

**EVALUATION OF HOUSEHOLDS' WILLINGNESS TO
CONTRIBUTE LABOUR IN FLOODS PREVENTION AND MITIGATION
PROJECTS IN KILOSA DISTRICT, TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Many initiatives to overcome floods have not succeeded and lack financial resources have been among the major problems associated with the failure. Contribution of labour by the surrounding community can be used as a panacea to money problem. This study investigated the households' willingness to contribute (WTC) labour in projects which intend to prevent the occurrence and mitigate the effects of floods. The study was conducted in Kilosa District with the aim of establishing the influence of socio-economic characteristics on households' WTC labour in floods prevention and mitigation projects, assessing the relationship between physical damage done by floods and households' WTC labour in the projects; and comparing WTC labour in the project between people that reside in vulnerable area to those who reside in non-vulnerable area. Purposive sampling was used to choose the study area and simple random sampling was used to choose household respondents making a total of 120 respondents. Primary data were collected using semi-structured and dichotomous questionnaires while secondary data were collected through document review. Data were analyzed by using Statistical Package for Social Sciences (SPSS) software. Results showed that age and occupation are the social economic factors that affected their WTC, physical damage by floods is the most important factor that drive respondents from vulnerable area to contribute more; and willingness to contribute was not influenced by respondents' status of vulnerability. It can be concluded that, the surrounding community is willing to contribute the activities that intend to overcome floods in the District and therefore responsible institutions may involve the community accordingly.

DECLARATION

I, ISEGE ZEPHANIA MIHAYO, do hereby declare to neither the Senate of Sokoine University of Agriculture that this dissertation is my own original work within the period of registration, and it has neither been submitted nor being concurrently submitted in any other institution.

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DEDICATION

This work is dedicated to my beloved parents Zephania and Sophia Mihayo who jointly laid the foundation of my education.

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ABBREVIATIONS

CE	Choice Experiment
CV	Contingent Valuation
EC	European Commission
EM-DAT	Emergency Events Database
IPCC	Intergovernmental Panel on Climate Change
NGOS	NON-GOVERNMENT ORGANIZATIONS
PMO	Prime Minister Office
SPSS	Statistical Package for Social Sciences
TMA	Tanzania Metrological Agency
TNDP	Tanzania Natural Disaster Profile
TZS	Tanzanian Shilling
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
UNUEHS	United Nations University Institute for Environment and Human Security
URT	United Republic of Tanzania
WFP	World Food Programme
WHO	World Health Organization
WTC	Willingness to Contribute
WTP	Willingness to Pay

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Floods are the most expensive and wide reaching of all natural hazards (Doocy, 2013). They are responsible for up to 50000 deaths and adversely affect 75 million people on average worldwide every year (Mwape, 2009). The Third World Water Forum, Poverty and Floods held in March (2003) showed that in recent years floods have been experienced more frequently with increasing severity; this has resulted into loss of lives, injury, homelessness, damage to infrastructure and environment as well as impacting on other sectors such as education and agriculture.

One of the significant sector which floods affect is the economy, they are responsible for larger economic losses worldwide than any other natural hazard (Gruntfest, 1995). Such situations are highly experienced in developing countries especially in some parts of Africa whose livelihood is highly enhanced by access to productive assets including land, livestock and farm equipment (Zezza *et al.*, 2007; Tatwangire, 2011). These assets are the key vulnerable items to the effects of floods.

All these consequences of floods have raised different practices done mainly by the responsible governments and other organizations (UNICEF-Tanzania, 2013) with the aim of overcoming the effects of floods and preventing the floods from happening again (WFP, 2000; Action Aid, 2002). Regardless of the efforts, there have been some researches in Africa showing that destroyed assets were in general not replaced in the recovery period, and so leaving people more vulnerable to subsequent disaster episodes (World Bank, 2005). In addition the number of people at risk has been growing each year

and the majorities are in developing countries with high poverty levels (Living with Risk, 2002).

In Tanzania floods are the major disaster after droughts that is often experienced (TNDP, 2011) leaving significant effects at national and household levels. They are responsible for large economic damage in the country compared to other disasters with the highest probability of occurrence per year (EM-DAT, 2009). Such floods have largely destructed the environment particularly in agriculture and infrastructure (Frederick, 2010).

KilosaDistrict is one of the areas that are susceptible to floods mainly due to rivers that are found in place. Report written by UNICEF-Tanzania (2013) indicated that bad behavior and cultural practices around the rivers are among the factors that enhance floods. Residents experience localized floods almost every year, but there have been a number of major floods that have adversely affected them (Hegga, 2012). Among the most devastated flood events in KilosaDistrict were those of 1997-98, 2009-10 and that of 2013-14.

1.2 Problem statement

In KilosaDistrict, floods are responsible for large physical destruction, serious financial problems and other social effects on the people (TNDP, 2011; UNICEF-Tanzania, 2013). According to PMO (2010) the most affected ones are the elderly, children, women, and poor people. Those situations have raised initiatives in form of projects to overcome floods. Such projects include construction of new settlements, raising public awareness on floods, repairing damaged infrastructures and river defenses actions. The activities are usually done by government (central and local) and Non-government organizations (NGOs) (EC, 2011; UNICEF-Tanzania, 2013).

Researches show that the projects have succeeded to some extent especially in creating public awareness and preparedness on floods in the community. To the other extent, the initiatives have not succeeded especially in prevention and mitigation; as many projects have been winded up unfinished (European Commission, 2011), others have not even started after being proposed (PMO, 2010) and the bad thing is that floods are still occurring. Lack of financial resources is one of the major factors which limit these implementations (Brouwer *et al.*, 2008).

Involvement of community is inevitable as it cuts the cost of projects. Nissen-Petersen (2006) established that inclusion of community labour in construction of water reservoirs contributed to about 64% of total construction expenses. Also for the case of Kilosa District, community plays large part in inducing floods through harmful practices around the river both in the upland and lowland areas (PMO, 2010; UNICEF-Tanzania, 2013).

While importance of community labour in cutting costs for the projects that are intending to overcome floods are widely acknowledged (Navrud *et al.*, 2012), it was not known to what extent people of Kilosa are willing to contribute. Therefore, this study provided the information by looking specifically on relationship between willingness to contribute (WTC) labour and the extent of loss households experienced; influence of social-economic characteristics in WTC labour and impact of being vulnerable to floods on WTC.

1.3 Justification of the study

The study provides information to responsible stakeholders on the understanding of people on their responsibility to mitigate and prevent floods. As it reflect the willingness to contribute in the activities of community around Kilosa; the responsible institutions may

adjust other coming projects accordingly, and therefore cutting down unnecessary expenses at the same time overcoming floods.

1.4 Objectives

1.4.1 Main objective

The main objective of this study was to evaluate the households' willingness to contribute (WTC) labour on the floods prevention and mitigation projects in Kilosa District.

1.4.2 Specific objectives

The specific objectives were to:

- i. assess the influence of households' socio-economic characteristics in their WTC labour in floods prevention and mitigation projects.
- ii. examine the relationship between households' WTC labour and extent of loss they experienced from floods.
- iii. compare households' WTC labour between people who are vulnerable to floods with those who are not vulnerable based on their location.

1.5 Research questions

The present study strove to answer the following questions:

- i. How does households' socio-economic characteristics affect their willingness to contribute (WTC) labour in floods prevention and mitigation projects?
- ii. What is the relationship between households' WTC labour and the extent of loss they experienced from the flood?
- iii. What is the difference in households' WTC between people who are vulnerable to flood versus those who are not vulnerable?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 An overview of floods

2.1.1 Floods as a global issue

Flood is a natural disaster that is experienced in many parties of the world and are the leading cause of natural disaster deaths worldwide by being responsible for 6.8 million deaths in the 20th century and have affected more than 2.8 billion others worldwide (WHO, 2013). Human societies worldwide have lived and died with floods from the very beginning, laying a prominent role for floods within legends, religions, and history (O'Connor and Costa, 2004).

