outside their home than urban viewers because of the low level of income (African Media Barometer, 2010).

2.4 Sources of Information by the Rural Farmers

Sources of information are the tools that can meet the information needs of different users. According to Riesenberg and Gor (1999), the choice of any information source depends on a number of factors including age, sex, farm size and level of education and income. In order for information to enhance and contribute positively to agriculture and rural development at large (Coetzee, 2000; Meitei and Devi, 2009), at the first place it should be solid on three pillars which are accuracy, timeliness, and relevance. Accuracy implies that information is free from bias. Timeliness means that recipients can get the information when they need it and relevance implies whether the piece of information specifically answers users' questions of what, why, when, who and how? (Ofuoko *et al.*, 2008). According to Kalusopa (2005) and Ofuoko *et al.* (2008) if farmers get information, utilize, deliver and disseminate those information freely and which base on the said qualities, the informed decisions can be made, which in turn will lead to better methods of farming, thus increasing food and cash crop production and self-sufficiency at the small-scale level.

Private and government institutions and agencies have developed a variety of services that facilitate the dissemination of agricultural information. Momudu (2002) found that the sources of information for rural communities in Nigeria were the government, radio, television, newspapers, extension workers and agents of all types. Further studies by Boz and Ozcatalbas (2010) found that family members, neighbouring farmers, extension services, input providers and mass media are the key sources of information for Turkish farmers. A study by Siyao and Gowelle (2012) found that population preferred neighbours, relatives, friends and fellow farmers as the most reliable informal means of getting agricultural information. However, listening to radio and watching TV were the most formal channels of receiving agricultural information (Siyao and Gowelle, 2012).

2.5 Adaptation and Mitigation Practices

Climate change requires the development of natural resource management strategies that ensure sustainable use of soils and water, halt biodiversity decline and deal with emerging issues such as growing demand for renewable energy. Societies must therefore respond by both minimizing further warming (by reducing the concentration of greenhouse gases in the atmosphere) and finding ways to adapt to their impacts that warming will bring, such as shifting precipitation regimes, more frequent and extreme weather events, and sea-level rise. According to URT (1997) and URT (2007) adaptation strategies in crop production include the use of early maturing rice and maize varieties, use of drought tolerant varieties, changing crop planting dates, water storage methods and rainwater harvesting.

Further, Adosi (2007) declared the widely implemented adaptive strategies in dry land of Tanzania including change of crop variety (drought resistant), irrigation, institute proper land use, shifting to higher ground to avoid floods, abandoning most hit areas, rainwater harvesting, planting trees, reducing animal numbers, setting aside grazing areas, and introducing zero grazing reversed by afforestation on the damaged watershed.

Similarly, mitigation practices can be through avoiding water-logging by using improved on-farm water management, including placement of drainage structures and minimizing construction noise and other disturbance during nesting season (USAID, 2008). The National Environmental Policy of 1997 provides a framework for making fundamental changes that are needed to bring about environmental considerations into the mainstream of decision-making in Tanzania (URT, 1997). One of the overall objectives of the National Environmental Policy is to raise public awareness and participation through afforestation/reforestation programmes, crop rotation, use of organic fertilizers, farm border building, and proper use of fertilizers, intercropping fallowing and contours as a

view to enhancing conservation and sustainable use of the land resources by farmers as environment mitigation. Mustalahti *et al.* (2002) asserted that despite the environmental projects introduced in Tanzania, mitigation to climate variability and change at the local level achieved through improved forest governance and sustainable management of forest resources.

According to Ngaira and Musiambo (2012), people adopt to climate change mitigation strategies through planting trees, green house farming and waste management. However, Nema (2005) and IPCC (2014) argued that fighting for climate variability and change impacts in African countries, including Tanzania, faces challenges because of financial problems.

2.6 Barriers to Access and Usage of Broadcast Media

There are many interrelated and complex factors that hinder quick and efficient mainstreaming of the climate change adaptation and mitigation strategies in development practice. Generally, these factors can be considered in terms of lack of awareness of climate change within the development community; limitation on the resources for implementation of climate change adaptation and mitigation activities; barriers within governments and donor agencies.

With respect to broadcast media, despite the benefits offered by them, many factor have been cited as constraining their effective access and usage by usage for adaptation and mitigation to climate variability and change by individuals, households and community. These factors include education, low income, unreliability of electricity, and poor broadcast network coverage. Momudu (2002) found that the major barriers to obtaining information in general is illiteracy, making it difficult for the farmers to understand the

information because it is often in English. Mbwana (1994) pointed out that broadcast media are too expensive that farmers cannot afford to buy, and lead to inability to access agricultural information. Furthermore, a study by Ogboma (2010) pointed out that the factors hindering the flow of agricultural information include the low literacy level of farmers and unreliable supply of electricity.

2.7 Broadcast Media, Adaptation and Mitigation to Climate Variability and Change Impacts

Radio and television are known for their ability to influence, inform and persuade large audiences to think or do something. Beyond providing entertainment, radio and television increase both availability of information on environmental issues and exposure of people to other ways of life. According to Sife (2010), television and radio provide access to educational and other information by which people can improve their own personal circumstances. Thus, in the changing climatic scenario, communities need information, awareness and proper training to adapt and mitigate disasters. Similarly, a study of United Nations (2012) argued that the introduction of broadcasting brought about meaningful life whereby stories about climate and environmental change appear in documentaries, interactive talk shows, drama and music helping communities to learn more about these impacts and share their experiences of responding to them.

Further, a study by Aligaesha (2006) found out that broadcasting media have managed to make field visits to certain agricultural activities and provide platforms for communities at large to air their views, share information, discuses and debate the way forward to conserving their environment. Similar findings were found by Bernad (2011) which revealed that all small-scale farmers were of the opinion that broadcast media play a major role in improving their decision making, including how to apply fertilizer, as well as how

and when to plant. Therefore, broadcasting media is expected to change the behaviour of people in the area by participating in environmental sustainability.

2.8 Research Gap

Climate change affects smallholder farmers because they are closely related; the type of farming and the output therefore is directly depending on the prevailing climate. Because of the large dependence on primary agriculture, natural weather patterns and basic means of production, the economic performance and livelihoods in rural areas are highly unstable. In order for smallholder farmers to successfully adapt to climate variability/change and mitigate it, they need information and knowledge about the various aspects of climate variability. Ngigi (2009) noted that farmers' capacity to adapt and mitigate climate variability and change impacts can be strengthened by awareness creation, educating farmers with tested and proven methods, and dissemination of climate variability information. There is evidence that if small holder farmers have access to information, it will enhance their awareness on adaptation and mitigation capacity. Melville (2010) noted that broadcast media are important in environmental sustainability by enabling new practices and processes in support of belief formation, action formation, and outcome assessment. Radio and television can play an important role as a medium of information and communication in adaptation and mitigation strategies on climate variability and change impacts.

However, research on communicating climate change has been recognized since the 1980s as one of the key areas of tackling the growing threats of global impacts on anthropogenic climate change (Moser, 2010). Thioune (2003) noted that broadcasting are known to transform communities; however the details of these transformations, the degree and pace of such changes are yet to be fully grasped. Ospina and Heeks (2010) noted that

experiences from vulnerable communities in Asia, Africa, Latin America and the Caribbean point to the use of broadcasting media applications as part of climate variability and change responses, however, this constitutes a very new field of enquiry where much remains to be explored. Therefore, this study seeks to contribute some answers to some of the concerns that have been raised. It has explored how broadcasting media as sources of information contributes on adaptation and mitigation to climate variability and change impacts amongst small holder farmers in Isimani Division since there is no research done under this field in the study area.

