REPOA
Research on Poverty Alleviation

16th ANNUAL RESEARCH WORKSHOP

Demand Assessment for Agricultural Microinsurance:
A case study of timberwood smallholder farmers in Mufindi district

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Work in progress ***Session I***

Presented at REPOAs 16th Annual Research Workshop
held at the White Sands Hotel, Dar es Salaam, Tanzania;
March 30-31, 2011

REPOA funded this research project as a part of our capacity building programme for researchers. This preliminary material / interim, or draft research report is being disseminated to encourage discussion and critical comment amongst the participants of REPOA's Annual Research Workshop. It is not for general distribution.

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ABSTARCT

This study focused on assessing key risks in timber wood production and their impact, the present coping mechanisms against the risks and their effectiveness, the role that can be played by agricultural micro insurance/Microfinance in the whole process of providing AMI services and the constraints/determinants of AMI supply in timber wood farming.

Focused group discussion, questionnaires and interviews were used to collect primary information on the set research questions. Content and matrix analysis were used to analyze the information collected through focused group discussion and interviews. On the other hand SPSS software was used to generate descriptive statistics (frequencies and percentages) from the questionnaire.

Findings of the study revealed that, fire was the riskiest hazard in timber wood production. The use of fire breaks was found to be the main coping mechanism for fire however it is not always effective, and the farmers perceive fire hazard as beyond their control. Demand for AMI was found high however their awareness to AMI is very minimal. Microfinance and agricultural micro insurance institutions can better serve the community through agent-partner or full service models. Lack of legal framework and policy support at National level, lack of adequate historical data at farm level, covariant risks, poor infrastructure (information and distribution) and lack of expertise in designing AMI were reported as the main constraints/determinants of provision of AMI services.

Based on the findings, this study makes various recommendations to policy makers; the need for the Government to set a clear AMI and legal framework on AMI that is both equitable and pro-poor, set information system for creating awareness to farmers and the infrastructure. Moreover, due to the complex nature of AMI, there is a need for the Government to get involved in the provision and supervision of AMI.

1 BACKGROUND INFORMATION

1.1 Introduction

Agricultural production is typically a risky business. Farmers face a variety of price, yield, and resource risks, which make their incomes unstable from year to year. In many cases farmers are also confronted by the risk of catastrophies. Crops and livestock may be destroyed by natural hazards such as hurricanes, floods, windstorm, hailstorm, frost, drought and other Man made hazards such as fire. When such hazards hit, the poor are the mostly affected since their coping capacity is low. Hazards are the main source of poverty in Developing Countries, Tanzania inclusive. Making agricultural micro insurance available to Smallholder farmers in Developing Countries such as Tanzania, will contribute significantly to achieving global development priorities, such as Millenium Development Goals (MDG) of halving poverty and hunger by 2015

Agricultural micro-insurance has been documented to be among the strategies that can provide a constant support to poor farmers in the event of a natural catastrophe (FAO, 1991; Hazelle *et al.* 1986 cited by Vandeveer, 2001; Hueth and Furtan, 1994). Many studies confirm the many benefits of agricultural micro insurance, such as; improve farmers' access to formal credit as it serves as collateral, promote the adoption of modern farming technologies, encourage farmers to invest appropriate levels of farm inputs, stabilization of agricultural crop prices; and relieves the Government from administering expensive ad hoc disaster relief operations for the farming sector. Others are protecting farmers from losses caused by insured perils, smoothen their income floor; and reducing reliance on post-disaster financing which can be more costly to the Government (Levin and Reinhard, 2007; Robert, 2005; and Manojkumar *et al.*, 2003).

The growth in demand for crop insurance is stated to have its origins in changes in the farming sector. Powerful influences are; increasing incidence of crop damaging weather events, greater commercialization of farming; example through contract Farming, World Trade Organization regulations, classic crop insurance products, accidental introduction of pests and diseases and food safety and environmental protection concerns (Eaton and Shepherd , 2001).

Tanzania has been stated to be amongst African countries on the top twenty of countries highly affected by natural hazards (Jan *et al*., 2006). Agriculture is the most affected sector by hazards such as droughts, floods, fires and hurricanes but it is not yet protected. Liberalization of insurance market on the other hand has not made an impact in agricultural sector, since none of them has devoted itself to provide agricultural insurance service. Moreover, studies on demand for agricultural micro insurance are limited and scarce in Tanzania. According to Robert (2005), conducting a demand study is a pre-requisite before introducing the product or service in a new place. Preliminary

results reveal that there is demand to crop insurance among Smallholder farmers to carter for drought and Pests and diseases in bean farming (Akyoo, 2004).

Mufindi is among the main producers of timber plantations and timber products in the Country, it is the first producer in Iringa region with a total of 102,369ha (57.1%), followed by Njombe 53,000ha (29.6%), Makete 10,219, Kilolo 6,940 and Ludewa 997. It is the main contributor in Region Government revenue. For example in year 2004/05, a total of Tshs 3.2 billions, were collected from timber wood production. Mufindi contributed 98.6% of the total revenue from timber (URT, 2007).

Moreover, there is a continuous increase of timber wood farmers due to increased demand for timber products locally and worldwide. For example, in a study conducted by Singunda (2009), it was found that 35% of family tree growers in Mufindi were new (less than 8 years in tree planting). In Tanzania, the total gross area of forest plantations is estimated to be 160,000 – 200,000ha of which 80,000 – 100,000ha is estimated to be village and farm plantations (MNRT, 2008). Softwood plantations on the other hand, cover about 70,000ha or 85% of the gross plantations area (op.cit). At household level, timber wood production in Mufindi is the source of employment, fuel wood, and income through selling young seedlings, mature trees, sawn timbers and timber by products.

Despite of the contribution of this sector to National economy and household livelihoods, the sector is highly vulnerable to various risk hazards such as fire, drought, pests and diseases and storms. No protection against the hazards and financing this sector especially the smallholder farmers who own 3ha and less is a still a dream. According to UNDP, (2005) report, the majority of economic losses are concentrated in the developed world; however the statistics fail to adequately capture the impact of the disaster on the poor who often bear the greatest costs in terms of lives and livelihoods, and rebuilding their shattered communities and infrastructure. Therefore any damage to these forests results into economic instability on the part of the households engaged in the activity. It is for this reason that protection is needed.

This study therefore aim at investigating the demand for agricultural micro insurance by smallholder timber farmers in Mufindi district on one side, while also the supplier of insurance and microfinance from study area will be interviewed to collect information on their shy away from providing insurance in agriculture sector.

1.2 Limitations of the study

This study does not pretend to be free of limitations. Though the findings and conclusions are not affected, it is important to highlight some of the limitations. Firstly, the study has only been conducted in Mufindi District, and has not examined regional variations in Tanzania. Secondly, as with most surveys, the study only captures the circumstances prevailing at the time of the interviews. Thirdly, it is also possible that some of the respondents did not provide their true opinions during the interviews because they regarded some of the questions as sensitive. However, this group is

regarded to be small and we assume that they did not affect the overall results and conclusions.