Recently, floods have been the common environmental hazard worldwide (Alderman *et al.*, 2012), which have been increasing as a result of climate change, with the effect felt more by the poor in developing countries. Asia is the most flood-affected region, accounting for nearly 50% of flood-related fatalities in the last quarter of the 20th century (Doocy, 2013); where China (1996, 1998), India, Nepal and Bangladesh (1998) attracted great attention throughout the world (Loster *et al.*, 1998).

Floods have many effects, the most affected part is the economic by being responsible for about one third of economic losses incurred worldwide (UNESCO, 2007). The Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC) predicted heavy precipitation events, which are very likely to increase in frequency and so increase flood risk. These floods are expected to affect life and livelihoods in human settlements in all areas e.g., coastal zones, river deltas and mountains.

Flood catastrophes are becoming more frequent and more intensive, researchers are pointing global warming as the main cause of the recently increase of the floods and so the vulnerability. If global warming continues to take place as predicted, a further dramatic deterioration in the risk situation must be expected (Loster *et al.*, 1998).

The United Nations University Institute for Environment and Human Security (UNU-EHS) warns that unless preventative efforts are stepped up, the number of people vulnerable to flood disasters worldwide is expected to grow to two billion by 2050. This as a result of climate change, deforestation and population growth in flood-prone lands (Bogardi, 2004).

2.1.2 Africa context

The African continent has not been spared by the floods. UNEP (2006) showed that in Africa many people of about one billion are more vulnerable to climate change than any other continent. Almost two billion people were affected by disasters in the last decade of the 20th century; 86% of these were from floods and droughts. Rising flood waters across Africa are intensifying health risks for millions of people. Major floods in early 2008 plunged Southern Africa into a growing humanitarian crisis killing dozens and displacing thousands (Mwape, 2009).

Among other causes, human settlement in flood plains is one of the important factors that increase vulnerability to floods in African society and economy. Douglas *et al.* (2008) indicated that poverty is the major factor that forces people to live in areas that are at floods risk. There is intensive and unplanned human settlements in flood-prone areas that appears to be playing a major role in increasing flood risk (Di Baldassarre, *et al.*, 2010). For example, in Egypt the river Nile floodplain is the most densely populated region in the

country. Mwape (2009) further added that in Mozambique at least twenty urban centers are at risk of flooding including major settlements along the Zambezi and six coastal locations.

In order to overcome floods in Africa there should be an introduction of flood forecasting systems, the building of population awareness and preparedness, urban planning and discouragement of human settlements in flood-prone areas, along with the development of local institutional capacities (Di Baldassarre *et al.*, 2010).

To support such initiatives, sustainable actions by low-cost technologies should be implemented, of which several are already available in many African countries, such as radio links from cellular communication networks, which can be used to monitor path-averaged rainfall (Leijnse *et al.*, 2007).

2.1.3 Tanzania experience

In Tanzania, many communities both in rural and urban are at varying degrees of flood risks which has resulted to severe effects both at household and national levels (Shingirira *et al.*, 2013). Experience from twenty years had shown that in Tanzania floods occurred 15 times, killing 54 people and affecting 800271 people (Senga, 2007).

Tanzania floods are related with rainfall amount, although the timing of the rains and the forecast of precipitation amounts do become more and more uncertain due to climate change and seasonal variability. Example for the past two decades rainfall intensity has been shown an exponentially rising as it diverge from its normal (Shingirira *et al.*, 2013). Regions that are susceptible to floods in Tanzania are Tanga, Mbeya, Pwani, Arusha, Rukwa, Iringa, Kigoma and Lindi and Morogoro. (Senga, 2007).

The government has made efforts to deal with disasters, by establishing a Disaster Management Department at the Prime Minister's Office which attends to all disaster issues (including floods) and incidents at all administrator levels, also there is a specialized body dealing with flood disaster warnings and advisories in the country which is Tanzania Meteorological Agency (TMA) whereby it provides weather forecasts and extreme weather warnings.

2.1.4 Kilosa perspective

History is showing that floods have been frequently occurring in Kilosa District since 1935, mainly due to the rivers that found in the District particularly Mkondoa river (UNICEF-Tanzania, 2013). Due to that, colonial government built water reservoirs and levees along the river to prevent the floods, but because of lack of regular maintenance the levees and dams for reserving water broke out and left the surrounding community vulnerable to the coming floods (Maringo, 2014).

Since then more flood events have been occurring in the place, such events have made Kilosa District to be subjected to among the worst flooding area in the country (RED CROSS, 2010). If no any permanent actions are taken, more events will continue to occur. Floods of 2009-10 are the currently the most devastating floods that have left serious damages to the households and country, and till today there are some people who have not fully recovered from the effects of such floods.

Report from Prime Ministry office (2010) and UNICEF (2013) show the followings as the main factor that cause floods in Kilosa; heavy rainfalls, environmental degradation, river siltation and destruction of dams, lack of enough water reservoirs and destruction of levees at Mkondoa River.

2.2 Prevention and mitigation of floods

Prevention of floods includes all Activities that aim at providing outright avoidance of the adverse impact of floods; it depends on social and technical feasibility and cost/benefit considerations. Investing in preventive measures is justified in areas frequently affected by disaster. In the context of public awareness raising and education, prevention refers to attitude and behavior towards a culture of prevention (PMO, 2011).

Mitigation of floods refers to measures undertaken to limit the adverse impact of floods disaster at community and the nation levels (Ivan, 2001). They include moving belongings to safe areas, ensuring the provision of clean drinking-water, surveillance and monitoring of health impacts, treating ill people to reduce the health impacts of flooding, and recovery and rehabilitation of flooded houses (WHO, 2013).

According to Wills (2010), activities done to mitigate and prevent floods should address loss prevention, risk mitigation and business continuity planning in advanced strategic plan that are designed to be an integral component of an organizations corporate culture. Actions must include all stakeholders in both in the decision making and implementation (PMO Report, 2010).

According to Heidari (2009) the best implementation method to control the flood should involve issues such as the most appropriate location to install the facilities; the most suitable size for the facilities; and flood damage risk-based analysis and cost-benefit economic analysis. Multisector collaboration among the military, police, water supply companies and health services is required. Mitigation and prevention measures are in two approaches structure and non-structure approaches.

2.2.1 Structure approaches

Flood control measures include mainly structure approach that is all about engineering works that seek to avoid the effects of floods, they include construction of dams, levees and damage infrastructures, water retention basins, river training interventions and enhancement, rehabilitation and restoration of the river corridor, whilst reduction and delay of runoff can be attained by adequate agriculture and forestry management practices, including also related works (Colombo *et al.*, 2002).

The activities tend to mainly consider the hydrological and hydraulic implications of flooding, which generally are solved by choosing the alternative that maximizes the expected net benefit (Ivan, 2001).

In order for the approach to be effective important properties should be considered such as soil properties as texture, structure, organic matter content and pH directly affect soil permeability, and therefore infiltration and runoff; topographic features such as slope (Colombo *et al.*, 2002).

2.2.2 Non-structure approaches

Non-structure approach includes techniques as regulations, financing, environmental impact assessment, construction standards, and protecting or restoring streams, floodplains, and wetlands (Ivan, 2001). Non-structural measures on the other hand offer a variety of possibilities, ranging from land use planning to constructions and structure management codes, soil management and acquisition policies, insurance, perception and awareness, public information actions, emergency systems and post-catastrophe recovery (EC, 2002).

The advantage of non-structural measures is that generally they are sustainable and also less expensive. On the other hand, they can only be efficient with the participation of a responsive population and an organized institutional network.

2.3 Risk and vulnerability of households to the floods

Vulnerability refers to the characteristics that limit any individual, a household, a community, a city, a country or even an ecosystem's capacity to anticipate, manage, resist and recover from impacts of natural or other threats, hazard or natural triggers (Oxfam, 2002). Risk is the probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable/capable conditions (PMO, 2011); therefore disaster risk is a function of hazard, exposure, and vulnerability UNISDR (2011).

Ariyabandu and Wickramasinghe (2005) showed that some groups are more vulnerable to floods than others; they mentioned culture, gender, disability, education and age as some of the factors that make those groups more vulnerable. Mwape (2009) suggest that women are often more vulnerable to disasters than men. This is experienced as a result of ignoring gender differences, different roles and responsibilities given to women in life; all these have caused many women needs to be bypassed.