2.9 Theoretical Framework

This study applies a "Communication for Development" (ComDev) approach for broadcasting media applications (FAO, 2010). ComDev is a people-centered communication approach integrating participatory processes and social media, ranging from rural radio to Information and Communication Technology (ICTs). ComDev approaches focus on engaging multiple stakeholders and facilitating dialogue in favour of progress and increased well-being. Ideally, the process of engagement would converge with the opportunities offered by new information.

Thus, ComDev has to help farmers realize climate variability and change impact in agriculture and figure out how to change their living through public awareness as the only first step. ComDev methods are used by the project to help achieve successful local adaptation and mitigation to climate variability and change impacts. In order to identify the most appropriate livelihood options in different agro - ecological contexts, adaptation and mitigation practices must engage and fully involve local communities in the decision making and implementation process. This is achieved through participatory

communication and dialogue using a range of methods such as radio and television (Sala, 2010).

Further, a study by FAO (2010) indicate four main elements of the ComDev approach for ICT applications namely as:

- **Networking:** Promote local information network, link rural knowledge and information systems
- **Capacity building:** Empower local people to take control of their mitigation processes
- **'Just in time' Critical decision making:** Channel information to the right people at the same time
- **Implementation and management:** Ensure information flows among concerned groups

2.2 Conceptual Framework

The study looked into ways of adapting and mitigating climate variability and change impacts through the use of television and radio. This study applied the conceptual framework from ComDev approach and it has been modified so as to make it work and fit for this study. According to the ComDev, access to and usage of radio and television enhances capacity building and networking which helps to identify various adaptations to and mitigation practices to climate variability and change impacts among smallholder farmers through linking rural knowledge and information systems to promote local information networking and empower local people to take control of their adaptation and mitigations processes (Fig. 1).

From Figure 1, farmers' access and usage of broadcast media raise capacity building and networking, resulting into their awareness on environmental related programmes for adaptation and mitigation practices to climate variability and change. The positive impacts and the better adaptation options lead to sustainable livelihoods and increase vegetation and forests. This in turn will decrease the intensity of agents of climate change in the atmosphere. In the long run, the global temperature will decrease. The climate will therefore stabilize and variations in climate will be arrested hence mitigating the impacts of climate change.

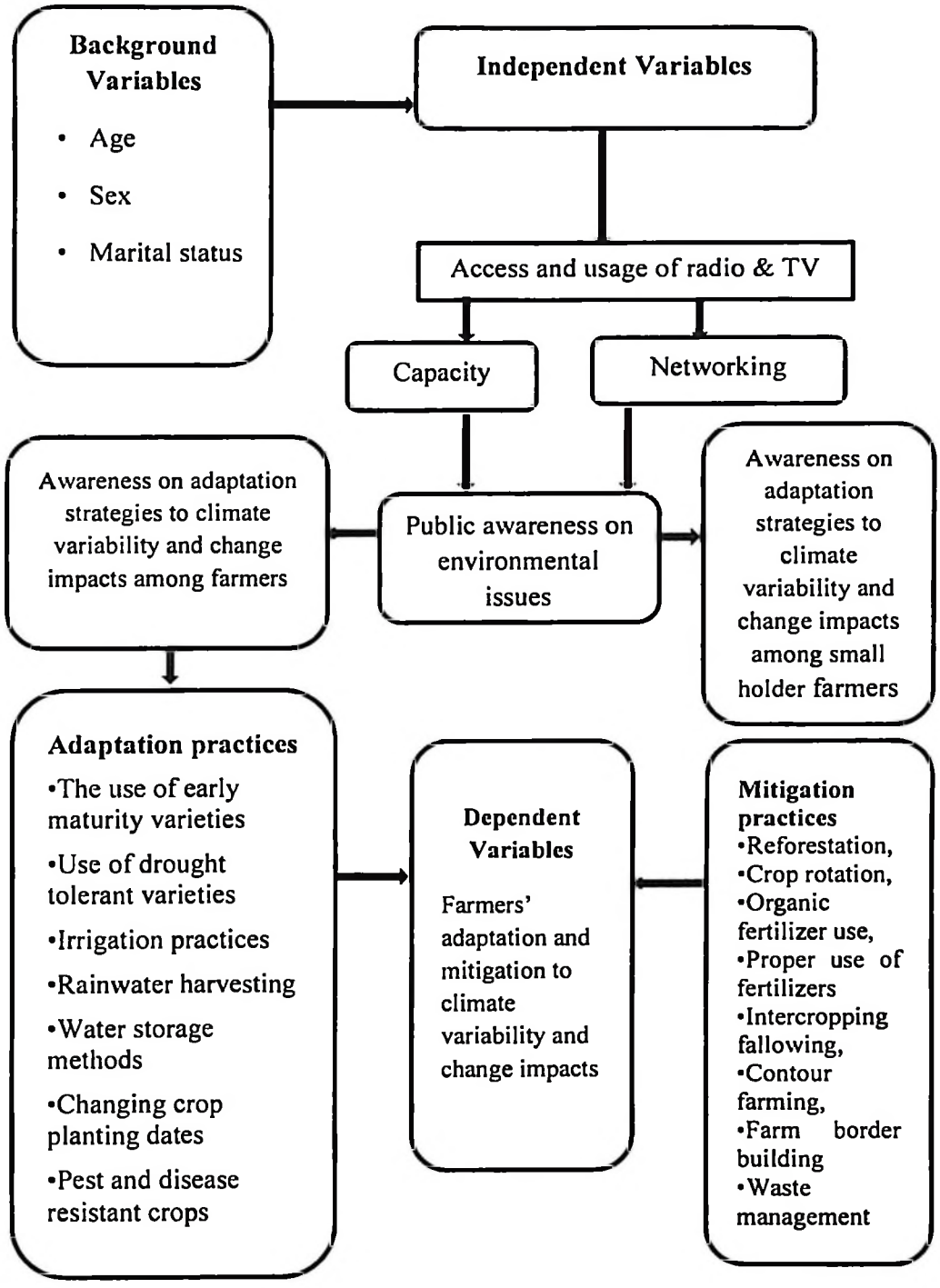

Figure 1: Conceptual Framework showing relationship of broadcast media and their effects on adaptation and mitigation to climate variability and change impacts

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

This study was conducted in Isimani Division, one of the six divisions in Iringa rural district. Other divisions in the district are Kalenga, Mlolo, Kiponzeo, Idodi and Pawaga. Geographically, being part of the Southern Highlands zone, the district is located between latitudes 7°00′ and 9°30′ South of the Equator, and 35°00′ to 37°00′ longitudes East of the Greenwich. It is bordered by Mpwapwa District to the North, Kilolo District to the East, Mufindi District to the North, Chunya District to the West and Manyoni District to the Northwest. The altitude of the division ranges between 900 and 1600 meteres above the sea level (URT, 2011). The relative location of the division in Iringa rural district is shown in Fig. 2.

According to URT (2013) the division's population is 61, 575 with 35, 715 women and 25, 860 men. Administratively, Isimani division has 33 villages with a total of 6 wards namely Migori, Kihologota, Nyang'oro, Izazi, Nduli and Malengamakali. Ethnically, the division is dominated by Wahehe, followed by Wabena while minorities include Wakinga, Wamasai, Wasukuma and Wabarbaig. Generally, the main activities of the communities are crop farming (maize, cassava, beans, millet, sorghum, sweet potatoes and ground nuts) and livestock keeping such as cattle, goats, sheep, pigs and chickens. Communities are also engaged in fishing and petty trade.

Isimani Division was chosen as a study area because it is one of the divisions severely affected by drought due to environmental degradation. According to Awadh and Starkey (2007), Isimani is the driest area in the North of Iringa Region whereby the average rainfall in the area is 500 mm per annual with a pattern of high annual variance.

