



DECLARATION

I hereby state the originality of my thesis, research and fieldwork and acknowledge all materials other than my own. The thesis has not been submitted to any other university than the Norwegian University of Life Sciences for any type of academic degree.

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First of all, I would like to thank my supervisor Gry Synnevåg for great guidance, for identifying literature and contribution to my research. She has provided feedback and instructed me through this research process which could not have been conducted without her expertise. I also acknowledge Sokoine University of Agriculture (SUA) and Professor Samwell Kabote for being my local supervisor. Secondly, I would like to thank the non-governmental organization International Child Support (ICS) which have contributed much to the thesis data and gave me a lot inspiration and advice during my fieldwork in Mwanimba and Mwashata. I am grateful to my translator Baraka Moses who was with me every day and did a great job translating the interviews. I am also grateful to all the villagers and village leaders in Mwanimba and Mwashata for being so welcoming and hospitable. Third, I would like to say thank you to Afshan Bibi at the writing center at the Norwegian University of Life Sciences (NMBU) for her great job in revising and correcting the thesis. She has been very helpful and provided great support during the writing process of the thesis. Last, I give thanks to my family, boyfriend and friends for believing in me and for giving motivation and encouragement when I needed it the most.

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ABSTRACT

The study of transformation of gender roles and adaptive capacity in the context of climate change took place in the two villages in the Meatu district in Tanzania; Mwanimba and Mwashata. Impacts of climate variability and change, like drought, inconsistent rainfall patterns, less reliable and shorter rain seasons, result in households having less access to water, decreased agricultural production and reduced access to food. This lead to additional pressure on already vulnerable households. Relations, structure and agency contribute to the transformation of gender roles and determine people's adaptation strategies. The main findings are firstly, that the impacts of climate change, such as increased drought contribute to a change in household structures that has consequence for gender relations due to the slow process of the decrease of polygamous household structures.

Secondly, results identify a transformation of gender roles due to women's triple role and the heavy burden of increased responsibilities. With respect to climate change, the triple role of women is particularly a threat to women's adaptive capacity and empowerment as the triple role increases household tasks, farm duties and community labor for women. Furthermore, a huge number of husbands escape the villages during drought and hunger crisis, and wives are left behind taking care of their children and the elderly. This is an event which threatens the women and the development of the village.

The role of men are also changing, especially for the men in polygamous household structures due to the household structure's decrease. Some men have started to fetch water, and since year 2000 some men have started to assist their wives with food preparations, which is clearly women's responsibilities according to traditional gender roles. This is an influence from climate change and from migrants from other areas outside Mwanimba and Mwashata.

Moreover, the results present strong differences between the variables 'household structure' and 'income level'. Respondents from low level of income and those with no livestock are the most vulnerable to the impacts of climate change. In contrast, the households with high amount of livestock have greater access to resources and therefore are able to adapt to the impacts of climate change. The representation of female headed households is slight but members tend to have less access to resources due to a low level of income

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1 INTRODUCTION

Climate change is seen as a great threat to earth's existing life and biodiversity. Change in earth's climate threatens ecosystems and the future scenario for various species that live within these ecosystems is disturbing. UN's panel on climate change and global warming (IPCC) warns that higher temperatures will alter earth's ecosystems. IPCC anticipates that global warming will cause even more changes than we see today such as, rising sea levels, floods, droughts, changes in rainfall patterns, increased food insecurity, extreme weather and a decline in human health (Martens as cited in Masika, 2002). Semi-arid areas are most affected by climate change (IPCC and Sarr as cited in Synnevåg, Kabote, Nombo, Delphina, and Mattee, 2015) and climate change is now a well-known catalyst for risk, disasters and people's vulnerability.

Women and poor communities are the group of people who are most vulnerable of the impacts of climate change (Aguilar as cited in Dankelman, 2010). Environmental changes concern gender roles because rural men and women in these vulnerable semi-arid areas experience the impacts of climate change differently. In the Meatu district in Tanzania, where I conducted my research, it is confirmed inconsistent rainfall patterns, drought and shortened crop growth seasons (Synnevåg et al, 2015). These environmental changes particularly threatens women because it challenges their survival techniques, work load, adaption strategies and vulnerability during adverse circumstances.

Evaluating rural men and women's gender roles in semi-arid areas and addressing the impacts of climate change are therefore crucial for sustainable development in order to avoid gender-based disadvantages. It was most necessary to examine if there has been a transformation in gender roles caused by the impacts of climate change and to look further into how women and men's vulnerability and adaptive capacity varies. This can contribute to closing the existing gap concerning gender- based dimensions of climate change.