Poverty causes people to be more susceptible to disasters because they lack resources to prepare for and respond to shocks of hazards. It is not easy for poor people to be spared from cycle of vulnerability. Example Sinclair and Pegram (2003) explains that with large increase in population and urbanization (driven by poverty) more people will be in informal settlements, probably in flood plains because it is the only undeveloped land

available near cities. This will put them at higher risk, not only due to their geographical location in the flood plains but also because they do not have enough financial resources to recover from the damage caused by flooding.

Among of the factors that make households and so their belongings be at risk is insufficient information and communication on emergencies which might lead to late response to early action and so sparing many lives and livelihoods. Such information is necessary for risk preparedness, protection, response and also recovery in household and national levels (UNICEF, 2013).

2.4 Valuation of environmental goods and services

Valuation of environmental goods and services involves assigning value to non-marketed goods and services. Goods and services that cannot be marketed are those which may not be directly bought and sold in the market place. Estimating economic values for goods and services which don't normally have prices is important for making many decisions. (Bennett and Birol, 2010).

Generally, there are two ways of estimating the economic values attached to non-marketed goods and services that reveal preferences and stated preferences. Revealed preference approaches identify the ways in which a non-marketed goods influence actual markets for some other goods. In stated preference approaches the economic value is obtained through a hypothetical or constructed market based on questionnaires. Stated preference approach is more preferred than revealed because it relay on what people say rather than what they do, also is more flexible as it can potentially be applied in almost any valuation context (Rahim, 2008).

Contingent valuation (CV) is a stated approach that is all about asking individuals to state their maximum willingness to pay for an increase in the level of environmental quality (Pearce *et al.*, 2002). To measuring willingness to pay in terms of cash, labour has also been used as utility measure. This is Especially so in developing countries, wherein some cases due to tight budgets households cannot give up any part of their income for public project. To avoid this problem, authors have suggested the use of contributed labour (or other in-kind payments) to better measure the benefits (Asrat *et al.*, 2004).

The other stated approach is choice experiment (CE) whereby individuals are given a hypothetical setting and asked to choose their preferred alternative among several alternatives in a choice set (Rahim, 2008).

In This study CV has been chosen over CE because it is a familiar method, it is able to estimate values for goods and services that are easily identified and understood by users (Rahim, 2008), on contrary choice experiment provide a limited number of options, it may force respondents to make choices that they would not voluntarily make. Apart from that, Respondents may find some trade-offs difficult to evaluate, because they are unfamiliar with the situation.

2.5 Theories guiding WTP/WTC for public environmental goods

Several theories have been proposed in an attempt to explain individuals' willingness to pay (WTP) for public environmental goods. This study has discussed a basic economic model and the theory of public goods.

2.5.1 Basic economic model

Basic economic models focus on two determinants that are income and the use of the good in question (Liebeat *et al.*, 2011). When individuals consider paying for improved

environmental quality, their choices and responses to valuation questions are limited by their income. Therefore, income is regularly included in stated preference surveys and is expected to have a positive effect on WTP (Carson *et al.*, 2001).

Whether people actually use the public good in question is another determinant closely related to the economic concept of value. People use the good because it is increasing their well-being. In this case, there is a direct behavioral link between the good and the individual's well-being. As this latter link is expected to be weaker than a link based on direct use, it is assumed that users are willing to pay more than nonusers (Carson *et al.*, 2001).

2.5.2 Theories of public goods

In the framework of the theory of public goods, dilemma concern and trust in other people's cooperation can be considered as determinants of WTP. Dilemma concern is seen as a concept to measure the degree to which people perceive environmental protection as a social dilemma and follow strategies of conditional cooperation (Franzen, 1995). It is expected that the more people perceive environmental protection as a social dilemma, the less likely they are willing to pay for the provision of a specific public good (Liebeet *al.*, 2011).

The concept of trust in other people's cooperation refers to a person's belief that others are willing to pay or do their share. The assumption is that individuals who believe in other people's payments regarding a specific public good are more likely to be willing to pay as compared to individuals who do not believe in other people's payments (Liebeet *al.*, 2011). This originates from the idea of conditional cooperation. Ostrom (2000) stated that conditional cooperators will tend to trust others. Those who trust that others will cooperate are less likely to think that they are the only ones who would contribute to the good (Sugden, 1999).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the study area

This study was conducted at Kilosa District in Morogoro region located in the North West part of the region with a population of 438 175 (URT, 2013) and it lies between 50°55' and 70°53' south and 36°30' and 37°30' east. To the east is bordered with Morogoro and Mvomero Districts south is bordered with Kilombero and Kilolo Districts and to the west is bordered with Mpwapa and Kongwa Districts (Figure 1).

The vegetation in Kilosa District is characterised by both Mediterranean and tropical types, depending largely on altitude along the south–north exterior; Typically it consists of Miombo woodland, with grass and shrub covering the soils (Benjaminsen *et al.*, 2009)

Climate of Kilosa District is characterised with tropical climate of semi-arid type with the mean annual temperature of 25°C. It has binomial rainfall which split between the short rains in November to January and the long rains between March to June which range from 800mm to 1300mm in low and high altitude areas respectively. The main economic activities done by the people of Kilosa are crop farming and livestock keeping (Kajembe, 2013); other minor activities include forestry, beekeeping, fishing and trading. Also there are also some few people who are employed in formal sector like education. The District has been selected since it the area that is frequently experiencing floods; on top of that, the area around Mkondoa river is the living evidence that is showing unsuccessfulness of both mitigation and prevention measures.

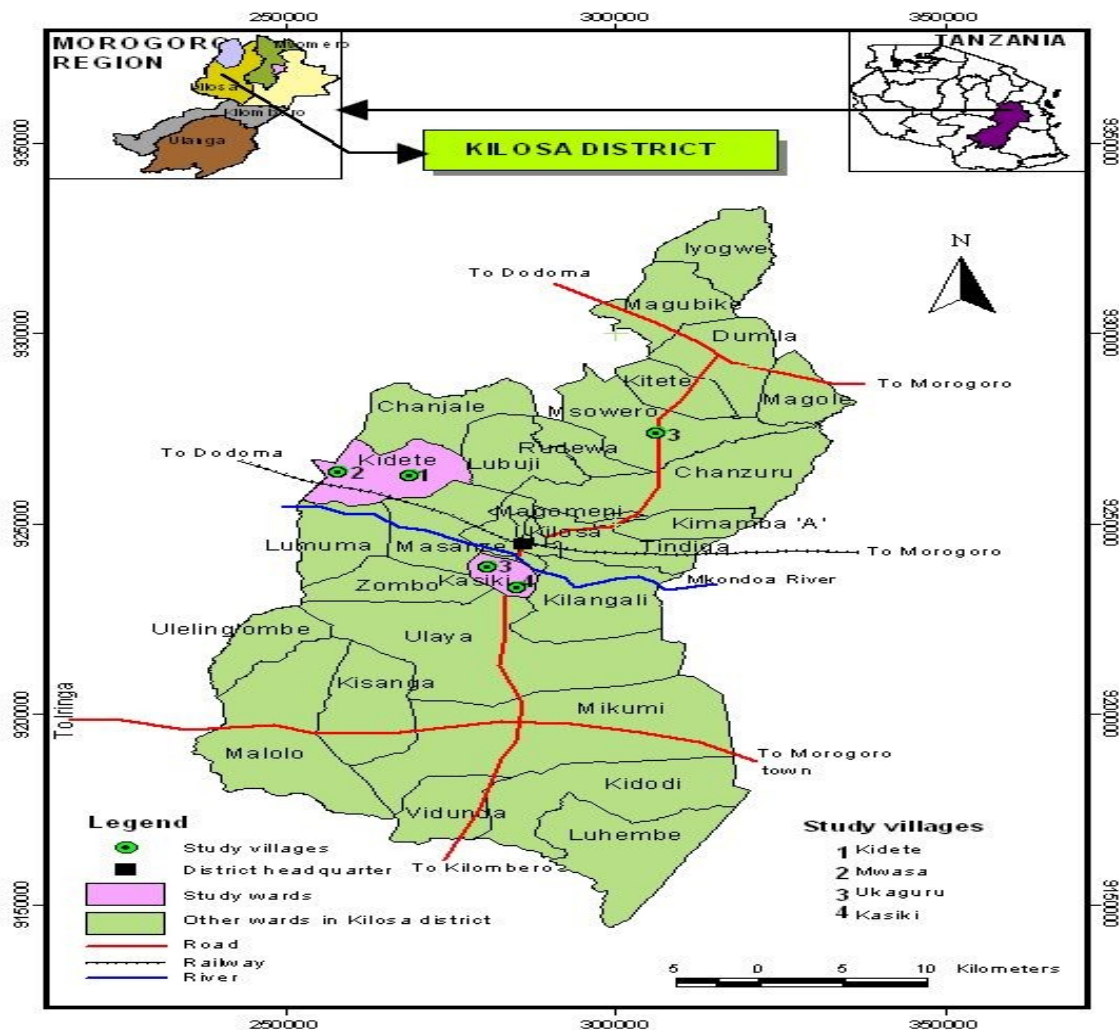


Figure 1: Map of Kilosa District showing the study area

3.1 Case study design

Cross sectional design was used. This design was chosen as it allows collection of data within a short period of time. The use of this design has been recommended by Bailey (1998) because it is more flexible and sometime less costly.