Conversely, in other areas of Iringa Region, rainfall is as high as 2 000 mm (Awadh and Starkey, 2007).

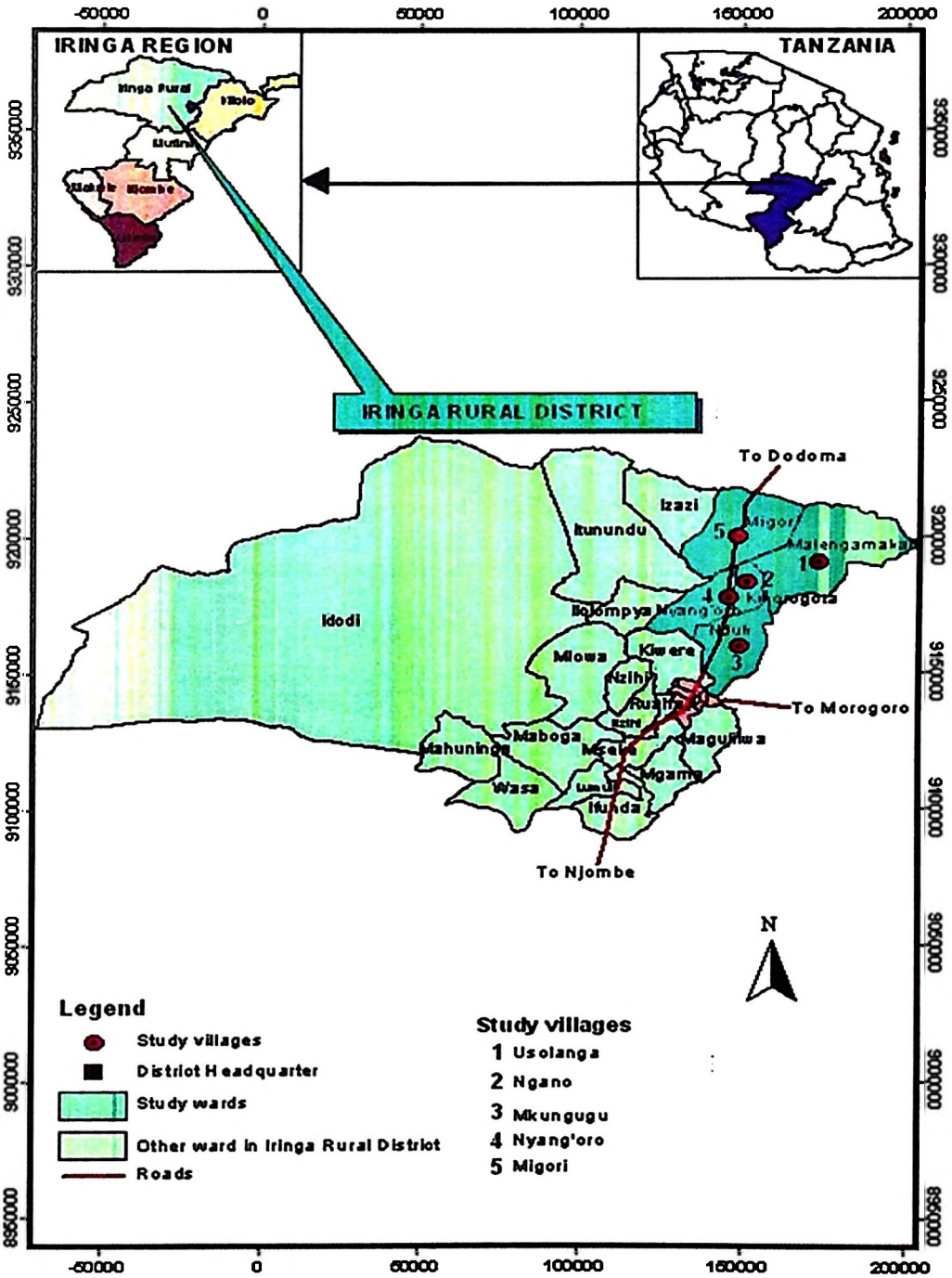

Figure 2: Map of Iringa Rural District in Iringa Region Tanzania showing the study

3.2 Research Design

A cross-sectional research design was used in this study in which data were collected at one point in time. According to Saunders *et al.* (2000), cross sectional design has many advantages because it collects data from a large number of subjects; it reduces cost and saves time. Both qualitative and quantitative research approaches were used. The rationale behind using qualitative methods, in addition to quantitative methods, was to supplement or increase understanding about dynamics, opinions and perceptions of people in the study area about the role of Radio and Television on their adaptation and mitigation to climate variability and change impacts. As observed by Tagarirofa and Chazovachii (2010), this complementary usage of the methods helps in the acquisition of comprehensive data about the variables under investigation. This study therefore, adopted a mixed methods approach whereby the quantitative part was conducted using questionnaire survey strategy and the qualitative part Particpatory Reserch Appraisal (PRA) tools such as in-depth interviews and focus discussion (FGDs).

3.3 Study Population and Sampling Procedures

Sampling procedures in this study involved multi-stage sampling technique with four stages. In the first stage, Isimani Division was selected purposely from the list of the nine divisions in Iringa Rural District based on the fact that the division is relatively most affected by climate variability and change. In the second stage, five wards in Isimani were selected purposely out of six wards because all five wards were involved in crop production by small-holder farmers with the exceptional of one ward (Izazi) where people were pastoralists (Maasai). In the third stage, one driest village in each ward was purposely selected to form a total of five villages. The last stage was the selection of

households. The sampling units for the questionnaire-based survey were those households that had at least one set of TV or radio, and the respondents were the household heads.

Although many definitions of household head imitate the stereotype of the male partner of the couple, this study adopted a Bonmeke and Ajay (2007) gender unbiased definition which considers a household head as either a male or female adult person who usually lives in the household and is recognized by other household members as the household head. In order to ensure random selection of households during data collection, being familiar with their communities, the acknowledged households in the respective villages were identified by a village leader whereby those households were given numbers. These numbers were written on pieces of paper, which were then mixed in a box. The paper pieces were randomly picked until the preferred sample size was attained. If a paper piece already picked was re-picked, it was ignored and returned into the box. In cases where the heads of household could not be found easily, other households were identified to fill the gaps.

A total of 120 household heads were chosen to form the study sample. According to Bailey (1994), a sample or sub sample should have at least 30 cases and in most cases, 100 cases are taken. Therefore, a sample of 120 households is even higher than the minimum of 100 cases recommended by Bailey (1994). In each village, 24 heads of household were selected randomly to form a study sample. Moreover, focus group discussions and key informant interviews were held in order to capture additional information to complement the questionnaire. Participants of FGDs were purposively recruited among those who participated in the process of questionnaire-based survey. This was necessary in order to ease the convergence of data by avoiding characteristics of different individuals.

To get a representative composition of the groups, participants were selected based on their socio-demographic characteristics such as age, sex, education, and experiences with the use of broadcast media. Hence, one FGD was planned for each village. Further, key informants were purposively selected on the basis of them being active members of the community; having adequate information about the topic; and possessing a television or radio set. In order to get in-depth information, 10 informants were interviewed (2 agricultural extension officers, 5 village leaders and 3 broadcast personnel) whereby two to three key informant interviews were held for each village.