Indeed, there is a gap of previous research regarding gender-based dimensions of climate change. Literature on climate change and development emphasize the importance of engaging gender in climate change issues. However, in order to create gender awareness that seeks to improve adaption strategies towards climate change and reduce environmental disaster risks, it is

necessary to look further into gender roles within different household structures. To find this out I looked at the key elements relations, structure and agency; structure is the monogamous and polygamous households, agency refers to the level of livestock and relations are the gender roles, i.e. the triple role of women; productive role, the reproductive role and the community role, and the role of men; productive and community role (please see conceptual framework for further explanation).

The study of transformation of gender roles and women's adaptive capacity in the context of climate change took place in two villages in the Meatu district in Tanzania; Mwamanimba and Mwashata. The research is part of the Enhancing Pro-poor Innovations in Natural Resources and Agricultural Value-chains program (EPINAV) titled “A gendered analysis of climate change impact and adaptation on dry-land farming systems and natural resources management” which started in 2011. The project’s objective “was to study gender differentiated impact of climate change on rural livelihoods in semi-arid areas of Tanzania and small scale farmer’s adaptation strategies” (Synnevåg et al, 2015). EPINAV is a collaboration between Sokoine University of Agriculture (SUA) in Morogoro, Tanzania and the Norwegian University of Life Sciences (NMBU) in Ås, Norway.

EPINAV required that the research contributed to the program objectives, addressed a certain research theme and a priority for a particular district or region in Tanzania. My research therefore followed the program's requirements and guidelines. The research's attention of EPINAV is on up-scaling of technologies and practices in agricultural districts, and regions using innovation systems and value chain approaches (Sokoine University of Agriculture, 2011). Furthermore, EPINAV emphasizes other research subjects such as climate change adaptation for agriculture and natural resources, policy research, analysis and governance, and lastly, innovative communication and knowledge dissemination pathways (Sokoine University of Agriculture, 2011).

This is a qualitative research strategy and is based on one month fieldwork in Mwamanimba and Mwashata. The study of transforming gender roles and adaptive capacity towards climate change is centered on a micro level study of where I employed qualitative data to understand the linkage between gender roles and climate change. One can measure gender and climate change quantitative but for me it is not interesting with statistics regarding my research questions. In

order to examine changes in gender roles and its dynamics the research observed changes in household structures and gender differentiated access to resources, vulnerabilities and adaption strategies. Data were analyzed from in-depth interviews with rural women and men from different wealth groups (the amount of cattle) and household structures (monogamous and polygamous unions), at household and local community level. I also interviewed key informants and conducted biographic interviews with elderly people. Qualitative in-depth interviews was used as indicators of the differences between gender roles and how the impacts of climate change transform them. Focus groups, biographical interviews and key informants provided the main data. Former research was also evaluated and compared with new findings.

I cooperated with the non-governmental organization “International Child Support (ICS)”, which “aims to create sustainably social and economic change in rural areas of developing countries, in cooperation with local inhabitants and communities” (ICS, 2014). ICS is connected to the EPINAV project and the two villages in Meatu and is a key informant which has contributed much to the thesis’s data. Other key informants are the two village leaders of Mwamanimba and Mwashata and my translator whom all have a lot of information regarding farming, the specific locations and areas, household structures and culture in Meatu.

Exploring how gender roles are changing due to impacts of climate change and to understand what this implies for women’s adaptive capacity is the main objective. In order to answer this I had to find out how women and men organize and plan for adapting to climate change, how they cope with vulnerability towards climate change, how the access to resources are different for women and men and for the different household structures. Furthermore, to reach the main objective the research questions had to be answered and they are as follows:

1. How do the impacts of climate change like drought and less access to resources affect gender roles?
2. How do the impacts of climate change like drought and less access to resources affect household structures?
3. How do the impacts of climate change like drought and less access to resources and the different household structures influence women’s adaptive capacity?

4. What is the relationship between climate change, level of income and the household's adaptive capacity?

First, the thesis start by giving an area description of where the research was conducted and explain how the impacts of climate change have influenced the environmental conditions. Secondly, the conceptual framework of the thesis provides an overview of the important concepts in this qualitative research. It presents the key terms which will be discussed further in the result section and literature review. Third, it presents methods of data collection and continues with the results and discussion part. The discussion section is divided into two parts; first I discuss the results according to my conceptual framework and then I discuss the results in relation to literature. Finally, a conclusion is provided with further recommendations on the specific matter.