3.2 Sampling procedures

Purposive sampling technique was used to select the area around Mkondoa river, this river was chosen because it caused 2009-10 floods. Then four villages were randomly selected from the area; two from vulnerable area and another two from non-vulnerable area. From

each village simple random sampling was used to select households. Bailey (1994) suggests that a minimum of 30 elements is conducive for each group in the sample of a socio-economic study; therefore from each village 30 households were selected randomly and making a total of 120 samples for the whole study.

3.2.1 Contingent valuation method

General methodology used was Contingent valuation (CV). There are several formats of questions that could be used to elicit WTP/WTC in CV which are dichotomous choice/referendum, opened ended, closed ended (Boyle *et al.*, 1996; Nunes, 2002). This study used dichotomous choice questionnaire (proposed by Bishop and Heberlein, 1979); this approach is like voting decision. It provides an offer and asks whether a respondent would be willing to contribute/pay to obtain the change of public goods.

3.3 Data collection and analysis

The study used both primary and secondary data. Qualitative as well as the quantitative data were collected using dichotomous choice, semi-structured questionnaires, checklist tools and physical observation. Data was obtained from households' survey, focused group discussions, different documents and physical observations. SPSS software was used to analyze and compute collected data according to the specific objective.

3.3.1 Assessment of the influence of households' social-economic characteristics in WTC

Dichotomous and semi-structured questionnaires were used to collect data on WTC and socio-economic characteristics of the households' respectively. Focus group discussion was used to supplement data obtained by questionnaires. Logistic regression was used to analyze results for this objective. Households' responses to the maximum WTC questions

were regressed against their socio-economics characteristics; logistic model was as follows:

$$\text{Logit}(y) = \left[\frac{\Pi}{1 - \Pi} \right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e_1 \dots \dots \dots (1)$$

Where: Π = probability of event, α = Y intercept, β = regression coefficient of respective X, X = independent variable; where X_1 = gender of respondent 0 = male and 1 = female, X_2 = age in years, X_3 = education level, X_4 = household size, X_5 = income level in TZS.

3.3.2 The relationship between households' WTC and extent of loss they experienced from effect of floods

Dichotomous questionnaire was used to obtain data for households' WTC labour; physical observations and semi-structured questionnaire were used to obtain data on the extent of losses household experienced. The result for this objective was obtained by running correlation analysis between WTC and extent of loss. Correlation ranges from negative (-1) to positive (+1) coefficient values. A negative correlation indicates that high values on one variable are associated with low values on the next. A positive correlation indicates that high values on the one variable are associated with high values of the other variable.

3.3.3 Comparison of households' WTC between people who are vulnerable to flood with those who are non-vulnerable

Dichotomous questionnaire was used to obtain data for households' WTC; semi-structured questionnaire and physical observation were used to identify the areas that are vulnerable and those which are not. Chi-square analysis was used to compare the WTC for the people who are vulnerable to floods with those who are not vulnerable depending on the location whether on flood plains (vulnerable) or not in flood plains (not vulnerable). WTC was dependent variable and location was treated as independent variable.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the research findings and observation experienced during the study around Mkondoa River at Kilosa District on evaluation of households' willingness to contribute labour in floods prevention and mitigation projects. Survey was done at Kasiki and Kidete wards which are in vulnerable (downward) area and non-vulnerable (upward) area respectively.

The results and discussion of the findings are presented basing on the specific objectives of the research which are: assessing the influence of households' socio-economic characteristics in their willingness to contribute (WTC) labour in floods prevention and mitigation projects; examination of the relationship between households' WTC labour and extent of loss they experienced from floods; and comparison of households' WTC labour between people who are vulnerable to floods with those who are not vulnerable based on their location whether downward river or otherwise.

4.2 Households' socio-economic characteristics

Characteristics of a household have an important implication on the household's contribution in any development activity (Muchunguzi, 2010). The compositions of a household do influence the decision to participate in such activities. This section describes the socio-economic characteristics of people residing around river Mkondoa focusing on age of respondents, sex of respondents, marital status, education level, occupation, household income and household size.

4.2.1 Age of respondents

In this study the targeted respondents were household heads who are adults with age above 18 years. Being adults, it means they are mature enough to cooperate and give out clear information as it has been assumed that they have enough experience on floods, their causes, prevention and mitigation (Hegga, 2012). The age groups of respondents are classified as young age (18- 35), middle age (36-55) and elders (above 56).

The overall results showed that the middle age consisted of the majority of the respondents (45%), followed by the young age (30.8%) and elders were in smallest number of about 24.2% (Figure 2). Middle age category is considered energetic Tanzanian work force group (URT, 2005) and so it means many respondents are capable of providing enough labour for the prevention and mitigation activities in the area.

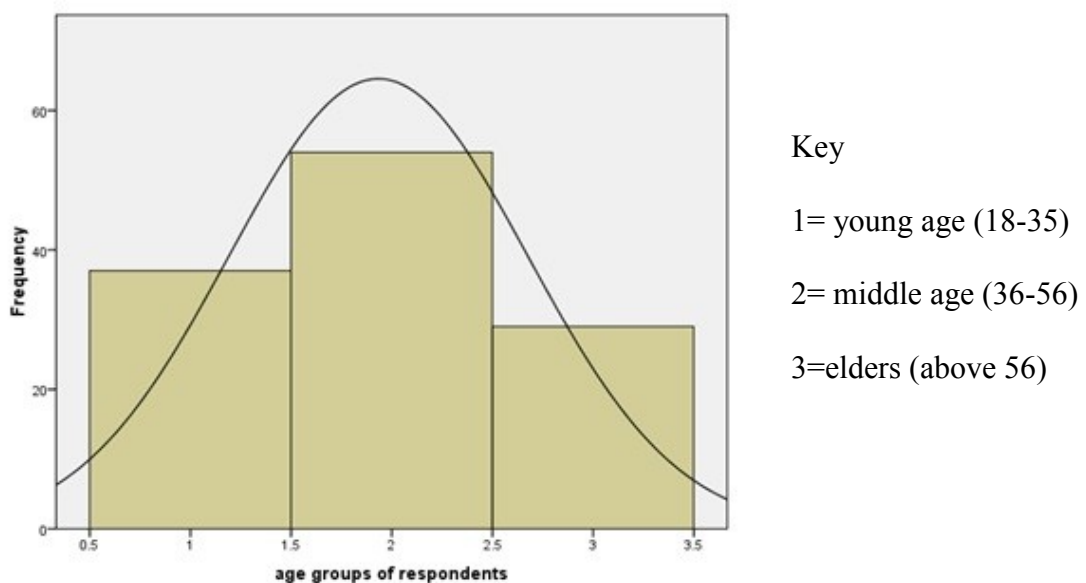


Figure 2: Age class distribution of respondents

4.2.2 Sex of respondents

Results showed that majority of the respondents were men who represented 53.3% of respondents and female respondents were represented by 46.7% (Table 1). This unequal promotional of respondents is highly found in Tanzanian culture because men are the ones who lead the family and main speakers (Kilave, 2010).