1.3 Organization of the report

This report is organized in the following way; chapter one covers introductory part, chapter two deals with literature review and theoretical framework, chapter three presents research methodology used in this study, while research findings and discussion has been dealt in chapter four. Moreover, chapter five covers the conclusion part ad chapter six dealt with emerging policy issues and dissemination pathway.

1.4 Problem statement and significance of the research

Agricultural micro-insurance has been documented to be among the strategies that can provide a constant support to poor farmers in the event of a risk hazards. Many studies confirm the many benefits of agricultural micro insurance, such as; improve farmers' access to formal credit as it serves as collateral, promote the adoption of modern farming technologies, encourage farmers to invest appropriate levels of farm inputs, stabilization of agricultural crop prices; and relieves the Government from administering expensive ad hoc disaster relief operations for the farming sector. Others are protecting farmers from losses caused by insured perils, smoothen their income floor; and reducing reliance on post-disaster financing which can be more costly to the Government (Levin and Reinhard, 2007; Robert, 2005; and Manojkumar *et al.,* 2003).

Despite the role played by micro insurance in agricultural development and economic stabilization, the service has not yet started in Tanzania although there are many insurance Companies operating in the country, providing various products in their portfolio as a result of liberalization of insurance sector since 1990s. From 1990s, the Government of Tanzania has been implementing financial sector reforms including liberalization of financial markets, in which, Insurance market was also liberalized in 1996. This was done in order to improve the service outreach and accessibility to all types of stakeholders including poor people who mostly live in rural areas solely depending on agriculture as their means of survival.

The reasons that have made the companies shy away from providing agricultural insurance services are not known. On the other hand, crops like timber wood plantations are very profitable both at household level and National economy but they are not protected from natural calamities. Demand for agricultural micro insurance by timber wood farmers is not known and limited literature is available to explain the same. This study therefore, aim at assessing the demand for agricultural micro insurance by timber wood producers in Mufindi District, and identifying the reasons for insurance and microfinance institutions from not providing the service to timber wood producers despite its profitability.

1.5 Objectives of the study

1.5.1 General objective

The aim of this study is to investigate the demand for agricultural micro insurance in timber wood production farmers.

1.5.2 Specific objectives

1. To assess key risks in timber wood production.
2. To investigate the impact of the risks in timber wood production.
3. To identify the current coping mechanisms in use against the risk hazards
4. To assess the effectiveness of the coping mechanisms in place
5. To identify where agricultural micro insurance/microfinance can play a role.
6. To identify the determinants of supply of agricultural micro insurance in timber wood farming.

2 THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 Theoretical background

Mohhamed and Ortmann (2005) defined agricultural micro insurance as "the elimination of the uncertain risk of loss for the individual through the combination of a large number of similarly exposed individuals who each contribute premium payments sufficient to make good the loss caused to any one individual". Robert and Dick (1991), define crop insurance as a financial mechanism that aims at reducing the uncertainty of loss by pooling together a large number of uncertainties so that the burden of loss is distributed. Mark (2005) stated agricultural insurance as a direct way of assisting small-scale farmers confronting production risks, with the expectation that such insurance would lead to less risk-averse behavior and to the more efficient use of farm resources.

According to Ray (1991), agricultural insurance has been defined as a social device which aims at reducing the uncertainty of loss through a combination of a large number of similar uncertainties by distributing the burden of loss over space and time through the use of accumulated funds.

A more specific definition of agricultural micro insurance that this study has adopted was reported by Mark (2005), as a means of protecting farmers against uncertainties of crop yields, arising out of practically all natural factors beyond their control. It is a financial mechanism in which the uncertainty of loss in crop yields is minimized. Minimization of loss is acquired by pooling most uncertainties that impact on crop yield so that the burden of loss can be distributed. When crop insurance is targeted towards serving smallholder poor farmers, it is termed crop/agricultural micro insurance.

Agricultural micro insurance has been advocated as a direct way of assisting small-scale farmers confronting production risks, usually with the expectation that such insurance would lead to less risk-averse behavior and to the more efficient use of farm resources. It is a way of transferring the actual loss to another party in exchange for a fixed premium in advance of the occurrence of loss. The intended purposes of agricultural micro insurance are twofold: stabilizing income and ensuring enough income each year to repay debts and meet essential living costs. These objectives must be achieved at a lower cost than the cost of risk Hazelle *et al*, 2000). In this study, micro insurance is defined in line with Robert (2005) as an insurance that (i) operates by risk-pooling (ii) is financed through regular premiums and is (iii) tailored to the poor who would otherwise not be able to take out insurance.

2.2 Literature review

2.2.1 Natural hazard risks

According to UN/ISDR (2002) report, natural hazards are natural processes or phenomena occurring in the biosphere that may constitute a damaging event or disaster. They comprise of geological phenomena such as earthquakes, tsunamis, and volcanic eruptions, and natural phenomena such as floods, storms, droughts and related disasters, landslides, avalanches, waves and surges. There are also biological hazards such as pests and disease infestations. Natural hazards are stated to be characterized by related to known processes, occurrences within a short timescale, immediate effects which are unintentional and rising emergency situation in a prone country or household (SINAPRED/UNDP, 2004).

2.2.1.1 Agricultural natural hazards in Tanzania

Tanzania is stated to be among the countries worldwide that are affected by various natural hazards, causing life, property and agricultural loss in the country. According to PMO (2000), agro-climatic hazards in Tanzania include drought, fire, hail, hurricane, frost, strong winds, and floods. The findings revealed that, disease epidemics, pests, drought, floods, fire, strong winds, landslides and earthquakes are the major natural hazards in Tanzania.

2.2.1.2 Effects of shocks from natural hazards to households

According to (Mark, 2005), the typical effects of a hydro-meteorological, geological, or biological disaster are one or more of the following; a decrease in farm income, decrease in employment for hired farm workers, a generalized fall in demand throughout the local or regional economy as a result of the reduced agricultural income of affected farm families and agro industries, an increase in loan defaults in affected region, affecting both financial intermediaries and agricultural input suppliers who sold on credit. a decrease in government tax revenue and foreign earnings due to a fall in agricultural exports and an increase in the price of basic food items, if the affected commodities where normally marketed domestically.

2.2.1.3 Importance of risk management for agricultural development

Risk management is stated to play a crucial role in the investment and financing decisions of farmers in developing countries and in transition economies. Basic risk management measures in agriculture include choice of plant varieties and animal breeds, crop and animal husbandry practices, diversification of farm enterprises as well as taking precautionary prevention measures against adverse weather events such as using mulching and shelter belts and, perhaps most important of all, securing access to supplementary irrigation facilities (Robert, 2005).