2 GEOGRAPHICAL AREA DESCRIPTION

Climate conditions are critical in Tanzania and drought and insufficient water supply is not an unfamiliar phenomenon. However, the current climate change has influenced the already existing and threatening environment badly. Global warming is predicted by scientists to cause further weather changes, more variability and further uncertainty of environmental conditions (Ragab and Prudhomme, 2002). Yet, Hulme, Doherty, Ngara, New and Lister (2001) argue that no detailed African future climate change scenarios have been presented and that there is a need for more literature to be published on future climate change scenarios for Africa.

In semi-arid countries of West Africa shortage of water supply is the foremost limitation to development (Casenave and Valentin, 1992) and in the Meatu district there is not enough water to support crops (Dinar, Hassan, Mendelsohn and Benhin, 2008). During the last 30 years there have been collected data of the climate variability on farming systems and adaptation in villages of Iramba and Meatu districts and the data have confirmed inconsistent rainfall patterns, increasing dry periods and further unpredictable weather. The seasonal calendar is changing for the rural farmers in Meatu and seasons have been shortened by a month, or even more. This have impacted negatively on rain-fed agriculture and livestock systems (Synnevåg et al, 2015).

In late 1960s early 1970s, agriculture in the Meatu district was abundant and production was relatively high. The dry seasons were shorter and because of consistent rainfall villagers in Mwanimimba and Mwashata did not experience drought to the same extent they do today. Some of the villagers claimed that 10-15 years ago the villages were surrounded by green forests. Meatu is a very dry area and the dry season is particularly a threat to the rural villagers' livelihoods because there is hardly any access to water. The streams are dried up and the small amount of water that exists is often contaminated and/or stagnant.

Resources which are especially sensitive to the impacts of climate change in my research area are mainly access to water, food, wood and land for cultivation. 10 years ago there was a forest and a much greener scenery in Mwanimimba and Mwashata, now it is defined as a semi-arid area with the resemblance of a desert (see picture in appendix). Rural women and men rely on the environment and its resources in Mwanimimba and Mwashata, they are highly dependable

on the environment because it is here they get water supplies, fetch firewood, grow their crops and collect fruits and vegetables.

The people of Mwamanimba and Mwashata are farmers and their main income which functions as their “bank” is cattle, some households have cash crops and others only have access to land which they cultivate for their own consumption. The cattle of course need to grass and as the area is getting drier and drier the cattle have less food. The consequences of environmental changes and shocks are immense and affect the social-ecological system in the villages. Local populations have adapted to certain changes but extreme weather conditions, such as drought, buck shots storms and rough wind, threatens the development of the villages. Although it is a semi-arid area, with dry land and dry winds, farmers are still able to use the small areas with forest and provide themselves through nature. But, they need more access to water, food, land and wood in order to survive and plan for a sustainable future.

After 2000-2002 the environmental conditions got worse due to increased drought and longer and earlier dry seasons. Low rainfall is now the main environmental challenge the rural people of Meatu have to overcome for survival. Climate change has resulted in a lack of important resources that threatens the rural people’s health and livelihoods. Access to water and food is scarce as drought and heavy hail storms continues to ruin their crops. The impacts of climate change are environmental catastrophes which is life threatening to the villagers in the Meatu district and much is needed to be done in order to adapt to these though weather conditions.

3 CONCEPTUAL FRAMEWORK

The conceptual framework provides an overview of the important concepts in this qualitative research. It presents the key terms which will be discussed further in the results section and literature review. The following diagram was used as a guide in order for me to bridge disciplines and to understand the key concepts related to gender and climate change. The diagram shows the framework of how this research addresses relations, structures and agency. Relations, structures and agency is explained underneath the framework. It is inspired by CARE's women's empowerment framework and climate change adaption (2010). The conceptual framework is the foundation for the research's main objective, research questions and the results.

Furthermore, I used this analytical framework from CARE (2010) to be able to direct the proper purpose of the research questions and interview questions in accordance with the thesis main objective. CARE is an organization working for women's and girls' rights and it aims to encounter poverty. Their framework brings a thorough understanding of vulnerability and adaptation, and the interaction between climate change and livelihoods. Thus, the paper also follows CARE's approach (2010) towards adaptation and vulnerability. Later in this section of the thesis definitions of core concepts are taken from the 'Intergovernmental Panel on Climate Change'. I chose IPCC because IPCC's contribution is up to date of the current state of scientific information on climate change and its impacts.