4.2.3 Marital status of household heads

Results from the survey as indicated in Table 1 are showing that about 65.8% of respondents were married, 19.2% were widows, 9.2% were single and 5.8% were divorced. Higher percentage of married respondents implies that most of respondents are permanent resident and have households' responsibilities which reflect a stable society (Kilave, 2010). Married households have an advantage over the other households when it comes to marital status in sharing managerial skills and provision of labour force needed for a given development activity. According to URT (2005) marital status is the key component in development responsibilities. This feature was attributed to social responsibilities that require collective efforts among household members.

4.2.4 Education level of household heads

Results in Table 1 show that most of the respondents around river Mkondoa represented by 68.3% had attained primary school education, while 17.5% had no education and 14.2% had attained ordinary secondary education. This shows that majority of respondents were literate which means they could easily understand what are they supposed to do so as to improve and protect their surroundings from floods disaster. Education is among the very important phenomenon which make human being responsible in solving his/her problem and Muchunguzi (2010) further mentioned that; the more and individual is educated the more it is expected of him or her to take measures that favour his/ her status.

4.2.5 Occupation of household head

Respondents in the study area are engaging in different income generation activities. One's occupation determines the income status and the ability to encounter various problems facing him or her. Results from Table 1 show that majority (82.5%) of respondents are farmers, involving themselves in subsistence farming. growing mainly paddy, maize, onions and sunflowers (Kajembe, 2013), the other small population is engaging in other occupation activities as agro pastoralism (2.5%), business (4.2%), employment (6.7%) and other activities (4.2%).

Table 1: Percentage distribution of household socio-economic characteristics (N=120)

Characteristics	Frequency	Percentage (%)
Respondents Sex		
Male	64	53.3
Female	56	46.7
marital status		
Single	11	9.2
Married	79	65.8
Widow	23	19.2
Divorced	7	5.8
Respondents' education level		
no education	21	17.5
primary education	82	68.3
form four	17	14.2
Respondents' occupation		
Farmer	99	82.5
Agropastoralism	3	2.5
Business	5	4.2
Employment	8	6.7
Others	5	4.2

4.2.6 Households' income

Results from Figure 3 show that about 42% of the household surveyed in the study area have an average monthly income ranging from 50000 to 100000TZS per month, followed by the ones who earn 100000-500000TZS per month with 40.8%. Respondents who earned below 50000TZS were 15.8% and very few households (1.7%) earned a monthly income between 500000 and 1000000TZS.

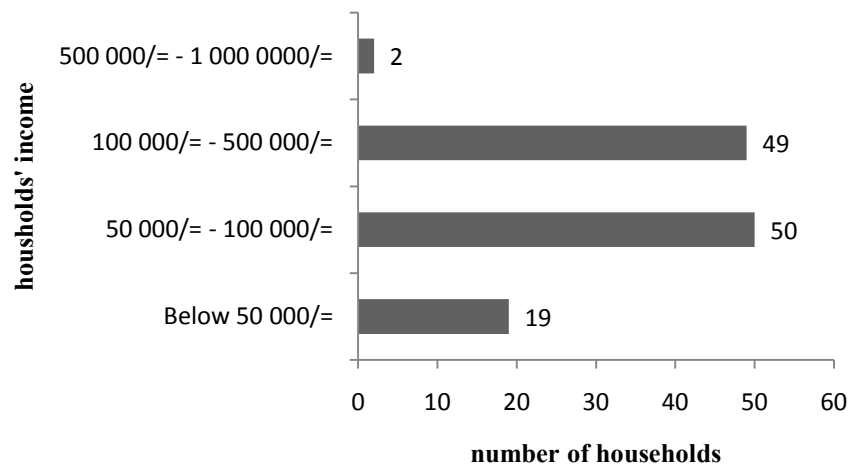


Figure 3: Households' income status

4.2.7 Household size

Data are showing that about 48.3% of the respondents in Kilosa District have household size that range from 6 to 10 people. 47.5% of surveyed households have household size that range from 1-5 people, while few households (4.2%) have large household size from 11-15 people.(Figure 4).

In this study, it was important to consider household size because larger household size could increase household contribution of the labour in the prevention and mitigation

projects. Household size was selected as is used to determine the available labour for any activity (Boehnke, 2003).

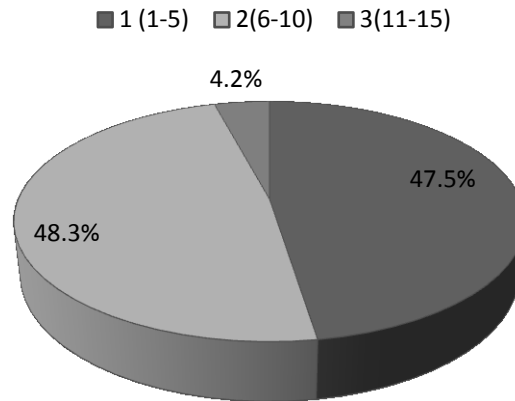


Figure 4: Respondents' household size

4.3 Influence of households' socio-economic characteristics in their willingness to contribute (WTC) labour

Logistic regression was used to identify the influence of households' socio-economic characteristics in their willingness to contribute labour. Households' responses whether to contribute or not contribute questions was regressed against their socio-economics characteristics that are age in years, sex, education level, occupation and household size. Results showed that Independent variables such as age, sex, and occupation were positively related to willingness to contribute labour; while other independent variables that are education and household size were negatively related to WTC labour.

Further results of Logistic regression analysis showed that two independent factors that are age in years and respondents' occupation influence their WTC labour at $P\text{-value} < 0.05$. On the other hand the remaining socio-economic characteristics which are sex, education and household size were not significant at level of significance 0.05 (Table 2).

Table 2: Influence of households' socio-economic characteristics on WTC labour

Variables	B	Standard error	P-value	Significance
Age	.057	.019	.003	**
sex(dummy)	.154	.574	.788	NS
Education	-.312	.500	.532	NS
Occupation	.411	.176	.019	*
household size	-.108	.106	.311	NS
Constant	-4.045	1.895	.033	*

NS= not significance at $P < 0.05$, * Significant at $P < 0.05$, ** Significant at $P < 0.01$

The relationship between respondents age and their WTC is positive and significant (P -value <0.05). This implies that an increase in respondents' age would increase WTC labour responses by 0.05. Report from PMO (2010) and Tapsellet *al.* (2002) indicated that as the age increase vulnerability to floods also increase, vulnerability is one among the factors that is expected to increase WTC labour. Walker *et al.* (2006) also indicated that as people are getting older are expected to make decision favoring their status.

The relationship between sex of respondents and their WTC is positive and insignificant (P -value <0.05); which mean that increase of male respondents would increase WTC labour responses by 15%, the insignificance of this variable can be attributed by the fact that there were small difference between male and female and the relationship is not that strong (by 15%).

Relationship between respondents' education level and WTC labour is negative and insignificant (P -value <0.005). This means decrease in education level would increase households' WTC labour by 31%. Relationship between respondents' occupation and WTC labour is positive and significantly (P -value <0.05), which means by being farmer

increase household's WTC labour, this significant relationship can be attributed by the fact that one among the most affect part of the floods is farms (TNDP, 2011) so by farmers knowing that; they would want to secure themselves from physical destruction of the their farms by floods. Contrary to these results Naiga and Penker(2014) indicated that household incomeplay a role in WTC, with comparatively lower willingness to contribute for subsistence farmers.

Household size is negatively and insignificant related to WTC labour ($P\text{-value} < 0.05$). This means that an increase of people in the household would decrease households' WTC labour by 0.1. Apart from these factors other authors have indicated, rules and policies and sex of respondents as the factors determine community's willingness to contribute to improve the quality of the environment (Madrigal, 2011; Foster, 2013).

4.4 Relationship between households' WTC labour and extent of loss they experienced from floods

4.4.1 Willingness to contribute in floods prevention and mitigation projects

Respondents were asked to state if they are willing to contribute in floods prevention and mitigation projects around Mkondoa River. Results from Figure 5 show that about 100 respondents (83.3%) answered "Yes" to the question regardless of number of hours; and respondents of about 20 (16.7%) answered 'No' to contributing.