2.2.2 Riskiness of natural hazards

Riskiness of a natural hazard is the degree to which it causes a potential harm to crops when compared to others. In a study conducted by Akyoo (2004), assessment of

riskiness of natural hazards in bean farming was done. In this study, farmers were asked to respond according to their own experience and perception of each particular hazard. Farmers' assessment was based on the extent and ability of a hazard to cause crop loss, thus both severity and frequency of the hazard concerned were taken into consideration. The methodology used in the assessment was that the most severe hazard was assessed very risky and the least was assessed not risky. The results of this assessment showed that drought was the riskiest hazard followed by pests and diseases.

Riskiness assessment of natural hazard is important in the consideration of agricultural insurance potential since farmers and insurers ought to know the riskiest hazard(s). This knowledge is stated to be important in determining insurability of the respective risk(s) given its nature and its selection among others. In most cases insurers are willing to insure specific risks rather than all risks if crop insurance is to be viable. This study therefore has adopted this methodology as it is useful in assessing both attitudes and perception of farmers towards hazards based on experiences they have.

2.2.3 Risk coping strategies

Traditionally, farmers are reported to innovate several ways to deal with disaster. For example selling part of their assets (such as livestock), using on-farm stocks and family savings, and seasonally migrating to places where there is work, sending money to those who stay on the farm. However, the obvious alternative at the farm level is the use of risk-preventing techniques, which include resource and enterprise diversification and adjustments to husbandry techniques within cropping systems. Crop diversification, intercropping, and flexible input use are the best-known practices to reduce production risk (Smith and Baquet, 1996).

2.2.4 Effectiveness of risk coping strategies

Ramesh and Nishant, (2006) in his study to identify the strategies used by older persons to cope with chronic non-cancer pain, used qualitative methods for assessment. He also measured their effectiveness by using a five-category response scale (1=not at all effective to 5=extremely effective). The same methodology was also used by Akyoo (2004), to assess the effectiveness of risk coping strategies in bean farming in Arumeru District, risk coping strategies were identified as borrowing from neighbors, dependence on remittances, spatial separation of plots and diversification to off-farm activities. The results showed that they were not effective and therefore necessitating the need to introduce crop insurance. This methodology is referred by Senkondo (2000), as a structured questionnaire approach in risk perception assessment. This methodology has also been employed in this study since it is a good measure of perception.

2.2.5 Agricultural micro insurance role

According to the study done by Toyoji (1987) in Japan, crop insurance was found to benefit farmers through the following ways: i) expansion of rice production into riskier areas ii) enabling farmers to secure credit, thereby buying fertilizers, seeds, herbicides and farm implements iii) compensating crop loss and therefore preventing a severe contraction of the economy of the region.

The basic ideas to the understanding of insurance are the reality that insurance does not and cannot obliterate risk. It spreads risk. There are two dimensions to this spread. The first dimension is the spread across an industry or an economy, extended in the case of international reinsurance to the international sphere. The second dimension of spread is through time. Most insurance programmes operate on both dimensions. The important fact to note is that insurance does not directly increase a grower's income. It merely helps manage risks to this income (Robert, 2005).
Hazelle (1992) has argued that with the reduction in risk made possible by crop insurance, production of many crops will increase. "Increases in production induced by crop insurance will benefit consumers as well as producers. Goodwin (1993) stated that crop-credit insurance for farmers might be effective in stimulating adoption of new and risky technology in agriculture.

2.2.5.1 Constraints in implementing agricultural micro insurance
According to Levin and Reinhard (2007), insurance against agricultural risks is not new at all. It was widely spread in Latin America and other developing countries during the 1960s and 1970s. They further states that, although demand for micro insurance solutions for small farmers in developing countries is great, the supply side faces several constraints and challenges which prevent the private sector from becoming involved in these solutions on the large scale. Being difficult to design and expensive in terms of administration and claims settlement, most of the comprehensive, multi-peril insurance covers encountered financial difficulties and were either scaled back or completely stopped. Among the common problems in micro insurance has been reported by Levin and Reinhard (2007) as asymmetric information which results into adverse selection, moral hazard and education/communication. Other problems that are specific to agricultural micro insurance are correlated risks, high administration costs non-transparent and unequal free disaster assistance and lack of infrastructure (information and distribution). FAO (1991), depicts that, inadequate benchmark data on the extent of damage to crops (long period and reliable data), and difficulty in determining the riskiness of farmers across crops and localities are stated to be the main constraints in implementing crop insurance programs in developing Countries; while lack of statistical independence, asymmetric information, high administrative costs, mismatch between farmers preferences and capacity to pay, inadequate legal and regulatory frameworks, distorted government incentives and reluctance of reinsures to enter the market, are reported by Wenner and Arias, (2003), to be the impediments to the development of agricultural insurance markets in developing countries, in which Tanzania is inclusive.

2.2.5.2 Factors influencing demand for agricultural micro insurance
Alexander *et al*. (2003), in studying demand for weather insurance in Kilimanjaro and Ruvuma, found that demand for the weather insurance is enhanced by higher incomes, exposure to markets and the type of coping mechanism. The study utilized a contingent valuation (CV) technique and panel data to analyze the demand for weather insurance.

In a study done to examine factors influencing the demand for crop and revenue insurance, Ashok *et al*. (2003), accomplished it by estimating a multinomial logit model

of insurance choices. Results indicated significant differences in the probabilities of adoption of each insurance plan. The levels of selected explanatory variables, such as operator's education level, debt-to-asset ratio, off-farm income, soil productivity, participation in production and marketing contracts, and the type of farm ownership, appeared to be the determinants of demand for crop insurance. In another study conducted by Mohammad and Ortmann, (2005), the results of a logit model indicated that formal education of the farmer and the farmer's awareness to insurance increased the probability of insurance demand.

In a study conducted by Ramesh and Nishant, (2006) to analyze factors that determine the demand for health insurance in a Micro insurance scheme in India, data used were primary, collected through survey of households. The findings showed that income, health care expenditure, age, coverage of illness, knowledge about insurance was found to be significant in determining health insurance purchase. Smith and Baquet, (1996), reported that, the Premium rate, expected yield returns, household income, farm size and farm operator experience, were the major factors that influence demand for insurance.

Demand was also found to depend on the possession of assets including (off farm income, livestock holdings, cultivated area, public aid and private gifts), household characteristics (adult equivalent size and age of household head), and plot characteristics (years since last fallow and soil type diversification). This explain that those who are wealthier and / or are more self insured demand less formal drought insurance, however assets were also found to allow households to make risky decisions that lead to demand for insurance (Takeshi and Thomas, 1997).

In a hypothetical study done by Vandeveer (2001), to examine the demand for area crop insurance among Litch producers in Northern Vietnam, estimation using logit model revealed that farmers with higher income levels and farmer education were the main determinant of demand for crop insurance.