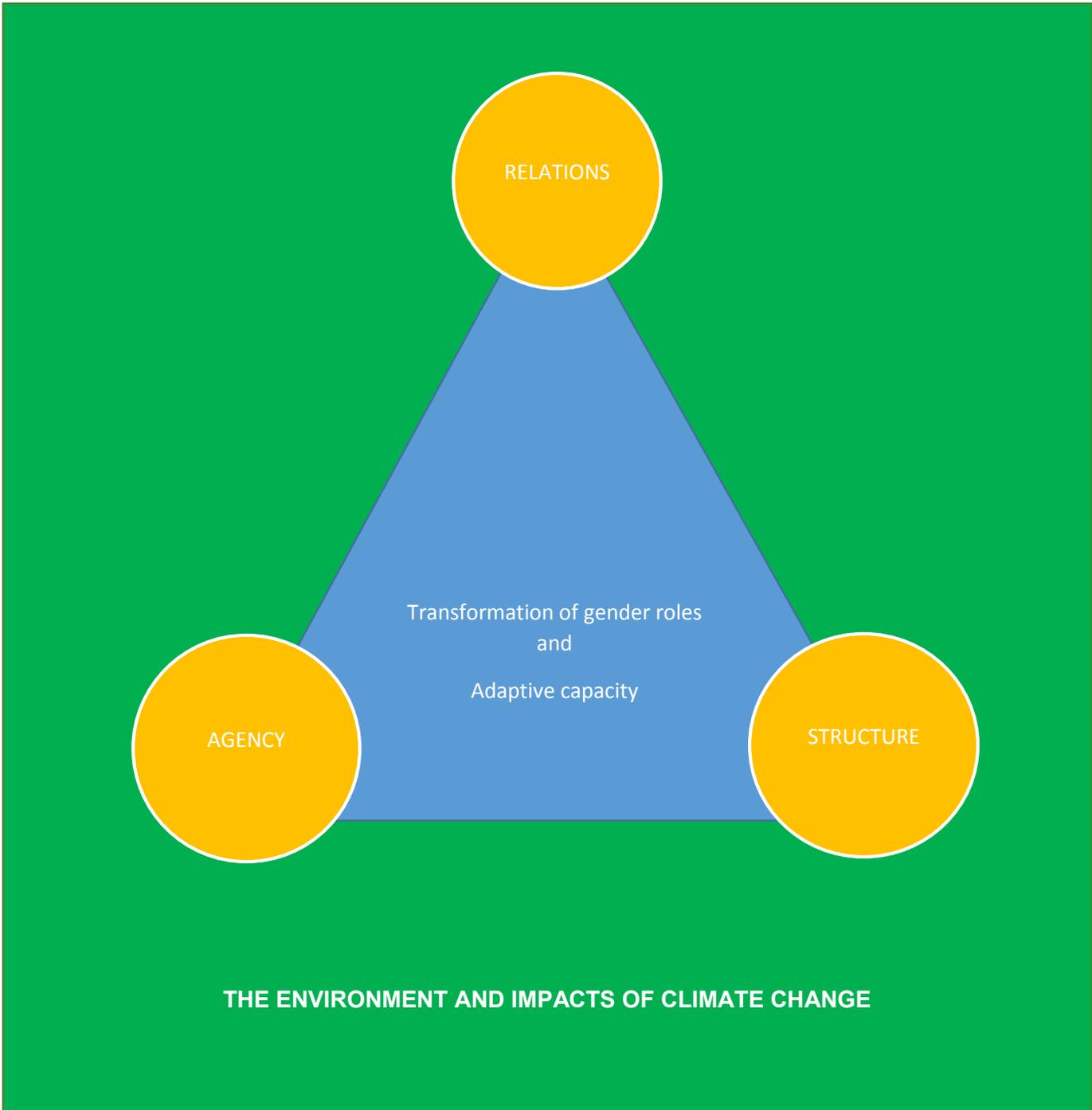


Diagram 1. Conceptual framework: the connection between climate change and gender roles

3.1 TRANSFORMATION OF GENDER ROLES AND ADAPTIVE CAPACITY

The transformation of gender roles and adaptive capacity is a platform of the diagram where the dimension of the changing landscape of gender roles in Mwamanimba and Mwashata is presented. Relations, structure and agency are the key elements which influence the transformation in the context of climate change. Furthermore, the diagram explores women's empowerment through their adaptive capacity. Gender roles are one of the main factors which influence people's adaptive capacity, but relations, structure and agency also participates in deciding this ability. Women can be empowered in possessing a stronger capacity to adapt to environmental changes and risks (CARE, 2010).

Relations:

- **Power relations:** In this framework and research relations refer to power relations between men and women in Mwamanimba and Mwashata. Power relations was explored among members of a household and at a community level during interviews and observation. In this platform power relations consist of decision-making processes and negotiations between women and men in monogamous and polygamous household structures. The interviews provided information on whoever gets to decide, why they get to decide and who have access to negotiations. Those individuals with more power in a household, or in the community, are defined as the decision-makers and control all negotiations between household members or villagers.
- **Decision-making:** The research explored how decision-making are done between women and men in polygamous and monogamous household structures. It explored why it is done in this particular way. Decision-making consists of negotiations between household members and between women and men.