There are many activities/projects that may reduce the occurrence of floods. According to Kidete Ward officer, (personal communication, 2014),

"Rebuilding dam at Kidete village and/or building additional dam anywhere upland the river will help in storing excess water; protecting catchment areas and area near the

river; making existing levee stronger; and other activities that will increase river deepness”.

These suggestions are in line with those of Maringo, (2014) and PMO (2010). In addition Maringo (2014) mentioned active practice of by-laws and regulations by the community as one of the way to secure environment around Mkondoa River at Kilosa District.

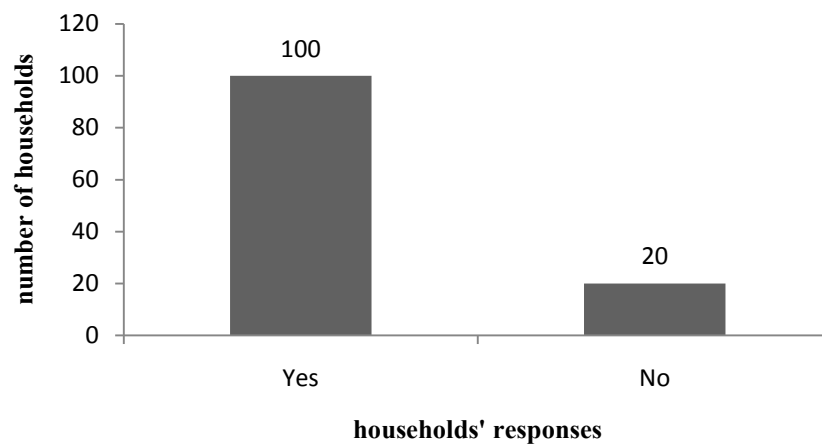


Figure 5: Households' willing to contribute labour

In the dichotomous questionnaire, the second question demanded the respondents who answered 'yes' in the contributing question to state the most important reason why they were willing to contribute labour. Results are showing that about 31.1% of the household heads did not want the coming generation to suffer from stresses of floods as they have suffered; this reason mainly came from respondents who reside in vulnerable area and they had already suffered the effects of floods.

About 19% of the respondents were willing to do so for the benefits of their own households, these respondents also came from respondents who reside in vulnerable area. Other respondents (18%) were willing to contribute because they wanted other people not

to experience floods again and these people mainly came from non-vulnerable areas. And lastly about 13% would do so due to other reasons like protection of the environment and to avoid destruction of infrastructures (Figure 6).

Contrary to these results, Navrud *et al.* (2012) shows that about one third of the households who were willing to contribute in projects that aim at avoiding floods in Vietnam would do it for the benefit of their own household, and about half would do so for the benefits of others.

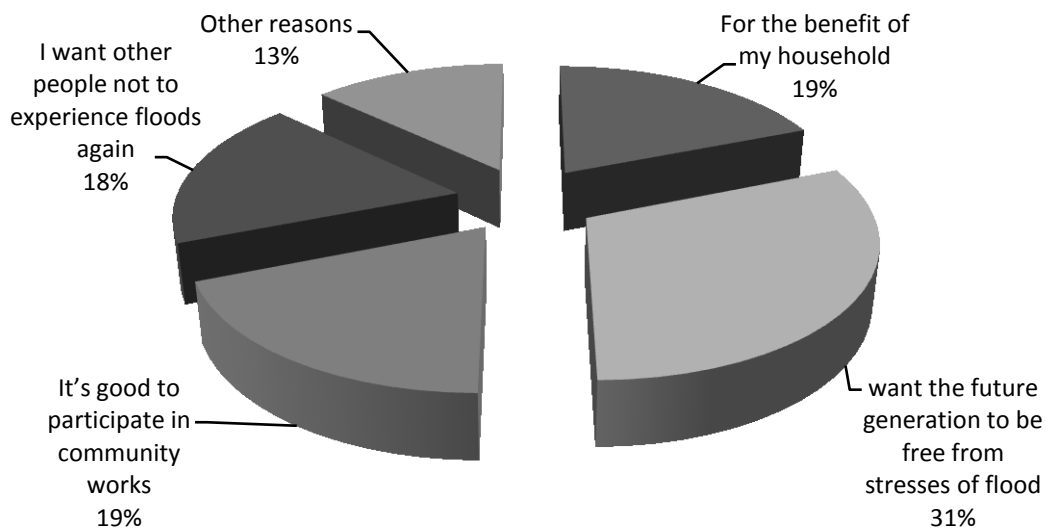


Figure 6: Reasons for accepting to contribute

In the other WTC question, respondents who were willing to contribute in floods prevention and mitigation projects were asked if they were satisfied with participation of 6 hr/week. Of all number of hours, 6hr/week were chosen as the basis by taking one hour per day and excluding one day for worshipping depending on one's religion and so making a total of 6 hours per week.

About 39.2% of respondents who answered “yes” to WTC agreed to offer 6 hrs per week in the activities, while others stated their highest number of hours/week that they were comfortable with, about 6.7% of respondents were willing to contribute 1hr/week, 0.8% were willing to contribute 1.5hr/week, 9.2 were willing to contribute 2hrs/week, 10.8% of respondents were willing to contribute 3hrs/week, 14.2% of respondents were willing to contribute 4hr/week, 1.7% were willing to contribute 5hrs/week; and lastly 0.8 were willing to contribute 12hrs/week (Table 3).

Table 3: Number of hours people are willing to contribute labour

Number of hours.	Frequency	Percent
0	20	17
1	8	7
1.5	1	1
2	11	9
3	13	11
4	17	14
5	2	2
6	47	39
12	1	1
Total	120	100

Respondents who answered “No” to willingness to contribute question were asked to state their reasons that made them to state so. Results from Table 4 are indicating that 45% of respondents who were not willing to contribute mentioned weak health as the main reason, 25% mentioned that there were other important things than mitigating and preventing floods, 20% they didn’t believe that the government will implement the

projects and there were 5% of respondents who thought that they are not vulnerable to floods, the other percent (5%) fall to other reasons like being too old.

It is expected that, users are willing to contribute if they are sure that their contributions would be put to the intended use (Naiga and Penker, 2014). This is confirmed by results showing mistrust to government as a challenge to WTC. On the other reason, seeing other things being more important than avoiding floods means people are not aware of the benefits of avoiding floods. Knowledge of the benefits of the action is very important, as it has been shown by White (1995) that collective action will take place and continue as long as a critical mass of stakeholders has practical knowledge of the benefits.

Table 4: Reasons for not accepting to contribute labour

Responses	Frequency	Percentage (%)
Weak health	9	45
Other things are more important things than avoiding floods	5	25
I don't believe the government will implement the projects	4	20
I think am not vulnerable to flood	1	5
Other reasons	1	5
Total	20	100

4.4.2 Physical losses that respondents experienced

This study captured physical losses that were caused directly by the floods. Data of money losses that people experienced were only collected from vulnerable area since they were the only ones who have directly suffered the consequences of floods. All people from vulnerable area experienced physical loss from the effects of floods. Data for physical

losses were collected from four areas which were house collapse, destruction of house properties, agriculture and physical losses they experienced from destruction of water sources.

Figure 6 represents summation of physical losses (in TZS) from each area. Destruction of water sources has the minimum value of 13 130 000 TZS and the maximum value came from floods effects in agriculture (70 794 000 TZS). House collapse and destruction of house properties like furniture caused physical loss of about 37 060 000 and 47 152 000 respectively.

Of all areas, agriculture has the maximum value in physical loss, Maringo (2014) and TNDP (2010) indicated that people do practice farming around the river due to good soil and availability of water, so it is expected that after farms will be highly affected and causing larger losses to the people and as it has been indicated in the results.