3 RESEARCH METHODOLOGY

3.1 Description of the study area

The study was conducted in Mufindi District which is located in Iringa region. Mufindi District is the largest producer of timber wood plantations in the Country. According to the Iringa region socio-economic profile, the district constitute 46% of the region land under forest cover, contributes about 98.6% of the government revenue from timber wood and has an area of 102,369ha of timber wood plantation (57.1%) of the region.

Mufindi District is one of the eight administrative areas of Iringa Region. It is located 80Km South of the Regional capital of Iringa. The District Geographical location is 30^0-36^0 longitudes east and latitudes 8^0-9^0 south. It is bordered by Njombe District to the south, Mbarali District to the West and Iringa District to the North. To the East lies Kilombero District in Morogoro Region. Administratively the district is divided into 5 divisions of Ifwagi, Sadani, Kibengu, Kasanga and Malangali, 28 wards and 132 villages.

3.2 Study type and data collection techniques

Demand assessment for agricultural micro insurance is designed as a qualitative study since it aim to gather an in-depth understanding of the demand for agricultural micro insurance which has not yet started in Tanzania although it is highly advocated. The study aimed at collecting information on key risks and their riskiness in timber wood production, its impact, coping mechanisms in place and their effectiveness, investigate the role of micro insurance/microfinance as risk management strategies. On the other hand, the study also aimed at collection information from financial institutions on their unwillingness to provide agricultural micro insurance in timber wood production.

Data collection techniques used were qualitative approaches, they involved use of focus group discussion (FGD) and use of key informants to gather information on risks, coping mechanisms and their effectiveness. Qualitative techniques were supplemented by the use of structured questionnaire to selected respondent timber growers. On the other hand, a checklist was used to gather information on determinants of supply of agricultural micro insurance from the supply side of insurance. Primary data collection was carried out in two rounds. The first round took place between November 20th to Dec 20th in year 2009, and covered timber wood farmers. The second round was conducted for microfinance and insurance providers, between February 1st to 10$^{th.}$ Feb of 2010.

3.3 Sample and sampling procedures

A structured questionnaire, utilized a sample total of 80 timber wood farmer respondents, 20 from each village respectively. In order to get the sample, the following multi-stage sampling technique procedural steps were followed: First stage involved

identification of the districts within Iringa region, which produce substantial amount of timber. Second stage constituted identification of wards within Mufindi which are potential in timber farming. Third stage involved selection of four villages within the selected Ward. Four villages namely Ifwagi, Mwitikilwa, Ikongosi and Mtili were selected. Finally, a random selection procedure was used to select a total of 80 smallholder farmers for interview, 20 farmers from each village. On the other hand, in order to collect information from the supply side of micro insurance, one ward Saccoss, two microfinance and two insurance institutions were consulted for interview. They included Ifwagi saccos, Mucoba (microfinance and insurance) and Giraffe insurance.

To constitute a focused group discussion, 10 members were selected based on in timber production, while key informants constituted 4 people selected based on experience in timber production and its setup, village history and understanding of climatic issues.

Table 1: Number of households sampled by village in Ifwagi Ward

Division	Ward	Villages	No. of households	Percent
Ifwagi	Ifwagi	Ifwagi	20	25.0
		Mwitikilwa	20	25.0
		Mtili	20	25.0
		Ikongosi	20	25.0
Total			80	100.0

Table 2: Number and type of financial institutions interviewed

Type of Financial Institution	Number
SACCOS	1
Microfinance Banks	2
Insurance Companies	2

3.4 Data processing and analysis

Data collected through focus group discussion and from the key informants and from financial institutions, were analysed by using matrix and content analysis that was prepared for each specific theme. On the other hand, all collected data by using the structured questionnaire, ware coded and entered in the computer, where analysis was done by using Statistical Package for Social Science (SPSS) computer programme, to generate frequencies and percentages on each specific variable.

3.5 Research questions

1. What are the key risks in timber wood farming in Mufindi Districts?
2. What are the impacts of the key risks in timber wood farming in Mufindi?
3. What are the coping mechanisms in place against the risks in timber production?
4. Are the coping mechanisms in place effective in protecting the farmers against the risks?
5. Where and how agricultural micro insurance can play a role as a risk management strategy? (secondary data review)
6. What are the determinants of supply of micro insurance in timber wood farming?

4 RESEARCH FINDINGS AND DISCUSSION

4.1 Key risks in timber wood farming

Hazardous risks are naturally occurring physical phenomena caused either by rapid or slow onset events having atmospheric, geologic and hydrologic origins on global, regional, national and local scales. They include earthquakes, volcanic eruptions, hurricanes, landslides, tsunami cyclones, floods, drought, fire and epidemics. They may represent a serious breakdown in sustainability and disruption of economic and social progress. In the study area, fire hazard was found to be a threat (riskiest) hazard in timber wood production more than any other risk. The riskiness of other hazards were assessed as follows;

4.2 Riskiness of natural hazards

Riskiness of a natural hazard is the degree to which the hazard is severe and results into high crop losses when it strikes. Ray (1991) reports that, always insurers would like to insure a single risk rather than multiple risks for sustainability of the insurance company. Therefore, this necessitates the assessment of the mostly perceived riskiest natural hazard that farmers could like to insure against. The following section deals with the individual assessment of riskiness of natural hazards.

4.4.1 Drought hazard riskiness

Drought is among the very important hazard that affects field crops in Tanzania. When farmers were asked to indicate the overall riskiness of drought hazard, results showed that, drought is not a risky in the study area. This is supported by the results which show that, 100 percent of respondents from Ifwagi, Mwitikilwa, Ikongosi and Mtili reported drought not risky in timber production. Therefore generally, it can be concluded that across the villages under study, drought is not risky. The results are summarized in appendix A, Table 1.

4.4.2 Pests and diseases hazard

Pests and disease hazard has been stated to be among dangerous hazard in crop production. Akyoo (2004) ranked the hazard second after drought hazard in bean farming. When farmers' were asked to indicate the riskiness of the hazard in timber production, cross tabulation results showed that the hazard was location specific. For example, in Mwitikilwa, Ikongosi and Mtili villages the hazard was ranked very risky with the overall respondents' percentage of 12.5, 26.9 and 30.0 respectively. On the othe hand, it was ranked not risky by 80.0, 87.5 and 71.3 and 65.0 percent in all the villages respectively. Therefore, from the results it is concluded that pests and diseases hazard vary across the villages, but it is not an important risk. Riskiness of pests and diseases was found to be high in the nursery plots. The results are summarized in appendix A, Table 2.