3.4 Data Collection Methods and Tools

Both primary and secondary data were collected. Primary sources formed a major base of the data while secondary data were collected to supplement primary data. Therefore, in the course of primary data collection various tools were employed. These included administered questionnaires with open and close ended questions using face-to-face interviews (Appendix 1) to collect quantitative data, in which questionnaire copies were administered to respondents by the researcher and research assistants. The major advantage of administering questionnaires is that they allow the researcher to probe and clarify issues on the spot (Walliman, 2006). Two methods were used to supplement information from questionnaires. Firstly, a checklist was administered to key informant interviewees (in-depth interview) with agricultural extension officers, Village readers and broadcasting personnel. A total of 10 informants were interviewed, which sought to clarify issues which were not captured in the survey (see Appendix 2). Lastly, focus group discussions (Appendix 3) were also employed. These aimed at capturing opinions of people in a manner that allowed on site clarifications and debate. Such debates revealed other information, which the respondents would not have divulged, in a normal interview.

According to Neuman (2003), such interviews help in understanding the perspectives of the respondents about the causes and reasons for the occurrence of particular phenomena by allowing the researcher to interact with people involved in a study area, record what they say namely, their words, gestures and tone and observe specific behaviours within the context in which they appear and which are relevant to the aspects of the study. Therefore, in this case one FGD was conducted in each village selected to make a total of 5 FGDs.

Figure 3: Focus Group Discussion at Migori village. Photo by Martina Kapinga

Secondary data such as climatic elements fluctuation and extreme events in Isimani Division, compared with adaptation and mitigation strategies in Tanzania, and the access and usage of broadcast media in rural Tanzania were obtained from the District

3.5 Data Processing and Analysis

Data collected from farmers (heads of household) were first coded and then entered in the Predictive Analytics Software (PAS). On the other hand, information collected from key informants and FGDs by the tape recorder were summarized in different forms such as percentages, tables and charts. These kinds of information were used to complement information from the questionnaire. Both Qualitative and Quantitative data were analyzed using PAS. For quantitative data, inferential statistics (Binary logistic regression) was used to analyze objective 3. However, for qualitative data, descriptive statistics such as mean and percentages were used for objective 1, 2 and 4.

3.5.1 The binary logistic regression model

The binary logistic model is based on the cumulative logistic distribution function expressed by Gujarat (2004).

$$\text{Log}\ (p/1\text{-}p) = \beta_o+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\ldots\beta_nX_n + e$$

Whereby;

P=Probability that farmers would have adapted and mitigate

1- P=Probability that farmers would not have adapted and mitigate

βo= Constant term

X_1=Age measured by years

X_2 = Education measured by years of schooling

X_3 = Sex = 1 if household member is a male

0 = if household member is a female

X_4 = Marital status = 1 if, household member is a married

0 = if, household member is not married

X_5 = Size of the farm measured in acres

X_6 = Distance from the market place to home measured in Kilometers

X_7 = Agricultural training measured by number of frequencies

X_8 = Extension service measured by number of frequencies on receiving services per year

X_9 = Access to credits measured in TZS

X_{11} = Access to remittance measured in TZS

X_{12} = Numbers of non-farm activities done

X_{13} = 1 if a farmer is uses any broadcast media 0 = if otherwise

e = random error term

3.6 Reliability and Validity of the Measurement

Any measurement must meet the tests of validity and reliability. In fact, these are the two major considerations one should use in evaluating a measurement tool. Validity refers to the extent to which a test actually what it is supposed to measures while reliability has to do with the accuracy and precision of a measurement procedure (Kothari, 2004). A reliable measuring instrument does contribute to validity, but a reliable instrument need not be a valid one.

3.7 Pre-testing of Data Collection Instruments

The questionnaire was pre-tested on small-scale farmers before it was used for actual data collection. To ensure that there was no misinterpretation of the questions, a pre-test of was conducted on 12 small–scale farmers in Kilolo District, which was not part of the study area. Therefore, necessary changes were made after pre-testing.

3.7 Ethical Consideration

The research was approved by the Institute of Development Studies of Sokoine University of Agriculture. Permission to conduct the study in the respective study site, Isimani Division, was granted by the respective district authority. On the bases of informed consent, the purpose of this study was explained to the respondents throughout the data collection exercise. In administering the questionnaire, respondents were not asked to write their names on the questionnaire copies. Specific permission was sought before taking pictures and voice recording of focus group discussion and key informant interviewees. In general, both written and oral consent was obtained before and during data collection. This process was in line with Bhattacherjee (2012) who argues that informant consent entails making the participants aware of the study purpose, clearly describes their right to not participate and right to withdraw, before their responses in a study can be recorded.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Demographic and Socio-economic Characteristics

Demographic and socio-economic characteristics of respondents include age, sex, marital status, educational level, household size, farm size, power access and distance to market presented in Table 1. Sixty five (65%) of the respondents were male while the rest were females. This is usual since male-headed households are common among African societies, most of which are patrilineal. The age bracket of 36 to 50 years constituted the majority of the respondents in the study area and only 41.7% of the respondents were married. These results are somewhat similar to the figures of Sife (2010) which indicate that 86.8% of household heads in rural areas in 2010 were between 20 and 49 years. These results suggest that most respondents were in the active age group that was capable of undertaking a range of adaptation to and mitigate climate variability and change impacts.

Literacy rate can help Isimani dwellers to understand environmental issues that are aired through radio and television channels. The study findings show that 74.2% of the respondents had completed primary school education (Table 1). According to URT (1995), primary education is the basement of literacy level before and after the independency. Therefore, using adaptation and mitigation practices requires only functional literacy, it can be concluded that majority of those who access and using broadcast media had the basic level of education for them to understand broadcast programmes on adapting to and mitigate climate variability and change.

Most households (58.3%) of the households were characterized by 4 to 7 members. DFID (1997) shows that at the household level human capital is a factor of the amount and

quality of labour available which varies according to household size and skilled levels. Instead of total household size, Kalineza *et al.* (1999) emphasizes on a number of adults in the households who are able to work as a major factor influencing adaptation and mitigation.

It was also found that 62.5 of the household owned 1 to 5 acres of farm size. The size is reasonable to allow for households adaptation to and mitigation of climate change. This is based on the fact that several studies have found that depending on the accessibility and situational setting, farm size can have an effect on the rate of adaptation and mitigation. For example, according to FAO and SIDA (2013), households having access to land on average from 3 acres and above influence members of such households on adapting to and mitigate climate change for better agricultural production.

Table 1: Characteristics of respondents at Isimani Division

Variable		Frequency	Percent
Age category (in years)	18-28	29	24.2
	29-35	29	24.2
	36-50	33	27.5
	51-60	21	17.5
	60+	8	6.7
Sex	Male	78	65.0
	female	42	35.0
Educational level	primary	89	74.2
	secondary	17	14.2
	certificate, diploma	3	2.5
	Adult education	1	0.8
	None(illiterate)	10	8.3
Marital status	Single	39	32.5
	marriage	50	41.7
	divorced	15	12.5
	widow	16	13.3
Farm size(in acre)	less than 1 acre	3	2.5
	1 to 5 acre	75	62.5
	6 to 20 acre	42	35.0
Members in household	1-3	35	29.2
	4-7	70	58.3
	8 and above	15	12.5
Market distance(in km)	0-6	115	95.8
	7-12	4	3.3
	25-30	1	0.8
Power access	Yes	51	42.5
	No	69	57.5

It was observed that access to electricity is a challenge in the study area as for most rural areas in Tanzania. The results showed that 43% of the surveyed households were connected to the national grid. The results further showed that nearly all respondents had access to solar energy systems which could meet small energy demands such as lighting and changing some electrical devices like cell phones. Assessment of distance covered to access market places show that the majority (80%) of the respondents walked/ traveled between 2 to 3 km to reach a market place. Thus, accessibility to market place from the farm do predict the response on adaptation and mitigation by the smallholder farmers.