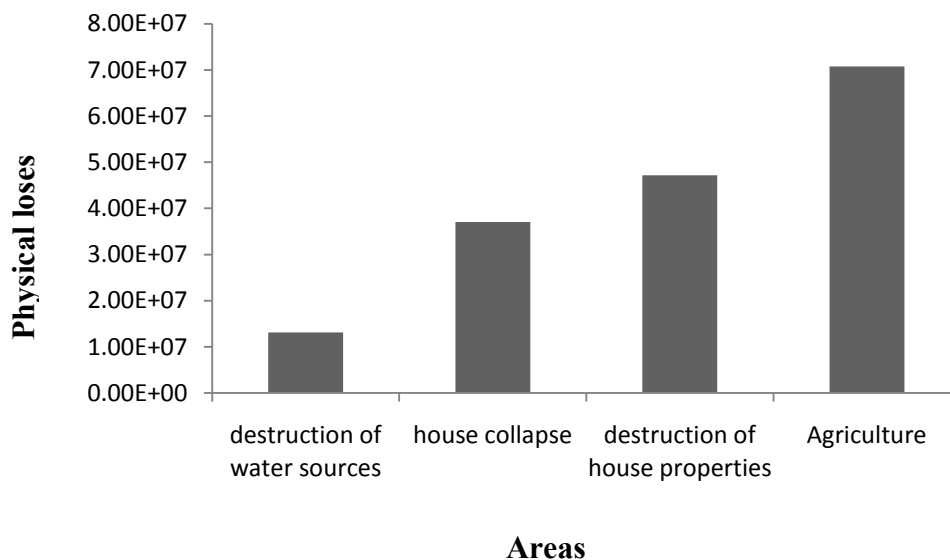


Figure 7: Data physical losses from each area

After summing physical losses from each area for each respondent, data show that a household which experienced a minimum amount had the loss of 340 000 TZS and the household with the maximum amount had the loss of 21 150 000 TZS with mean of 2 8064 000 TZS; and sum of all losses were 168 000 000 TZS. This huge physical loss experienced is also supported by physical observation in the affected area where most of the effects can easily be seen by eyes especially house damage where some of the house had been totally destroyed and could not be used again for accommodation.

4.4.3 Relationship between respondents' willingness to contribute labour and physical losses they experienced

Since only the area which is vulnerable to floods was the one that experienced physical losses from effects of floods, relationship were computed using data from that area only. Coefficient correlation (r) through SPSS was used to examine the relationship. Variables included were willingness to contribute in terms of hours and physical losses in term of money.

Results from Table 5 show that correlation is significant at $P\text{-Value} < 0.01$. Since the obtained value for correlation coefficient (r) is 0.3; this indicates that there is positive relationship between households' willingness to contribute and the physical losses they experienced; that is to say the hours per week that households are willing to contribute increase with increase of physical losses they experienced and decrease with the decrease of physical loss they had experienced.

This means among the most important things that influenced respondents in a vulnerable area to contribute more hours is the extent of losses they had experienced. These findings

are in line with Navrud *et al.* (2012) who indicated that Flood experience had a significant positive effect on WTC labour to the people of Vietnam.

As results showed, activities on agricultural areas are among the factors that caused losses to the respondents. This is an important sector for the wellbeing of many people (URT, 2005), also is the leading sector that supports livelihood of many Tanzanians than any other sector (UNICEF, 2013), this means people are expected to overcome any threat that threatens agriculture sector so as to secure their livelihood.

The contribution can be explained from the physical losses from destruction of water sources. About 46% of Tanzanians have no access to improved water supplies and 75% have no access to adequate sanitation (Mihayo and Mkoma, 2012), and the situation is more worse in rural and peri-urban areas like Kilosa, no doubt people will contribute more in activities that tend to overcome any challenge that will hinder their access to safe and clean water as it has been shown by people from Kilosa in the results.

Table 5: Relationship between number of hours and physical losses

	physical loss	no of hours
Pearson Correlation	1	.317**
Sig. (1-tailed)		.007
N	60	60

**Correlation is significant at the 0.01 level (1-tailed)

4.5 Comparison of households' WTC labour between people who are vulnerable to floods with those who are not vulnerable

The evaluation report done PMO (2010) at Kilosa District indicated that one among important factors which contributes to floods in the District is destruction of the

environment, that is mainly done by people residing in area around the river regardless of the position downward (vulnerable) or not; but the only affected ones are the vulnerable ones. The main reason for this objective is to identify if non-vulnerable residents are being responsible and accountable for their destructive action around the river even though they don't suffer the consequences directly.

In this study it is important to consider accountability as it is very important factor for the successful of the community contribution in any development activity; as Fielmua (2011) showed accountability as key to successful management of water facilities in Ghana and with Madrigal *et al.* (2011), who found downward accountability to be an important factor affecting performance of community-based drinking water organizations in Costa.

Their responsibility could be shown through participating in projects that indent to overcome floods. The extent to which residents from non-vulnerable area have participated in the projects was captured through identifying the difference in their WTC labour and that of residents from vulnerable area who were expected to participate since they are the key victims of floods. This was done by comparing WTC labour of non-vulnerable residents with that of vulnerable ones by using Chi-square test as shown in Table 6.

Results are showing that more respondents from non-vulnerable area offered to contribute highest number of hours than respondents from vulnerable area. This is attributed to the fact that non-vulnerable respondents are located in the villages where they are mainly engaging in labour activities such as farming so it was easy for them to contribute such

hours than respondents from vulnerable area. The highest number of hours mentioned was 12hrs/week which was mentioned by one respondent from non-vulnerable area.

Table 6: Respondents' area and number of hours which they are willing to contribute

No of hours	Vulnerable		Non-Vulnerable	
	Frequency	Percentage	Frequency	Percentage
0	5	83	15	25
1	7	12	1	2
1.5	0	0	1	2
2	5	8	6	10
3	8	13	5	8
4	12	20	5	8
5	1	2	1	2
6	22	37	25	42
12	0	0	1	2
Total	60	100	60	100

As far as to whether the area (vulnerable or non-vulnerable area) of a respondent influence households' willingness to contribute labour in term of hours, results show that there is no difference in the WTC labour between respondents from vulnerable and non-vulnerable area with Chi-square of 15.357 and level of significance 0.05. So as respondent from vulnerable area are willing to contribute, respondents from non-vulnerable area are willing also.

By these results, it means for the successful of the projects that intend to overcome floods in Kilosa District specifically in the area around Mkondoa river; community should be involved as the households around the river is willing to contribute labour. Ward and Pretty referring to a meta-study of 25 World Bank projects indicated that when

beneficiaries knowledge and power is sought and incorporated in planning and implementation project activities are more likely to be sustained (Pretty and Ward, 2001). Studies done in Uganda, show that where communities were involved in water infrastructure installation, the sources tend to be more sustainable over the long run than where they are not (Asingwiire, 2008). Ghana's experience also shows that sources installed without community Participation were abandoned by users (Braimah, 2011).

According to White (1995), participation provides the possibility for sharing information, building trust, constructing rules, monitoring and sanctioning behavior necessary for effective institutional structure which in turn allow participants to share risks, leverage resources, extend pay-back periods, test innovations, and make effective contribution.

On top of that, Golooba (2005) indicated that people are keen to participate in public affairs, that they possess the capacity to do so and that all they need is opportunities. However, local participation does not happen automatically, but has to be facilitated through capacity building and awareness creation, so as to ensure effectiveness of the contribution.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

On the basis of research findings and information gathered from respondents, it can be concluded as follows:-

Of all selected socio-economic attributes, age and education has been identified as the ones influencing the households' willingness to contribute, although women and poor people are among the most affected groups, but information gathered show such attributes have nothing to do with their WTC labour.

The study also confirms that huge physical destructions that have been caused by floods of 2009-10 specifically to households have been motivating many households who are vulnerable to floods to contribute more hours in the activities. Furthermore results are showing that households depending on agriculture have experienced large physical losses from floods, since they have experienced huge farm destructions and a lot of food stocks damage.

All people around Mkondoa River are willing to contribute labour regardless of whether they are vulnerable or not vulnerable, even though non-vulnerable respondents have given out "no" response three times more than those from vulnerable area. From the reasons indicated by non-vulnerable respondents, it means they are taking into consideration of other people suffering.