4.4.3 Hailstorm natural hazard

Hail is a solid precipitation in the form of hard pellets of ice, which fall from cumulonimbus clouds. These balls or lumps of ice are often spherical, conical or irregular in shape and are composed of alternate concentric layers of ice and compacted snow. While extremely large hailstones are rare, hailstorms are a great problem to farmers. In Tanzania, hailstorms cause considerable damage to valuable crops. In this study, farmers were asked to rank the riskiness of this hazard from very risk to not risky. Cross tabulation results revealed that the hazard is not risky by 90.0, 83.0, 76.9, and 84.0 percent in Ifwagi, Mwitikilwa, Ikongosi and Mtili villages respectively. Thus in general, the differences in riskiness perception of hailstorm across the villages are not significant. The results are summarized in appendix A, Table 3.

4.4.4 Frost hazard riskiness

Frost is a natural hazard which occurs when the temperature of the air in contact with the ground, or at screen level (about 4 ft or 1.2 meters) is below the freezing point of water (ground frost or air frost respectively). The term is also used for ice deposits that may form on the ground and on objects in such temperature conditions. In the study area, frost hazard do occur in June, July and August of every year, resulting in a significant loss although in just a short period of time. During the study, respondents were asked to assess the riskiness of frost in the study area. Respondent results showed that the hazard was generally not risky. This was supported by 70.0, 69.0, 73.1 and 65.0 percent of respondents from Ifwagi, Mwitikilwa, Ikongosi and Mtili respectively. The results are summarized in appendix A, Table 4.

4.4.5 General discussion on the assessment of hazard riskiness.

The general assessment of natural hazard riskiness aims at giving overall results of riskiness for comparison purposes, so that the most risk hazard can be identified. The overall result showed that, among all the natural hazards, fire were assessed the most risky hazard. Therefore it is advised to insure for fire hazard since this is found to be genuine to all the villages, and their associated loss is high. Therefore, if agricultural micro insurance is introduced, it can work in all villages for fire hazard.

4.3 Risk coping mechanisms in the study area

Coping mechanisms has been defined by UN/ISDR (2004) as a manner in which people use their existing resources in the adverse conditions of a disaster or risk. These risk coping mechanisms ranged from diversification to off-farm activities, spatial separation of plots, and diversification to other crops, minimum investment, sale of assets, wage employment, dependence on government relief aids and irrigation. Effectiveness of the already operating coping strategies has got an influence on the demand and preference for crop insurance. In other words, farmers will accept crop insurance only when the risk coping strategies are not effective. Therefore, this study was interested in assessing the effectiveness of the above mentioned coping strategies across villages in study areas.

4.3.1 Diversification to off-farm activities

Diversification to off-farm activities occurs when a farmer decides to shift away from farm production activities to other non-farm activities, as a result of hazardous effects.
In assessing the effectiveness of this strategy, almost all respondents reported that the strategy was not effective. This was supported by 72.0, 50.0, 84.6 and 83.0 percent in Ifwagi, Mwitikilwa, Ikongosi and Mtili villages respectively. Therefore this method was generally found not effective in combating risks associated with natural hazards across all the villages. The results are summarized in appendix B, Table 1.

4.3.2 Spatial separation of plots

Spatial separation of plots involves having more than one farm plots that are scattered, so that when one is affected by natural hazards, the other ones serves the farmer so that the business does not completely collapse. In all the villages, the strategy was assessed not effective by 100.0, 95.8, 92.4 and 96.8 percentages in Ifwagi, Mwitikilwa, Ikongosi and Mtili respectively. Therefore the strategy was generally found not effective across the villages. The results are summarized in appendix B, Table 2.

4.3.3 Diversification to other crops

Diversification to other crops involves growing timber and other crops at the same time in separated plots. This helps in case timber is affected by natural hazards; a farmer sells the produce from other crops to get money. Respondents' in the study area were asked to assess the effectiveness of this strategy. The results were found to vary across villages. About 72.0 percent in Ifwagi, 65.4 percent in Ikongosi and 71.0 percent in Mtili villages, reported the strategy not effective. On the other side, only 33.3 percent in Mwitikilwa reported the strategy as not effective while 37.5 percent reported effective. Therefore, although the results vary, generally the strategy was assessed not effective. The results are summarized in appendix B, Table 3.

4.3.4 Minimum investment

Minimum investment is a risk coping strategy in that, a farmer may decide for example, to apply very little amount of fertilizer in the farm so that in case natural hazards strikes the crop, the farmer does not lose much of his invested capital. Another example of minimum investment is the cultivation of just small farm plots. Generally minimum investment involves investing little in the farm for the fear of natural hazards attack.

In order to understand the effectiveness of this strategy against natural hazard risks, respondents were asked to assess its effectiveness. Results showed that, in all the villages, the method was not effective. The results were as follows: Ifwagi village, 84.0 percent not effective, 83.3 percent in Mwitikilwa, 92.3 percent in Ikongosi, and 76.0 percent in Mtili village. Therefore from the results it was concluded that the strategy was not effective. The results are summarized in appendix B, Table 4.

4.3.5 Sale of assets

Sale of assets is techniques of risk coping whereby a farmer decides to sell part of his assets such livestock animals so as to compensate for the loss caused a hazard. The

effectiveness of this strategy was assessed as not effective by 76.0 percent in Ifwagi, 100.0 percent in Mwitikilwa, 96.2 percent in Ikongosi, and 80.0 percent in Mtili village. Therefore the strategy was generally assessed not effective across all the villages. The results are summarized in appendix B, Table 5.

4.3.6 Wage employment

Wage employment is a risk coping strategy that provides an alternative source of income to farmers in bad weather years. Therefore in case a farmer fails to get enough crop produce, the wage supplements the deficit. The presence of private tea companies in Mufindi acts as a very good source for wage employment such that whenever farmers face difficulties natural hazards inclusive, they easily tend to secure employment from these companies thereby acting as a coping strategy. This study therefore aimed at assessing whether this strategy is an effective coping strategy against natural hazards. This strategy was assessed as to be not effective in combating risk hazards by 84.0 percent, 95.8 percent, 100.0 percent and 96.0 percent in Ifwagu, Mwitikilwa, Ikongosi and Mtili villages respectively. The results are summarized in appendix B, Table 6.

4.3.7 Dependence on Government relief aids

Government relief aid is a risk coping strategy which involves Government provision of humanitarian aid to victims affected by natural hazards. A good example for this involves relief aid provided by the Government due to el-nino strike in 1998, as crops were completely destroyed by el-nino rains. This strategy was assessed not effective as a coping strategy by 100 percent of all the respondents across the villages in the study area. The results are summarized in appendix B, Table 7.

4.5.8 Irrigation application

Irrigation acts as a strong coping strategy against drought hazard, whereby a crop does not depend on rainfall. In the study area it was found that, the topography is hilly, such that the only favorable kind of irrigation is the use of motor pumps where water application is through sprinklers. However, due to its high cost nature, most of the smallholders farmers cannot afford to purchase its components. Thus in the study area, irrigation was found not to be practiced. Irrigation was only found to be applicable in the nursery sites, where seedlings are raised.