- Negotiations: I raised questions to myself regarding this platform such as how do men and women negotiate? How do household members negotiate? Why? These were important questions for me in order to determine the transformation of gender roles and the adaptive capacity of women in the villages.

Structure:

- Household structure: A household structure in this study is defined as either a monogamous household structure or a polygamous household structure. These structures were further divided into households with large amount of livestock, medium amount of livestock and little/none amount of livestock. Household structure is one of my variables so this particular element from the framework was emphasized. I compared household structures in the villages and examined if there was a connection between the different household structures, transformation of gender roles and women's adaptive capacity.
- Norms: The focus here is on the social norms which consist of belief systems people of Mwanimba and Mwashata have in their particular traditions, religion and culture. How and why do people behave as they do were important factors to keep in mind during my research.
- Belief system: I explored what kind of attitudes, ethical values and ideologies women and men have in Mwanimba and Mwashata, and where these attitudes originate. I also compared the two villages to see if there were any differences and if these differences might show in my data.
- Attitudes, values and ideologies: What are they? Do they differ between women and men? Why? These were also important questions in order to determine the transformation of gender roles and the women's adaptive capacity. Norms, belief systems, attitudes,

values and ideologies is part of individuals and communities culture. However, culture can be a vague term meaning quite a lot so I divided it down to these elements.

Agency:

- The key element agency is the capability and capacity of which individuals possess. Agency was determined by access to resources, general knowledge of climate change the rural people have, their capabilities, and their adaptive capacity and vulnerability context.
- Access to resources: How do women and men's access to resources, such as water, land, livestock, infrastructure, education, finances, and market differ? Who has access and why do they have access and others not? Access to knowledge of climate change was also evaluated since indigenous knowledge plays an important part in adaptation skills. People in Mwanimba and Mwashata have cultural customs and inherent knowledge concerning climate and trends. I compared polygamous and monogamous households and the two villages in order to evaluate the general condition of access and what access implies for transformation gender roles and women's adaptive capacity.
- Level of income: In this particular platform I recognized the different household's amount of livestock, which is the equivalent of money. The farmers sell their cattle and buy commodities they need. They also use cattle for bride price. Cattle is considered as the villager's "bank" as they themselves define it. I compared the level of income between the two different household structures and looked further to see how the differences influence their adaptive capacity and vulnerability.
- Adaptive capacity and vulnerability: In this platform the key element agency is equivalent to the exposure and sensitivity towards the impacts of climate change. I emphasized how it determines women's vulnerability but also the differences between

the two household structures and level of income. The disposition of women to be adversely affected by climate change was identified. Women's triple role was explored and seen as a major challenge for their adaptive capacity.

3.2 CLIMATE CHANGE IN SEMI-ARID AREAS IN AFRICA

In the synthesis report of the 'Intergovernmental Panel on Climate Change' (IPCC) 'Summary for Policymakers' (2014) they state that: "Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems" (p. 2).

IPCC (2007) has observed the late 20th century trend of trends of extreme weather events. The phenomenon of warmer temperatures and more frequent hot days, as one can see in table 1 underneath, are predicted to be very likely. This is relevant to my research area because of the warmer temperatures and increasing drier conditions in the Meatu district. The table provided below shows the importance and likelihood of risk of the impacts of environmental changes and that it should not be taken lightly. It is taken from IPCC's report for policy makers and is provided here to show the importance of climate change.

Table 1. IPCC's table on recent trends, assessment of human influence on the trend and projections for extreme weather events for which there is an observed late-20th century trend

Phenomenon and direction of trend	Likelihood that trend occurred in late 20th century	Likelihood of a human contribution to observed trend	Likelihood of future trends based on projections for using 21st century using SREs scenarios
Warmer and fewer cold days and nights over most land areas	Very likely	Likely	Virtually certain
Warmer and more frequent hot days and nights over most land areas	Very likely	Likely (nights)	Virtually certain
Warm spells/heat waves. Frequency increases over most land areas	Likely	More likely than not	Very likely
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls	Likely	More likely than not	Very likely
Area affected by droughts increases	Likely in many regions since 1970	More likely than not	Likely
Intense tropical cyclone activity	Likely in some regions since 1970	More likely than not	Likely
Increased incidence of extreme high sea level	Likely	More likely than not	Likely

(IPCC, 2007)

3.3 GENDER & GENDER ROLES

Gender roles are socially constructed by individuals and decide social and economic activities which is ascribed to women and men. Gender roles vary across cultures and often reflect biological differences between women and men. Furthermore, gender refers to the ascribed 'feminine' and 'masculine' by society because there are certain characteristics attributed to males and females which are learned; one learn from others how to behave like a man or a woman. Such behavior are deeply rooted but can change over time and is therefore dynamic (FAO, 2012).