5.2 Recommendations

From the conclusion above, the study draws the following recommendation:

- a. Since community is willing to participate, responsible institutions should play part in their responsibility so as to ensure floods preparedness, prevention and mitigation projects are permanent and sustainable. Ministry of environment should cooperate with community to ensure that existing laws and guidelines are followed with penalties so as to protect environment around the river. Ministry of infrastructure should ensure that a lot of money which is being used almost every rain season to rebuild and repair infrastructures specifically railway and roads should be saved in alternative activities that aim to permanently avoiding floods.
- b. Provision of education to the community through magazine and seminars by the local government and other organization on what are they supposed to do; the importance of the river may enhance and strength the contribution.

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APPENDICES

Appendix 1: Household Questionnaire

Greetings! My name is.....from Sokoine University of Agriculture, Morogoro. I am doing a study in the District to evaluate households' willingness to contribute on floods mitigation and prevention projects. As a member of this village, you have been selected among others from which the information will be collected. The information collected will be confidential and your participation is highly appreciated.

Respondent name _____

Village _____

Ward _____

District _____

Date of interview _____

Questionnaire No _____

1.0 Social economic information (Please circle the right answer)

4.1 Age _____

4.2 Sex

1. Male 2. female

4.3 Marital status

1. Single
2. Married
3. Widowed
4. divorced

4.4 Education

1. No education
2. Primary education
3. Form four
4. Form six
5. Others (specify)_____

4.5 Occupation activity

1. Farming
2. Pastoralism
3. Agropastoralism
4. Business (specify)_____
5. Employment (specify)_____
6. Others _____

4.6 Household income

1. Below 50,000 TZS
2. 50,000-100,000 TZS
3. 100,000-500,000 TZS
4. 500,000-1,000,000 TZS
5. Above 1,000,000 TZS

4.7 Household size

1. Children (0-12 yrs)_____members
2. Teen (13-17 yrs)_____members
3. Adults (18 and above yrs)_____members

2.0 Household willingness to contribute questions

Hypothetical Scenario

Many of daily activities in Kilosa town have been interfered due to the effects of floods. In addition, during rainy season people are not comfortable enough as they don't know what will happen if the rain will lead into serious floods. With no appropriate prevention and mitigation projects/programmes, people will still continue to be susceptible to subsequent flood events.

District and village authorities want their people to live free from risks and vulnerability of floods, so that they concentrate in securing their livelihood and so having better living rather than troubling themselves with floods impacts. To accomplish that, there should be appropriate, long run projects to clear the effects of floods and prevent them from happening again.

Suppose the government is now considering implementing flood prevention and mitigation projects, which in future years will completely avoid the damages you have been experienced. These measures will be financed by the government and other international donors, but the local population will have to provide labour for these measures to be implemented.

Now we are asking a series of questions on maximum number of hours that your household would be willing to contribute labor on these projects. In answering these questions please think about the effects of flooding on the health and well-being of your household, and the damages to your home, agricultural production, livestock, and other costs that the flood has caused your household. Also consider that you would need to foregone other activities in order to contribute.

1.1 Are you willing to contribute in the projects?

1. Yes (go to #1.2)
2. No (go to #1.5)

1.2 Are you willing to contribute 6 hours per week as time in different projects that intend to mitigate and prevent floods in your area?

1. Yes (go to # 1.4) 2. No (go to # 1.3)

1.3 What maximum number of hours per week are you willing to contribute as labour in mitigation and prevention projects _____

1.4 If “YES” indicate the reason/s why are you willing to contribute in the projects

1. For the benefit of my household
2. I want the future generation to be from stresses of flood
3. It's good to do so
4. The time given is reasonable
5. Other reasons, specify _____

1.5 If you are not willing to contribute in any of the projects, please indicate the reasons

1. Other things are more important things than avoiding flood
2. I don't believe the government will implement the projects
3. I think am not vulnerable to flood
4. Weak health
5. Other reasons, specify _____

3.0 Questions on the Flood effects

2.1 House

2.1.1. Did your house collapse due to floods?

1 = Yes 2 = No – go to 2.2

2.1.2. How much loss did you experience from the collapse (monetary value)

2.1.3. Did the collapse of the house force you to relocate to a new area?

1 = Yes 2 = No

2.2 Property/ Asset

2.2.1. Did the house lose any of the following property or asset?

1 = Yes 2 = No

Property	yes	No	Cost(TZS)
Bed			
Bicycle			
Radio			
Furniture			
Hoe and			
Television			
Other.....			

2.3 Agriculture

2.3.1 Did the household experience crops damage during the floods?

1 = Yes 2 = No

2.3.2. If yes, what was their value interm of money_____?

2.3.3 Did the household experience any loss of food stocks during the floods?

1 = Yes 2 = No

If yes could you indicate the amount (quantity) _____?

2.3.4 Did any of your household lose any domestic animals?

1 = Yes 2 = No

2.3.4 If yes, what was their value in terms of money _____?

2.4 Education

2.4.1. Are there any education facilities in your area?

1 = Yes 2 = No

2.4.2 Did any of the school going children in your household experience any disruption in attendance due to the floods?

1 = Yes 2 = No

2.4.3 Was there any damage to school infrastructure (classroom blocks, teacher's houses, toilets) due to the floods?

1 = Yes 2 = No

2.4.4 If the answer to 2.4.2 above is yes, why? (Indicate main reason/s)

1. _____

2. _____

Others _____

2.4.5 What additional cost did you incur to take your children from your household to school?

2.5 Health

2.5.1. Are there any health facilities in your area?

1 = Yes 2 = No

2.5.2. Was there any damage to health facilities due to the floods?

1 = Yes 2 = No

2.5.3 Was there any disturbance in access to health services due to the floods?

1 = Yes 2 = No

2.5.4 Did any of the household members get sick during the floods?

1 = Yes 2 = No

2.5.5 If YES what diseases were experienced? _____

2.5.6 What additional cost did the household incur to treat the members?

2.6 Sources of water

2.6.1. What is your common source of drinking water? _____

2.6.2 Was the main source of water affected by the floods?

1 = Yes 2 = No

2.6.3 Did those effects cause you to add some cost to get more clean water?

1 = Yes 2 = No

2.6.4 If YES by how by much _____

2.7 Please indicate in details any loss that you incur and it have not mention here

_____ **Vuln**

erability to Floods

3.1 Is your house located in flooded area?

1= YES 2=No 3= I don't know

3.2 If YES what are the underlying causes of vulnerability?

a) Residing in a flood prone area.

b) Poverty

c) Lack of alternative livelihood(s)

Other specify _____

3.3 Who are the most vulnerable household's heads to floods?

1 = Male Headed 2 = Female Headed.

Appendix 2: Checklist for Key Informants

**District Officer, Village Officer, Educational Officer, Health Officer,
Agricultural Officer,**

What was the effect of the flood in the following areas?

Areas	Level of effects 1= no effects 2= Moderate effects 3= Severe effects	Reasons	Loss experienced if it is known
Crop (production)			
Crop (stock)			
Livestock			
Health			
Water (access)			
Infrastructure			
Housing			
Property/assets			
Education			
			Total loss_____

3.4. Were health facilities in the flooded area(s) affected? If YES, explain to what extent they were affected.

3.5. Was there any disruption in the access to health facilities? If yes, provide details of the disruption.

3.6. Was there an increase in disease outbreak/ incidents due to the floods?) Explain giving details of major health problems and age groups affected).

3.7. What are the common water sources in the community?

3.8. What percentage of the community water sources were affected by the floods?

3.9. Did the affected households experience any water accessibility problems?

3.12. What type of infrastructures (road, bridges/ culverts) are available in the District/ village?

3.13. What was the impact on the infrastructure?

3.14. Was there any educational infrastructure affected by the floods in the District/village? If yes, provide details;

3.15. Was there any disruption in learning due to floods?

3.16. Did the communities experience crop and livestock loss due to floods? Explain by giving details of losses and estimate population affected.

3.17. What was the impact of the floods on people's houses?(Explain in detail giving data if possible)_____

4. Underlying Causes of Vulnerability to floods

4.1. What in your view are the underlying causes of vulnerability on the District/ village? Elaborate.

4.2. Who are the most vulnerable groups?

Appendix 3: Sampled population per village

Sampled village	Household Population	Sampled population
Kidete	801	30
Mwasa	712	30
Ukaguru	675	30
Kasiki	711	30

Source: Tanzania census 2012