4.2 Extension Services and Environmental Training

The study findings show that 61.7% of the respondents claimed that there were no extension services. When asked whether they had attended environmental training, slightly more than half acknowledged to have received some kind of such training. This finding implies that accessibility to extension service is not sufficient because of presence of too few extension officers in the district. According to Ngigi (2009), public extension services have been declining in Africa due to inadequate financial and human resources, and poor infrastructure. The study done by Malima *et al.* (2014) in rural Tanzania found similar results indicating that Ministry-based extension has been unable to reach a majority of farmers for economic, socio-psychological, and technical reasons. The reason why extension services declined in rural area is probably due to the fact that government was not allocating enough budget in extension man power and activities.

4.3 Financial Support

The study findings show that 73.3% of the respondents had never accessed loans from such institutions. The findings also show that, unlike others, the majority (86%) of the respondents had never received remittance from their relatives. The study found that the majority of respondents had minimum access to services such as village community banks (VICOBA) or savings and credit cooperative organizations (SACCOS) due to the fact that financial formal institutions are very few in Isimani. These results were similar to results obtained in the study done by Bee (2007) which showed that there is an increase in financial sector service providers and products, rural households' access to financial services is very few in Tanzania. Therefore, the implication of farmers' poor access to financial loans in the study area is that farmers are deprived of the benefits of using funds to increase production. As a result they are more vulnerable to shocks caused by climate variability and change. Sufficient and affordable credit loan facilities are essential for agricultural development. Farmers' access to financial support has an impact on their coping strategies since loans or any financial support can be used to invest in agricultural production. The fund could be used for buying drought resistant and early maturing seeds to cope with the existing climate change.

4.4 Access and Usage Patterns of Broadcasting Media

The first objective established access and usage patterns to broadcasting media in Isimani Division. This question was achieved by identifying ownership of radio and television, media preference, preferred time for listening/watching radio and television, frequency of listening to radio, and watching television and the locations where they preferred for listening/watching radio and television.

The study findings in Table 2, indicate that the majority (93.3%) of the respondents owned radio sets while only 28.3% owned Television sets. The study by Intermedia (2011) indicate that 85% of Tanzanians access to radio sets, while only 27% owning TV sets. These findings suggest that radio was a more efficient medium in serving Isimani masses because it is a bit affordable as compared to television. The majority owned radio sets because they are cheap to buy, available locally even sold by petty traders, and in some retail shops in the respective villages, Batteries are also easily available and live long.

Table 2: Access to Radio and Television

Variable	Category	Frequency	Percent
Radio set	none	8	6.7
	one	90	75.0
	two	18	15.0
	three	4	3.3
Television set	none	86	71.7
	one	34	28.3

The survey on the available networks availability of radio stations showed that several radios frequencies are captured in the area. These included what would call local stations such as Furaha FM; Ebony FM; Country FM and Nuru FM which are located in Iringa Region. Other stations considered 'national' were TBC FM and RFA. However, among all radio stations, Ebony radio was the most listened to (21%) followed by TBC FM (16%) and RFA and Furaha each (8%). InterMedia (2011) declared that 64% of the audiences in Iringa prefer to listen Ebony radio, followed by Radio Free (55%) and Country FM (40%). With regard to television, 31.5% of the respondents preferred watching TBC 1 followed by Star TV (16.3%) and ITV (10.9%). Seventy eight percent of the respondents showed that they were listening to radio early in the morning and 77.5% watching Television at

night every day. It was also found that about (56.7%) preferred listening to radio at home. However, due to sharing traditional and insufficient fund on buying TV sets by the community in the study area, 34.4% of the respondents watched Television at neighbours' homes. This can be concluded that since majority of the Isimani dwellers prefer to watch TV at neighbours, hence it is appropriate for them on sharing information about adapting to and mitigating climate risks.

The majority of the respondents preferred to listen and watch local and international news. The study findings show that over 70% of the respondents preferred to listen to local and international news. Likewise, 86.0% of the respondents preferred to watch local, national and International news. These findings is in line with the study by InterMedia (2011) which indicate that 83% of Tanzanians prefer to watch and listen news programme. In this case, environmental institutions and NGOs may sponsor short messages such as jingles which can be aired at the very beginning, during and at the end of some radio programmes to capture a big number of audience. For example, a short message of a few seconds addressing environmental issues can be aired before news bulletins. Therefore, it is obvious that a number of people who are ready to listen to the forthcoming news bulletin programme will get an opportunity to listen, watch and discuss those short messages.

Figure 4: A satellite dish at one of households in Mkungugu village. Photo taken by Martina Kapinga

4.5 Mitigation and Adaptation Practices

4.5.1 Adaptation practices

Perception of respondents on variation and changes in climate variables (temperature and rainfall), 95% of the respondents reported that there was decrease in rainfall compared to ten years previously, and 91.6% reported that temperatures were higher most of the time in a year. Kijazi *et al.* (2012) claimed that there is unreliable and unpredictable rainfall in Isimani due to environmental degradation.

When asked to provide three key adaptation practices they normally practised, 30.7% of them said that they preferred to change crop planting dates to cope with unpredictable rainfall (Table 3). Also, 28.3% of respondents preferred to use drought tolerant varieties

such as sorghum, millet and sunflower, and 22.5% preferred to use early maturing varieties, mainly maize and beans. The study done by Lema and Majule (2009) found that, to avoid crop production risks due to rainfall variability and drought, staggered plating is very common to most farmers in Manyoni District whereby crops are planted few days before rain onset. Therefore, adaptation practices in rural Tanzania depends on the nature of the environment or the impacts of the climate variability and change in a given area.

Table 3: Adaptation Frequencies

Adaptation practices	Responses	
	n	Percent
Early maturing varieties	66	22.5
Drought tolerant varieties	83	28.3
Pest and disease resistant crops	5	1.7
Early maturing seed varieties	10	3.4
Water harvesting using tied ridges and mulching farms	32	10.9
Water storage methods	7	2.4
Changing crop planting dates	90	30.7

4.5.2 Mitigation practices

Mitigation practices used included afforestation/reforestation programmes, use of organic fertilizer, farm border building, proper use of fertilizers, intercropping, and contours as strategies for enhancing conservation and sustainable use of the land resources. However, some practices were less applied while others were predominantly practised by most farmers in the area (Table 4). The study findings show that over three-quarters (76.7%) of the respondents preferred intercropping to reduce soil erosion. Nearly three-quarters (74.2%) of the respondents preferred to use organic fertilizers. According to USAID (2008), combining different friendly crop varieties in a farm prevents soil erosion and

preserves moisture in particular farms. Therefore, table 4 indicates that crop rotation, intercropping, reforestation, use of organic fertilizers and crop residual management were the key mitigation strategies practised by over 50% of the respondents.

Table 4: Mitigations frequencies

Mitigation practices	Frequency	Percentage
Crop rotation	60	50.0
Intercropping	92	76.7
Reforestation	70	58.3
Contour farming	20	16.7
Farm bordering	48	40.0
Use of organic fertilizers	89	74.2
Use of inorganic fertilizers	43	35.8
Crop residual management	70	58.3

4.6 Effects of Broadcasting Media on Adaptation and Mitigations

The research question was analysed using a binary logistic model through two steps. In the first step, the independent variables were not incorporated in the model while in the second step they were built-in. The left hand side variable (Pi) in the model indicated the probability that the farmers would adapt and mitigate (1) and zero (0) otherwise (i.e. [1-Pi] to indicate the probability that the farmers would not adapt and mitigate climate change and variability impacts (Table 5). In this first step, a classification table had results with only the constant incorporated before any independent variables were entered in the model. This helped to determine the suitability of the model. The results in Table 5 suggest that if we knew nothing about our variables and guessed that farmers would adapt and mitigate, we would be correct by 65.8% of the time.