The women and men in Mwanimba and Mwashata have often multiple roles and they play these different roles in order to interact with others and to be accepted by other individuals. For instance, men is typically playing the productive role because they are expected to be the providers of their households and women is typically playing the reproductive role because they are expected to be caretakers. These are examples of common stereotypes. However, the socio-economic setting actually determines their roles and some settings create constraints which are rooted in cultural biases and discrimination (FAO, 2012). The women in Mwanimba and Mwashata struggle with this gender barrier and have to face gender inequality because most importantly their gender role determines power and access to resources which is unbalanced between women and men (FAO, 2012).

In Mwanimba and Mwashata most women have a triple role which is the reproductive role, productive role and the community managing role (Moser as cited in FAO, 2012). In the two villages women and men are expected to live up to their cultural gender ideals and many struggle with this expectation. First, the women and their triple role is a challenge towards their adaptive capacity because it demands more responsibilities for them than the men. More responsibilities leads reduced time in managing all their daily activities and domestic chores. Men have a double role consisting of the productive and community role. They do not participate in domestic chores and are most occupied with their productive role.

However, men also experience the influence of what is expected from them, male respondents from the two villages claimed that men were often forced to leave because they were seen by others as not being man enough if they fail to be a provider. During drought and food crisis the men struggle to provide enough food for their households and they run away in shame.

3.4 ADAPTATION

The social and cultural identities and gender roles attributed to women and men not only determine power relations but also determine their ability to adapt to the impacts of climate change (Dankelman, 2010, p.125). Gender roles in the context of climate change are deep-seated in social and cultural identities that have been attributed over generations. In the patriarchal system in Mwanimba and Mwashata men are head of households. They are the bread-winners, have far more access to resources and decision-making and control resources. This challenges women's adaptive capacity.

3.5 VULNERABILITY

I define vulnerability in this research as the extent to which an individual or a household are able to cope with the negative effects of climate change. Several factors influence the state of being vulnerable in Mwanimba and Mwashata; food insecurity, loss of income, loss of production, health issues and lack of systems which support the villages during crisis. Vulnerability is a function of the adaptive capacity meaning that if a villager fail to respond successfully to the degradation of the climate and weather extremes such as severe drought, one is vulnerable. Moreover, type of household structure and level of income also participate in defining the state of vulnerability in Mwanimba and Mwashata. Adaptive capacity also varies with gender and social status in the two villages.

Women are more vulnerable to the hostile effects of climate change than men are because women are more dependent for their livelihood on natural resources that are threatened by climate change. Women also have to deal with social and economic barriers that often limit their

adaptation capacity (UN WomenWatch: The UN Internet Gateway on Gender Equality, n.d.). The triple role of women and having great responsibilities such as cooking food, gather water and firewood contribute to women being more vulnerable than men in Mwamanimba and Mwashata. When this is joined with the issue of having less access to resources than men, no entrance to decision-making processes and limited freedom of undertaking this place women in rural areas in positions where they are extremely affected by climate change and vulnerable (UN WomenWatch: The UN Internet Gateway on Gender Equality, n.d.).

Nevertheless, women are not merely vulnerable to the impacts of climate change. Indeed, women are agents, negotiators and represent change in relation to both mitigation and adaptation towards environmental degradation. Many women have capabilities, knowledge and skills that are very important in climate change mitigation, disaster reduction and adaptation strategies. In addition, women's great responsibilities and their triple role, place them well to participate and contribute to livelihood strategies and adaptation (UN WomenWatch: The UN Internet Gateway on Gender Equality, n.d.).

3.6 RESOURCES

Resources refers to inputs and assets such as land, livestock, water, food, infrastructure, technology, fertilizers and mechanical equipment. The term also refers to human resources such as farm labor and social resources such as education and institutional services (FAO, 2012). The table down below by Food and Agriculture Organization of the United Nations (FAO) is used because it represents the gender gap in access to resources between men and women, and ways for reducing the gaps in rural areas. This functioned as tool in my research to compare access to resources between men and women which is available in the research area.

The concept 'sustainable livelihoods' are five key indicators. These five livelihood assets are natural resources, human resources, economic resources, social resources and physical resources and is taken from the sustainable livelihood framework (SLA). I have not used the SLA directly but was inspired by these five elements in order to understand resources and access to resources better. They will be the key resources in the research and show how, in different

contexts, sustainable livelihoods are achieved through access to livelihood resources (Scoones, 1998).