Research results showed that about 100.0 percent of the respondents in Ifwagi assessed the strategy not effective, 95.8 percent in Mwitikilwa also assessed not effective, 92.3 in Ikongosi showed the same results and also 80.0 percent of the respondents in Mtili reported not effective. The reason for it being not effective could be due to the costly nature of the system such that most of the smallholders farmers cannot afford to buy it. On the other hand timber woods are found to resistant to drought under normal conditions. Therefore this study found that, all smallholder farmers were rainfall dependants. The results are summarized in appendix B, Table 8.

4.3.9 Construction of fire breaks

Fire is a major peril for many crops (especially broad field crops such as grains) and for virtually all forests. It is commonly included in multi-peril crop insurance, and is

frequently the key peril under forestry covers. Fires are caused by human action (and carelessness) and also by lightning strikes during electrical storms. Whatever the cause, there are control measures to reduce losses. These may be through early detection and the subsequent means to take action and/or through the use of cleared firebreaks. Construction of fire breaks as an ex-ante strategy was reported to be among the major method used to control fire. Therefore, this study decided to investigate its effectiveness as a risk coping strategy. Results revealed that the method was effective, supported by 70.0 percent of the respondents, while those who reported to be very effective was 27.5 percent and only 2.5 percent reported as moderate. Therefore, generally the method is shown to be effective in controlling fire. However in case it fails then insurance could be among the best option for trapping the farmer out of poverty.

4.3.10 General discussion on the assessment of effectiveness of risk coping strategy

From the above results, it can be concluded that, risk coping strategies in place in the study area, are perceived to be not effective in combating natural hazard risks in timber production. Therefore these results are expected to have some impact on the demand for additional risk management strategy such as micro insurance. Fire breaks construction on the other hand is reported to be effective in some villages although not very effective, as most of the growers suffer from fire hazards when it erupts. Therefore introducing agricultural micro insurance could be of special advantage as farmers will be in a position to be indemnified in case of fire outbreak.

4.4 Agricultural micro insurance role and function

4.4.1 Farmers perception on agricultural Micro insurance

Assessment of farmers' perception on agricultural micro insurance aimed at collecting information on how farmers perceive their ability to manage timber wood risks, meaning that, do they see shocks as so far beyond their control; what do they know about agricultural micro insurance and how it works. Results show that, about 67.5 percent of the respondents perceive hazards risk being beyond their control. Moreover, 30.0 percent of the overall respondents perceived risks to be within their control, while 2.5 percent stated that they do know. On the other hand, farmers reported fire hazard to be the riskiest hazard that require additional management strategy.

In addition, among all interviewed respondents, none of them was found to have joined any insurance scheme, meaning that they don't have perfect knowledge on insurance services, its potential and how it works. These results vividly exemplifies that information awareness on agricultural micro insurance and insurance for the poor is highly vital for the development of the insurance market in the Country and globally.

4.4.2 Demand assessment for agricultural micro insurance

One among the principles of planning for agricultural insurance in a new area is to conduct a demand assessment among farmers to identify if they will accept the service and use it when it is introduced in their vicinity. To identify farmers' option for crop

insurance, farmers were asked to indicate if they need an additional risk coping strategy following the performance of the present coping strategies. The response from the respondents showed that, 86.3 percent of the overall respondents needed an additional risk coping strategy (agricultural insurance); while only 1.3 percent reported that there were no need for an additional strategy, and 12.5 percent reported that they have little knowledge on insurance services thereby making it difficult for them to decide. On the other hand, the demand for additional risk management strategy was expected due to the reason that, almost all the coping strategies in use were reported not to be effective.

4.4.3 Information awareness on agricultural micro insurance

Assessment on the information awareness was found necessary in order to understand the farmers' awareness with crop insurance. The awareness in the study area was found to be very poor. About 81.3 percent of the overall respondents reported to be unaware of crop insurance and its potential, while only 18.7 percent reported to be aware. This could be attributed to the fact that there is no crop insurance scheme operating not only in the study area, but also in the Country. Therefore information awareness on agricultural micro insurance and insurance in general needs to be addressed if at all insurance sector is to grow and contribute to poverty reduction and promote economic development in the country.

Table 3: Information awareness on agricultural micro insurance

Respondents' awareness on micro insurance	Respondents' response (%)	
	Frequency	Percentage
Aware	15	18.7
Not aware	65	81.3
Total	80	100.0

This study was also interested to assess the kind of agricultural insurance that farmers' could prefer to hedge their tree crops. The assessment was done against all risk insurance or multi-peril insurance and specified or specific insurance. The former covers a combined risk or hazards, while the second covers only a single peril, for example fire only. In the study area results indicated that, the preference was location specific. However overall results showed that 38 percent were in favor of multi-peril insurance while 62 percent reported to prefer specific risk insurance. Results are summarized in the Table 4.

Table 4: Kind of agricultural insurance preferred by villages

Kind of crop insurance Preferred	Ifwagi (n=20)	Mwitiilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
	% of respondents			
All risk insurance	20.0	33.3	0.0	60.0
Specific insurance	80.0	66.7	100.0	40.0

4.4.4 Preferred contract duration

Contract duration in this study refers to interval of time at which the crop is protected by the insurance. It was assessed based on six months duration, one year and more than one year as timber is a perennial crop. Results show that 70 percent of the overall respondents prefer one year contract duration, 24 percent more than one year while 6.0 percent prefers six months contract duration. The preference for one year contract duration may be associated by the fact that, the life cycle of seasons are completed in a year. On the other hand, the difference in responses across the villages may be attributed by the fact timber is a perennial crop, such that contract duration of more than one year may also be useful. These results are summarized in Table 5.

Table 5: Preferred contract duration by villages

Contract duration Preferred	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
	% of respondents			
Six months	0.0	12.5	7.7	4.0
One year	96.0	83.3	65.4	36.0
More than one year	4.0	4.2	26.9	60.0

4.4.5 Constraints and determinants to supply of agricultural Micro insurance

In order to identify the factors that have hindered Insurers and microfinance from providing agricultural micro insurance, the study conducted a discussion with the Insurers and microfinance providers, guided by a checklist. Lack of historical data on natural hazards occurrence, lack of adequate farm level data, problems in estimating premiums and indemnification levels, covariant and frequent risks in agriculture, were reported to be the major factors that have hindered the introduction of agricultural micro insurance in the country. Others were found to be lack of policy support at National

level on agricultural micro insurance and lack of knowledge and experience on how to design and run the service on the part of insurance providers. Finally lack of infrastructure (information and distribution) was also reported to be a serious problem. These results were found to be in line with Levin and Reinhard (2007).