Table 5: Classification for Logit without Independent Variables

Step 0	Observed		Predicted		
			Dependent variable (0= Not adapted, 1= Adapted)		% Correct
			Not adapted	Adapted	
	Dependent variable (0= Not adapted, 1= Adapted)	Not adapted	0	79	100.0
		Adapted	0	41	0.0
	Overall percentage				**65.8**

A constant is included in the model

Table 6 presents the variables not in the equation and whether each independent variable improved the model. From the table, some variables can contribute and improve the model because they are significant and some are not because they are insignificant.

By including the independent variables, it was possible to predict with the outcome of the effects of predictors by 80%. This shows how the classification error had changed from the original 65.8%. The model appeared good, therefore there was a need to evaluate the model fitness and significance of the variables. The goodness of fit statistics shown in Table 6 indicates that the proportion of cases classification was checked and 83.5% of the cases were correctly classified for the not adopted group, and 73.2% for adopted group. Generally, testing of the model fitness was 80% correct when compared to 65.8% before fitting.

Table 6: Classification of variables not in the equation

Step 1	Observed		Predicted		
			Dependent variable (0= Not adapted, 1= Adapted)		% Correct
			Not adapted	Adapted	
	Dependent variable (0= Not adapted, 1= Adapted)	Not adapted	66	13	83.5
		Adapted	11	30	73.2
	Overall Percentage				**80.0**

The Nagelkerke R Square shown in Table 7 was 0.544%, which means that the independent variables included in the model explained 54.4% of the chances of adaptation to climate variability and change. The Nagelkerke R Square is used to measure the correlation between all covariates as a group and the response variable. Garson (2008) highlightes that Nagelkerke R^2 is normally higher than Cox-Snell R^2 and is the most-reported of the pseudo R^2 estimates.

Table 7: Model summary

Step 1	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
	94.085	0. 394	0. 544

Table 8 indicates that five variables contributed significantly to the prediction of adaptation ($\leq$ 0.05). These were: Age (p = 0.010), farm size (p = 0. 045), Extension (0. 022), non-farm activities (animal keeping and entrepreneurship) for (p = 0.002), and access and usage of broadcasting media (0.046). The rest of the independent variables had

no significant impact, and the constant had negative impact on the chances of farmers' adapting whereas farm size had three times as chances of farmers' adapting to climate variability and change impacts. Therefore, broadcast media had positive effect on community adaptation and mitigation to climate change and variability.

Table 8 : Variables in the Equation

Independent variable	B	S.E	Wald	df	Sig.	Exp(B)
Age	-0.817	0.316	6.695	1	0.010	0.442
Sex	0.606	0.609	0.990	1	0.320	1.833
Education	0.214	0.211	1.030	1	0.310	1.238
Marital status	-0.376	0.336	1.250	1	0.264	0.687
Farm size	1.139	0.569	4.005	1	0.045	3.123
Members of the household	-0.024	0.136	0.030	1	0.862	0.977
Extension service	-1.217	0.530	5.269	1	0.022	0.296
Agricultural training	0.825	0.555	2.207	1	0.137	2.281
Distance from the market	-0.059	0.089	0.447	1	0.504	0.942
Credits from VICOBA/SACCOS	0.816	0.616	1.755	1	0.185	2.261
Access to remittance	1.383	0.861	2.581	1	0.108	3.988
Non-farm activities	-0.909	0.293	9.651	1	0.002	0.403
Access and usage of broadcasting media	1.228	0.336	4.375	1	0.046	3.223

4.7 Barriers to Access and Usage of Broadcasting Media for Adaptation and Mitigations on Climate Variability and Change Impacts

Respondents were asked to mention challenges they encountered in accessing and using broadcasting media for adaptation and mitigation to climate variability and change. Their responses are indicated in Fig. 5, showing that the main constraint faced to access and use of broadcasting media on adaptation and mitigation comes from low incomes. A substantial proportion (38.1%) of the respondents indicated that lack of income on buying broadcasting sets was one of the challenges in accessing and using broadcasting media for adaptation and mitigation in their area. According to InterMedia (2011) income levels play a substantial role in determining household access to broadcast devices. Thus, the respondents further pointed out that in the study area they did not have a common market for selling their agricultural materials. In an in-depth interview with one respondent from Mkungugu Village, the respondent commented emotionally as follows:

> *If our government extended market infrastructure to our area for agricultural production, we would be able to earn enough money to access broadcasting media especially TV sets and their digital themes. Generally, most of us cannot afford Television sets and the decoders.*

About a quarter (25.4%) of the respondents pointed out that there was language barrier whereby some of the broadcasting media stations used mixed language where some vocabularies were in English. Most of the people in the study area could not understand. Weak or unreliable network was among the three main constraints to accessing and using broadcasting media for adaptation and mitigation to climate variability and change impacts. Nineteen (19.0%) of the respondents pointed out that there was poor television and radio broadcasting reception. For example, during this study those with television sets in the study area were unable to receive television signals using simple antennae due to

lack of terrestrial connections. With regard to radio, it was pointed out that many radio stations had poor reception in many villages, especially in the evening. Generally, these results are in line with results obtained from the study by the African Media Barometer (2010) which found that majority of Tanzanians in rural areas face significant obstacles on their access to information due to location of residence, income level and gender inequality.

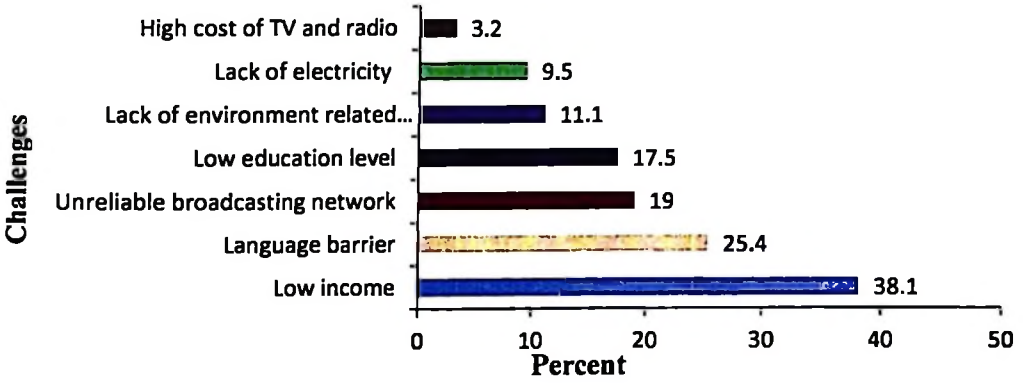

Figure 5: Responses on Barriers

Fig. 6 indicates that radio had the highest influence as a source of information while televisions had very little influence on the frequency of adaptation and mitigation since television set and its decoder was costly to them in the study area. Around 92.5% of radio listeners admitted that radio influenced their adaptation and mitigation to climate change impacts, followed by information from friends, relatives and fellow farmers for 87.5%, mobile phone (67.5%) and television (65.8%). Generally, these findings confirm the findings from earlier studies (Manda (2002); Sife (2010); Siyao and Gowelle (2012) and Mwalukasa (2013) that a wide range of agricultural information sources are available to farmers. Thus, this study is in line with ComDev approach since broadcasting media offer

a wide range of communication and knowledge sharing solution on community adaptation to and mitigation strategies in Isimani Division.