Table 2. *The gender gap*

Assets/resources	The gender gap	How to close the gap
Land	Access to land and ensuring women they are aware of their rights and able to claim them.	Reforming laws to equal rights and empowering women to ensure that they are aware of their rights and able to claim them.
Financial services	Women have less access to credit and loans. Female smallholders often face institutional discrimination.	Enhancing women's financial capacity. Innovative delivery channels and social networks can make financial services more readily available to rural women.
Technology	Women are less likely to use mechanical tools and equipment. One of the underlying reasons being the obstacles of access to credit.	Improving women's access to agricultural technologies can be facilitated through participatory gender inclusive research and technology development programs.
Education	The gender gap in education and training of skills is particularly acute in rural areas.	Women's groups and other form of collective action can be an effective means of building relations and addressing gender gaps in education and training.

(FAO, 2011)

4 METHODS OF DATA COLLECTION

This research aims to better understand the connection between the impacts of climate change and the transformation of gender roles. Furthermore, it sought to capture how the environment affects women and men differently, and what this particularly implies for women's adaptive capacity. I accomplished this research by collecting, organizing and analyzing qualitative data.

Berg and Lune define qualitative research as the quality and nature of things (Berg and Lune, 2013, p.3). Qualitative research refers to meanings, concepts and descriptions of a phenomenon and this research is primarily interested in individuals and their life-worlds (Berg and Lune, 2013). Therefore, I used a qualitative research design because the purpose was to study a social problem; the aim was to capture people's perceptions, descriptions, meanings, belief systems, their life stories and experiences of how climate change has influenced them as women and men. Thus, a quantitative research approach, which measure the subject matter and distribution, will not be of my interest in this particular research (Berg and Lune, 2013).

The research concerns rural people's understanding of climate change and gender roles in semi-arid areas. The research explores the impacts of climate change and how this affects women and men's gender roles differently in the two villages in Meatu district, Mwamanimba and Mwashata. As a qualitative researcher I am interested in how people organize their livelihoods, household activities, their social settings and how women and men make sense of their environment through their specific gender roles (Berg and Lune, 2013, p.8). Literature has emphasized women's vulnerability to environmental conflicts and shocks which further challenge their adaptive capacity. However, to better understand women's perspectives, men are also central in the data collection. The research emphasizes how roles of women have changed but in order to do that the transformation of roles of men is also important.

Planned and autonomous responses will lead to climate change adaption and it is therefore necessary to identify vulnerabilities and to understand the gender-based dimensions of climate change. Monogamous and polygamous household structures have not been compared and examined in this particular area before. Therefore, the research compare these contrastive

household structures with different amount of livestock (large amount: 50 cattle, medium size: 30 cattle and small or none amount of cattle: 10), and the two villages to see if there are any particular differences worth noticing and to support the data.

I interviewed women and men from two different villages, both in the same area but there is a long distance between them. The purpose of this was to compare results and to validate the data. Additionally, it was interesting to find out if the villagers would differ strongly in their answers and to see if and how climate change has affected them similarly or differently. In total, 60 women and men were interviewed; 30 people from each village divided in 15 women and 15 men. In addition to these, I interviewed key informants consisting of 2 village leaders, staff from ICS and my translator who lives and is a farmer in the same area. I also interviewed to elderly persons who provided a biography of their lives. They were not asked questions like the other interviews but I asked them if they please could tell me about their life in the village, from childhood to adolescent.

In conducting an analysis, by examining the vulnerability context looking at access to resources and adaptive capacity; the research explored how women and men's time management of daily activities and adaptation strategies was structured. By this I gained insight to the main objective which is to understand how the impacts of climate change have transformed gender roles in connection with the framework's key elements structure, relations and agency.

Women and men's meanings they assign to gender roles was the research focus and their work and daily routines was examined in a natural setting. These elements are directly observable but their emotions, perceptions and motivations behind their actions were considered by my own perception and understanding (Berg and Lune, 2013, p.15).

There are several methods of collecting data that you can use to do qualitative research. However, I chose one main method which fits the purpose of this case study the most; in-depth interviews with focus groups. Since participant observation is time consuming I conducted direct observation which suited my time frame. In direct observation I made specific observations of a situation without influencing or participating directly in any way. One need to participate fully in the community in order to know whether your observations are valid in participant observation. Researchers often stay and live over longer periods in the village during participant observation techniques (Berg and Lune, 2013).