4.4.6 Role of Microfinance and insurance institutions in agricultural micro insurance

In many Countries around the World, micro insurance services are provided by Microfinance and Insurance institutins working in the community. Micro insurance can be sold to individuals or to groups following one of these delivery models: Partner-agent model commercial or public insurer with MFI or NGO collaborates in developing the insurance. The insurer absorbs the risk, the agent markets the insurance through its established networks, lowering distributions cost (dominant in India); Community-based model local communities, NGOs, MFIs and/or cooperatives develop, distribute the insurance and absorb the risk; no commercial insurer is involved. (mainly used in health insurance); full-service model Commercial or public insurer develops and runs its own insurance scheme by absorbing profits and losses; and provider model Banks and other providers of microfinance can directly offer or require insurance contracts, usually coupled with credit (widely used in general insurance but has high transaction costs). In the Tanzania context, the first model could work better since more people are aware with Microfinance services. Therefore, micro insurance could be equipped with credit services.

5 CONCLUSION

From the results of this study, fire hazard is found to be very risky in timber wood farming. Its occurrence is not predictable however its impact is very big. Coping strategies in place were found to be construction of fire breaks, diversification to off-farm activities, spatial separation of plots, diversification to other crops, minimum investment, and sale of assets, wage employment, Government relief aids, and irrigation application. However they were found to be not effective in coping with risk hazards with exception of construction of fire breaks which was assessed effective. Agricultural micro insurance could be the best option in case fire is beyond control of farmers.

Regarding the assessment of farmers' demand for agricultural micro insurance in Mufindi district, it was found that farmers have high demand for the same. Therefore, this study concludes that, fire hazard is the most risky natural hazard in timber farming such that it calls for agricultural micro insurance.

Insurers on the other hand, view agriculture as a very risky business that might make the viability of agricultural micro insurance not to be sustainable, thus difficulty in the willingness to provide agricultural micro insurance. Lack of historical data on natural hazards occurrence, lack of adequate farm level data, problems in estimating premiums and indemnification levels, covariant and frequent risks in agriculture, were reported to be the major factors that have hindered the introduction of agricultural micro insurance in the country. Others were found to be lack of policy support at National level on agricultural micro insurance and lack of knowledge and experience on how to design and run the service on the part of insurance providers. Finally lack of infrastructure (information and distribution) was also reported to be a serious problem. Whereas business insurance belongs in a business setting, the very nature of agricultural micro insurance means that there is bound to be strong Government involvement and intervention.

Micro insurance and microfinance institutions can play a very big role in helping the farmers by providing agricultural micro insurance so that farmers cope from falling into poverty as a result of hazardous risks. There are four main methods/models micro insurance or microfinance can use in offering agricultural micro insurance services: partner-agent model, community-based model, full-service model, and provider-driven model.

6 EMERGING POLICY IMPLICATIONS AND DISSEMINATION PATHWAY

6.1 Emerging Policy implications

Based on the findings and conclusion from this study, various policy implications have emerged. The first is the need for the Government to set a clear policy on agricultural micro insurance and insurance market in general that is pro poor. Most insurance companies in Tanzania are not geared towards assisting the poor who are the majority. Secondly, the Government needs to set an information system for creating awareness to its people on the potential of agricultural micro insurance in the Country and set the agricultural micro insurance infrastructure. Thirdly, because of complexity of agricultural insurance, there is a high need for the Government to get fully involved in the provision and supervision of the service.

6.2 Pathway for dissemination of the research findings

Wide dissemination of research results ensures that demand for agricultural micro insurance research can be understood by and useful to others. Also it let's people know what has happened to the research activities. To ensure that the above objectives are met, the results of this study will be disseminated through the following pathway; Workshops to stakeholholders (timber wood farmers, microfinance/insurance providers, Insurance regulatory department (ISD), publication, Repoa annual workshop, and leaflets.

6.3 Suggested areas for further research

Since Tanzania has not yet embarked in agricultural insurance, there is a need to design a hypothetical agricultural micro insurance and test its viability and estimate quantitative variables such as willingness to pay for the service. The research should focus on specific crop or segment of farmers to make it more practicable, and also should be directed to one peril such as fire.

References

Akyoo, A.M. (2004). Agricultural Production, natural hazards and risks: An analysis of coping mechanisms and the potential of crop insurance. Dissertation for Award of MSc Degree at Sokoine University of Agriculture, Morogoro, Tanzania, 107pp.

Ashok, K., Mishra, B. and Goodwin, K. (2003). Adoption of Crop versus Revenue Insurance: A Farm-Level Analysis. *American Journal of Agricultural economics,* 75: 460-485.

Eaton, C. and Shepherd, A. (2001). *Contract Farming, Partnerships for Growth.* FAO, Rome, Italy, 29pp.

FAO. (1991). Food and Agricultural Organization of United Nations. *Crop insurance.* FAO, Rome, Italy, 65pp

Goodwin, B.K. (1993). "An empirical Analysis of the demand for Multiple peril Crop insurance" *American Journal of Agricultural economics*, 75: 425-435.

Hazelle, P. (1992). "The appropriate Role of Agricultural insurance in Developing Countries". *Journal of International Development,* 4:567 – 581.

Hazelle, P., Lardson, D., Mac,I.D. and Zupi, M. (2000). Weather insurance project study; Ethiopia feasibility assessment. World bank Fondazione Salernitana Sichelgaita/IFPRI, Washington Dc, USA, 45pp.

Hueth, D. and Furtan, W. (1994). *Economics of agricultural crop insurance*: Theory and evidence. Kluwer Academic publishers, Boston, USA. 104pp.

Jan, S. Trond V. and Marit, H. (2006). *Natural hazards and disasters. Drawing on the international experiences from disaster reduction in developing countries. Annual Report.* Norwegian Institute for Urban and Regional Research. Norway. 127pp.

Levin, L and Reinhard, D. (2007). Microinsurance Aspects in Agriculture. Discussion Paper. Munich Re Foundation. Munich.

Maria. S.B. (2007). *Insurance in emerging Markets: Sound development; Greenfield for agricultural development*. Swiss Reinsurance Company, Zurich, Switzerland. 134pp.

Manojkumar, K., Sreekumar, B. and Ajithkumar G.S. (2003). *Crop insurance scheme: A case study of Banana farmers in Wayanad District*. Kerala Research Programme on Local Level Development, Centre for Development Studies, Thiruvananthapuram. 56pp.

Mark, W. (2005). *Agricultural Insurance Revisited: New Developments and Perspectives in Latin America and the Caribbean*. FAO, Rome, Italy. 78pp.

Mohhamed and Ortmann. (2005). Factors influencing adoption of Livestock insurance by commercial Dairy farmers in three Zobatat of Eritrea, Ethiopia. *Journal of Agricultural economics.* 44(2):38 – 47.