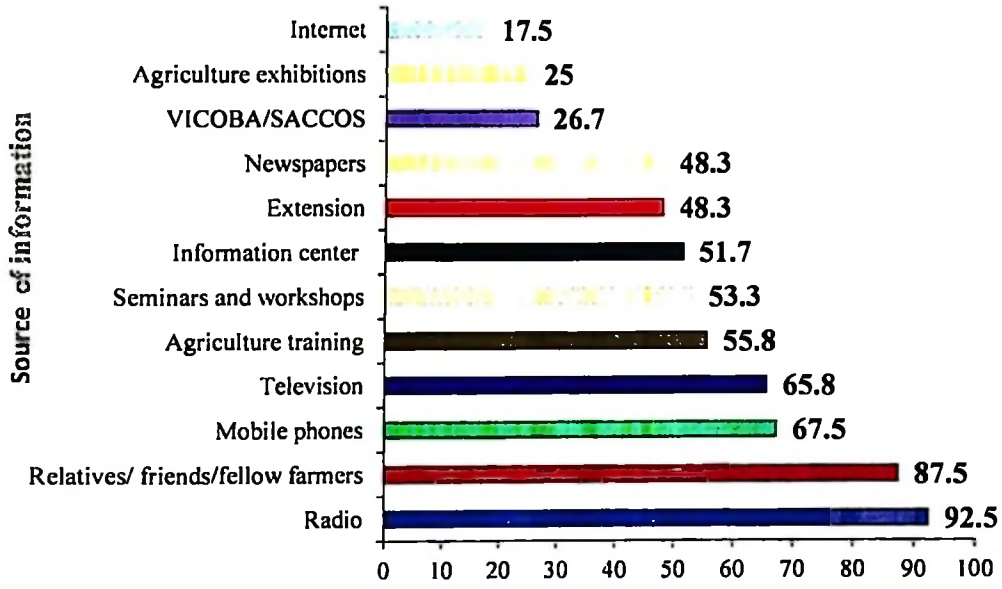

Figure 6: Sources of adaptation and mitigation information to climate variability and change impacts

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The study specifically aimed at identifying broadcasting media involved and issues covered in those media with regard to conservation of the environment through the use of good farming practices. The study also aimed to find out on how broadcasting media influenced farmers on different adaptation practices due to climate change impacts in the study area to improve their livelihoods. Based on the study findings, a number of conclusions are made.

First, the majority of the households had owned radio and only a few owned television sets. That is why they preferred listening to radio at home, and watching television at neighbours' homes. The findings show that the majority used radio and TV for local and international news followed by entertainments and agriculture programmes. From the findings, it is concluded that radio is the main medium that can be used to channel adaptation and mitigation messages.

Second, the majority of the respondents practised three key adaptation strategies: changing crop planting dates, use of drought tolerant varieties, and use of early maturing varieties mainly maize and beans. With regard to mitigation, most of the households preferred intercropping to reduce soil erosion and used organic fertilizers as well as crop residual management methods. These findings imply that if broadcast media increase on disseminating good farming methods, farmers would practice many adaptation and mitigation methods.

Third, binary logistic modal confirmed that access and usage of broadcasting media (TV and radio) have effect on farmers' adaptation and mitigation to climate variability and change. Conversely, other factors that have effect on farmer's adaption and mitigation included age, farm size, extension, and nonfarm activities (animal keeping and entrepreneurship). On the basis of these findings, it is concluded that, broadcasting media are the main media that can be used to disseminate adaptation and mitigation information.

Fourth, the study found that barriers to access and usage of broadcasting media for adaptation and mitigations on climate variability and change impacts included high low income, language barrier, unreliable network coverage, low education level, lack of environment related programmes, and lack of electricity. On the basis of this finding, it is concluded that if there were none of these barriers, many people would access and use broadcasting media easily, which in turn would attribute to adaptation and hence mitigating climate variability and change impacts.

5.2 Recommendations

In view of the discussions in Chapter Four and Conclusions, the study recommends the following:

i) The government should reduce taxes imposed upon equipment for broadcasting media

ii) Institutions and NGOs, should sponsor all advertisements/ announcements concerning environmental conservation to curb effects of climate variability and change.

iii) Media institutions should work closely with agriculture personnel in generating contents of programmes on adaptation and mitigation of climate variability and change.

iv) Government through Rural Electrification Agency (REA) should hasten the pace of electrifying rural areas so as to increase accessibility and usage of broadcast media on adapting to and mitigating climatic risks associated with climate variability and change.

5.2.3 Areas for Further Research

This study was conducted in a small area and involved only a smaller sample which might be partial to generalize the findings to the entire population in the country. Therefore, there is a need to conduct a similar study elsewhere on a larger scale to have a clear picture on how broadcasting media influence adaptation and mitigation strategies to climate variability and change in Tanzania.

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APPENDECES

Appendix 1: Questionnaire for heads of household

A: General Information

1. Date of interview: _____
2. Questionnaire No: _____
3. Village:_____
4. Ward: _____

B: Social Demographic Data

6. Age (*Tick or circle the appropriate age group*

1) 18 – 28 years 2) 29 – 35 years 3) 36 – 50 years 4) 51 – 60 5) 60+ years

7. Sex of respondent

1= [ ] Male

2 = [ ] Female

8. What is your level of education of the head of the household that you achieved? (Check the appropriate category)

1 = [ ] Primary education

2 = [ ] Secondary education

3 = [ ] Certificate, diploma,

4 = [ ] University education

4 = [ ] Adult education

5 = [ ] None (Illiterate)

9. What is your marital status?

1 = [ ] Single

2 = [ ] Marriage

3 = [ ] Divorced

4 = [ ] Widow

10. How many are you in your household? _____

11. Apart from farming, what other activities do you engage with?

_____

12. What is your farm size? Per acre (Tick appropriate box)

Less than one acre [ ] One to five acres [ ]

Six to 20 acres [ ] More than 20 acres [ ]

13. Do you receive extension service?

Yes [ ] No [ ]

If yes how many times in a year? _____

14. Have you ever attended training in agriculture and / or environmental protection?

Yes [ ] No [ ]

15. What is your home distance from the market?

_____ Km

16. Are you a member of VICOBA/SACCOS?

Yes [ ] No [ ]

17. Do you receive any to remittance?

Yes [ ] No [ ]

18. Does your house have access to electricity?

Yes [ ] No [ ]

If yes, mention _____

19. How many of the following broadcasting media receivers do you or your member of the household own? (Fill in the number of receivers)

1 = [.....] Radio

2 = [.....] Television

3 = [.....] Mobile phones

C: Access and use of Radio

20. What means do you use to receive information from broadcasting media?

1 = [ ] Radio set

2 = [ ] Mobile phone

3= [ ] Internet

3 = [ ] others (specify) _____

21. Which radio stations that you most frequently listen? Explain why?

No.	Tick	Radio stations	Reasons
1		TBC Radio	
2		RFA	
3		Country Radio	
4		Ebony Radio	
5		Radio Nuru	
6		Others (specify).....	

22: What are your favorite radio programmes? (Check all that apply)

1 = [ ] Entertainment programmes

2 = [ ] Agriculture related programmes

3 = [ ] Environmental related programmes

4 = [ ] Health related programmes

5 = [ ] Local and international news

6 = [ ] Programmes on topical discussions

7 = [ ] Others (specify) _____

23. At what time of the day do you prefer listening to a radio?(*Check all that apply*)

1 = [ ] Early morning

2 = [ ] Afternoon

3 = [ ] Evening

4 = [ ] Night

5 = [ ] Other times (specify) _____

24. Where do you listening to a radio? (Check *all that apply*)

1 = [ ] Home

2 = [ ] Neighbors home

3 = [ ] Relative's home

4 = [ ] Others (specify) _____

25. How many times do you listen to radio per week? _____

D: Access and Use of Television

26. What means do you use to watch Television?

1 = [ ] Television set

2 = [ ] Mobile phone

3 = [ ] Internet

5 = [ ] Others (specify) _____

27. Please indicate local TV channels that you most frequently watch. Explain why?

No.	Tick	Television channel	Reasons
1		ITV	
2		TBC	
3		Star TV	
4		Channel Ten	
5		Others (specify).....	

28: What are your favorite television programmes? (Check all that apply)

1 = [ ] Entertainment programmes

2 = [ ] Agriculture related programmes

3 = [ ] Environmental related programmes

4 = [ ] Health related programmes

5 = [ ] Local and international news

6 = [ ] Programmes on topical discussions

7 = [ ] Others (specify) _____

29. At what times of the day do you prefer watching TV programmes?(*Check all that apply*)

1 = [ ] Early morning

2 = [ ] Afternoon

3 = [ ] Evening

4 = [ ] Night

5 = [ ] Other times (specify) _____

30. At what location area do you watch TV programmes? (Check *all that apply*)

1 = [ ] Home

2 = [ ] Neighbors home

3 = [ ] Relative's home

4 = [ ] Others (specify) _____

31. How many times do you watch Television per week? _____

E: Adaptation and mitigation practices to climate variability and change impacts

32. What are the three principle mitigations to climate variability and change impacts do you practice? (*Check three main activities if any*)

1 = [ ] Crop rotation

2 = [ ] Intercropping fallowing

3 = [ ] Reforestation

4 = [ ] Contour farming

5 = [ ] Farm bordering

6 = [ ] Organic fertilizer

7 = [ ] Proper use of fertilizers

8 = [ ] Others (Specify) _____

33. What are the three principle adaptation strategies to climate variability and change impacts? (Check three main activities if any)

1 = [ ] Use of early maturing varieties (Specify) ----------

2 = [ ] Use of drought tolerant varieties in other crops (Specify) ----------

3 = [ ] Use of pest and disease resistant crops (Specify) ----------

4 = [ ] Water harvesting using tied ridges and mulching farms

5 = [ ] Water storage methods

6= [ ] Changing crop planting dates

7= [ ] Waste management

8= [ ] Others (specify) _____-

34. What are the sources of your information on adaptation and mitigation practices? (*Tick appropriate boxes*)

Sources of information	**Frequencies**	
	Yes	**No**
Radio		
Television		
Information Centre		
Seminars and Workshops		
Agricultural training		
Association meetings, SACCOS and VICOBA		
Newspapers		
Relatives, Friends, fellow farmers and Neighbours		
Agricultural Extension Officers		
Agricultural exhibitions		
Mobile Phones		
Others(specify)_____		

F: Effects of access and usage of broadcasting media on adaptation and mitigation to climate variability and change impacts

36. Indicate effects of accessibility and usage of radio and Television contribution to mitigation practices to climate variability and change impacts for you over the last two years? (*Tick appropriate boxes*)

Mitigation practices	**Do not agree**	**Slightly agree**	**agree**	**Strongly agree**
Crop rotation				
Intercropping fallowing				
Reforestation				
Contour farming				
Farm bordering				
Organic fertilizer				
Others(specify).....				

37.Indicate the effect to which the accessibility and usage of radio and Television have contributed to the following adaptation strategies to climate variability and change impacts for you over the last two years?(*Tick appropriate box*)

F: Effects of access and usage of broadcasting media on adaptation and mitigation to climate variability and change impacts

36. Indicate effects of accessibility and usage of radio and Television contribution to mitigation practices to climate variability and change impacts for you over the last two years? (*Tick appropriate boxes*)

Mitigation practices	**Do not agree**	**Slightly agree**	**agree**	**Strongly agree**
Crop rotation				
Intercropping fallowing				
Reforestation				
Contour farming				
Farm bordering				
Organic fertilizer				
Others(specify).....				

37.Indicate the effect to which the accessibility and usage of radio and Television have contributed to the following adaptation strategies to climate variability and change impacts for you over the last two years?(*Tick appropriate box*)

Adaptation strategies	Do not agree	slightly agree	agree	Strongly agree
Early maturing varieties				
drought tolerant varieties				
Water harvesting				
Water storage methods				
Changing crop planting dates				
Others(specify).....				

38. Is broadcasting media helping you on adaptation and mitigation strategies to climate variability and change impacts? *(Tick appropriate box)*

Yes [ ] No [ ]

G: Barriers on accessing and using broadcasting media

39. What barriers do you face, if any, when accessing and using radio and television on adaptation and mitigation to climate variability and change impacts? *(Tick the appropriate column)*

	Constraints factors	Yes	No
1	Low cost of TV & radio		
2	Availability of electricity supply		
3	Reliable network		
4	High income		
5	High education levels		
6	Availability of related environmental programmes		
7	Simplified Language (swahili)		
8	Others(specify).....		

40. What are your general comments regarding access and usage of broadcasting media in adaptation and mitigations to climate variability and change impacts?

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THANK YOU FOR YOUR COOPERATION

Appendix 2: Focus Group Discussion Interview Guide

The role of broadcasting media on community adaptation and mitigation to climate variability and change impacts in Isimani Division, Iringa Rural District.

A: General Information

1. Village .....
2. District .....
3. Date of discussion.....
4. FGD No .....
5. Number of participant.....
6. Age of each participant .....
7. Sex of each participant .....
8. Education level of each participant .....

B: Discussion Questions

9. What are the sources of information on adaptation and mitigation practices in your community?
10. Do you see any link between radio and television, and mitigations/adaptation to climate variability and change in your village/community?
11. Do you practice any adaptation and mitigation to climate variability and change? Please, specify
12. What are the adaptation and mitigation practices you know in your village/community that can be attributed to the use of radio and television? Give example. Any success stories or failures?
13. Recognizing the fact that your village/community is comprised of different socio-economic groups in terms of age, sex, economic status and ethnic groups with diverse information needs, which groups do you think are benefiting more with the use of

broadcasting media in adaptation and mitigating to climate variability and change impacts? And why?

14. What are the factors that enhance you and your community as far as access and usage of radio and television is?
15. What are the constraints that you and your community are facing as far as access and usage of radio and television is concerned? What should be done to overcome such constraints?
16. If you were to give advice to the government, private sector or donors about what they could do to help the broadcasting services in this community work better, what advice would you give them?
17. Is there anything else (ideas) you would like to say?

THANK YOU FOR YOUR COOPERATION

Appendix 3: Interview Guide for Informants

The role of broadcasting media on community adaptation and mitigation of climate variability and change impacts in Isimani Division, Iringa Rural District.

A: General Information

1. Date of interview.....
2. Interview No.....
3. Village.....
4. Division.....
5. District.....
6. Name of respondent (optional).....
7. Sex: (Observe and check appropriate box)

   1= [ ] Male

   2= [ ] Female
8. Age (years) of respondent.....
9. What is the highest level of education that you achieved? (Check the appropriate category)

   1 = [ ] Primary education

   2 = [ ] Secondary education

   3 = [ ] certificate and diploma,

   4 = [ ] University degree

   5 = [ ] Adult education

   6 = [ ] None (Illiterate)
10. What is the source of information on adaptation and mitigation practices in your community?
11. Do you see any link between radio and television, and mitigations/adaptation to climate variability and change in your village/community?

12. What are the adaptation to and mitigation practices you know in your community that can be attributed to the use of radio and television? Give example. Any success stories or failures?
13. Recognizing the fact that your village/community is comprised of different socio-economic groups in terms of age, sex, economic status and ethnic groups with diverse information needs, which groups do you think are benefiting more with the use of broadcasting media in adaptation and mitigating to climate variability and change impacts? And why?
14. What are the factors that enhance your community as far as access and usage of radio and television is?
15. What are the constraints that your community is facing as far as access and usage of radio and television is concerned? What should be done to overcome such constraints?
16. If you were to give advice to the government, private sector or donors about what they could do to help the broadcasting services in this community work better, what advice would you give them?
17. Is there anything else (ideas) you would like to say?

THANK YOU FOR YOUR COOPERATION