MNRT, 2008, Tanzania Forest Conservation and Management Project (TFCMP), Provision of Consultancy Services for Implementation of Private Sector Involvement Activities. Part I; Socio-Economic Survey, Final Report.

PMO, (2000). Prime Ministers' Office. Disaster Vulnerability analysis report. Government printer, Dar es salaam, Tanzania, 29pp.

Ramesh, B and J. Nishant. (2006). *Factors affecting the demand for health insurance in a Micro Insurance Scheme*. Indian Institute of Management, AHAMEDABAD, India, 37pp.

Ray, P.K. (1991). *A practical guide to multi-risk crop insurance for developing Countries.* Oxford and IBH publishing co.PVT.LTD. New Delhi, 20pp.

Robert, R.A.J. (2005). *Insurance of crops in developing countries*. FAO, Rome, Italy, 140pp

Robert, R.A.J and Dick, W.J.A (eds). (1991). *Strategies for crop insurance planning*. FAO Agricultural services bulletin 86. FAO, Rome, Italy, 60pp.

Smith, V.H. and Baquet A. (1996). "The demand for Multiple Peril crop insurance: Evidence from Montana Wheat farms". *American journal of agricultural economics* 26(2): 173 – 184.

Senkondo, E.M.M. (2000). Risk Attitude and Risk perception in Agro forestry Decisions in Babati, Tanzania. Thesis for Award of PhD Degree at Wagenigen University. The Netherlands, 208pp

SINAPRED/UNDP (2004): Risk scenarios and local resources. A useful tool for municipal planning. National System for Disaster Prevention, Mitigation and Response. UNDP, Nicaragua, 104pp.

Singunda, T. W. 2009. Economic Contribution of Private Woodlots to the Economy of Mufindi District, Tanzania. MSc Dissertation, Faculty of Forestry and Nature Conservation, Sokoine University agriculture.

Takesh, S. and Thomas, R. (1997). Potential demand for drought insurance in Burkina

faso and its determinants. *American Journal of Economics* 79:1193 – 1207.

Toyoji. Y. (1987). Evolution of crop insurance programs in Japan. [http://www.Ifpri.org/pubs/books/Hazell86/Hazell86ch13.pdf]. Site visited on 1.11.2009

UN/ISDR (2002): *Disaster reduction for sustainable mountain development*, 2002 UN World Disaster Reduction Campaign. Washington Dc, USA, 85pp.

UNDP (2005). Lessons Learned. Evolution of a Disaster Risk Management System in Mozambique. [http://www.undp.org] Site visited on 2/10/2009.

URT (2007). Iringa Socio-economic profile. United Republic of Tanzania. Dar es Saalam

Vandeveer, M.L. (2001). Demand for area crop insurance among Litch producers in Northern Vietnam. *Journal of Agricultural Economics* 26(2):173-184.

Wenner, M. and Arias, D. (2003). Agricultural insurance in Latin America: Where are we? Paving the way Forward for Rural finance: An International Conference on Best Practices, Washington DC, USA, 2-4 June, 2003, 19pp

APPENDICES

Appendix A: Riskiness of hazards in timber wood farming

Table 6 : Drought hazard riskiness by villages

Natural hazard	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Drought	Very risky	0.00	0.00	3.8	0.00
	Risky	0.00	0.00	0.00	0.00
	Moderate	0.00	0.00	0.00	0.00
	Not risky	100.0	100.0	96.2	100.0

Table 7: Pests and diseases hazard riskiness by villages

Natural hazard	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Pests & diseases	Very risky	7.0	12.5	26.9	30.0
	Risky	8.0	0.00	0.00	5.0
	Moderate	5.0	0.00	0.00	0.00
	Not risky	80.0	87.5	73.1	65.0

Table 8: Hailstorm hazard riskiness by villages

Natural hazard	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)

		% of respondents			
	Very risky	8.0	16.7	23.1	16.0
Hailstorm	Risky	0.00	0.3	0.00	0.00
	Moderate	2.0	0.00	0.00	0.00
	Not risky	90.0	83.0	76.9	84.0

Table 9: Frost hazard riskiness by villages

Natural hazard	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
	Very risky	24.0	25.0	26.9	30.0
Frost	Risky	0.00	6.0	0.00	2.5
	Moderate	6.00	0.00	0.00	2.5
	Not risky	70.0	69.0	73.1	65.0

Table 10: Effectiveness of diversification to off-farm activities by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Diversification	Very effective	4.0	0.00	0.00	0.00
to off-farm	Effective	12.0	41.7	3.8	10.0
activities	Moderate	12.0	8.3	11.5	7.0
	Not effective	72.0	50.0	84.6	83.0

Table 11: Effectiveness of spatial separation of farm plots by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Spatial separation	Very effective	0.00	0.00	3.8	2.0
of farm plots	Effective	0.00	0.00	0.00	0.00
	Moderate	0.00	4.2	3.8	1.2
	Not effective	100.0	95.8	92.4	96.8

Table 12: Effectiveness of diversification to other crops by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Diversification	Very effective	4.0	20.8	0.00	18.5
to other crops	Effective	12.0	37.5	19.2	3.5
	Moderate	12. 0	8.3	15.4	7.0
	Not effective	72.0	33.3	65.4	71.0

Table 13: Effectiveness of minimum investment in agriculture by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Minimum	Very effective	0.00	0.00	0.00	0.00
investment	Effective	4.0	8.3	3.8	4.0
	Moderate	12.0	8.3	3.8	20.0
	Not effective	84.0	83.3	92.3	76.0

Table 14: Effectiveness of sale of assets by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Sale of assets	Very effective	8.0	0.00	0.00	12.0
	Effective	16.0	0.00	3.8	8.0
	Moderate	0.00	0.00	0.00	0.00
	Not effective	76.0	100.0	96.2	80.0

Table 15: Effectiveness of wage employment by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Wage employment	Very effective	0.00	0.00	0.00	0.00
	Effective	0.00	0.00	0.00	4.00
	Moderate	16.0	4.2	0.00	0.00
	Not effective	84.0	95.8	100.0	100.0

Table 16: Effectiveness of dependence on government relief aids by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Dependence on government relief aids	Very effective	0.00	0.00	0.00	0.00
	Effective	0.00	0.00	0.00	0.00
	Moderate	0.00	0.00	0.00	0.00
	Not effective	100.0	100.0	100.0	100.0

Table 17: Effectiveness of irrigation application by villages

Strategy	Assessment	Ifwagi (n=20)	Mwitikilwa (n=20)	Ikongosi (n=20)	Mtili (n=20)
		% of respondents			
Irrigation application	Very effective	0.00	0.00	0.00	0.00
	Effective	0.00	0.00	3.8	16.0
	Moderate	0.00	4.2	3.8	4.0
	Not effective	100.0	95.8	92.3	80.0