I interviewed women and men at the household and community level. My attention was directed towards micro-level impacts of climate change. I therefore compared different household structures and the different level of income for women and men. Interviews was first conducted individually and then collectively and I used audiotaping because it captures interactions and data accurately. From earlier experience audiotaping tend to provide more complete data. Furthermore, interviews provide depth and allows detailed insight into participant's lives (berg and Lune, 2013). I tailored the interviews specifically to key informants but the interviewees with the villagers were asked the exact same questions.

Women and men were interviewed separately and individually. Having all the attention on one respondent at a time with me and my translator was very important in order to get the women to speak freely. Discussing gender roles is very much a sensitive topic and men often wanted to control the interview by their presence when I interviewed the women. However, we managed to separate women and men with the men's approval. FAO's training guide for gender and climate change research (2012) in order to be gender sensitive when I was conducting my research. The guide provided me with information and tools for collecting and sharing gender-sensitive information about the households and individual household members (FAO, 2012).

4.1 SAMPLING

In order to avoid choosing a sampling method which results in a biased sample of the variables under my study I considered the characteristics of behavior and social interactions that was relevant to the study population and the research questions (Altmann, 1974). I chose a selective sampling method because focus was needed on particular groups, location and subjects (ChangingMinds.org, 2015). There were certain characteristics I needed in my sampling such as gender specifics, level of income and household structures.

In my qualitative method I used a small sample and included in-depth interviews, group discussions, biographical interviews, reflection field notes and various texts literature (Berg and Lune, 2013). The sample size of the research was set in cooperation with the village leaders and they provided the specific number of respondents for my interviews each day. The sampling

went accordingly to my variables so I divided the respondents into focus groups according to their household structure and level of income.

First, I divided the total of respondents in monogamous households and polygamous households in two separate groups (household structure). However, there was also a third group that was important not to neglect, namely the female headed households. The smallest focus group of female headed households are the households with women who are either not married or widows. Secondly, I divided these three groups according to my variable level of income. So, one group was monogamous, polygamous or female headed household with high level of income (large number of livestock), the next was monogamous, polygamous or female headed household with medium level of income (medium level of livestock) and the last was monogamous, polygamous or female headed household with low level of income (small amount of livestock or no amount of livestock). I found this division of focus groups necessary in order to compare the group and be able to spot the differences between them more effectively.

I had to work with certain constraints which affected my sample size. First, I had to cooperate and listen to the instructions the village leaders gave me. They had a lot of control over my sampling size. At the beginning they brought people to the area I was placed and women and men were mixed. However, we agreed a bit later that I was to go from household to household if I had a village guide with me, (walking around with my translator was not allowed). The guide was not participating during interviews and women and men were divided separately. Secondly, I had to go through many different channels before being allowed access to my informants.

Finally, group discussions were conducted with the same people being interviewed before. This was to done to get the communication and interaction going further into depth of the topics and the key elements from the conceptual framework. The group discussions were divided between women and men but included all participants from all levels of income. The respondents really opened up and in hearing what other respondents said they got inspired and contributed with a lot more data than during the individual interviews. Data from the individual interviews were open for discussions afterwards which provided clear insight into some of the main issues concerning climate change and how it affect gender roles.

4.2 INTERVIEW QUESTIONS

The aim was to have the interviews to illustrate the basic structure of households, the level of income, the structure of the communities, the changing climate conditions and the differences between them. It was a great background for further exploration of gender roles and how the impacts of climate change have affected gender roles. As I have mentioned I followed FAOs (2012) training guide for researchers and one of the techniques mentioned there is not to ask directly about the issue you want to investigate, but rather ask indirectly and around the issue. Many questions were asked more generally with a contextual view in order to avoid questions that might be uncomfortable to answer, especially regarding the questions concerning gender roles. So, to find out the direct influences from climate change and if there had been a transformation of gender roles I would start asking questions like:

- How are women and men's time divided during daily activities now?
- How was women and men's time divided during daily activities before (10 years ago)?
- How are women and men's workload divided? Why do you think is it dived like this? Who decides this division of labor?
- How do the workload vary by season?
- Which activities involve income?
- Which activities involve the environment?

The following table is an overview of research questions, the interview design, who the respondents are and the type of interview questions. Please see appendix for all the specific interview questions asked.

Table 3. Overview of research questions, interview design, respondents and interview questions

Research question	Interview	Respondents	Interview questions
<p>1. How do the impacts of climate change like drought and less access to resources affect gender roles?</p> <p>2. How do the impacts of climate change like drought and less access to resources affect household structures?</p> <p>3. How do the impacts of climate change like drought and less access to resources and different household structures influence women's adaptive capacity?</p> <p>4. What is the relationship between climate change, level of income and the household's adaptive capacity?</p>	<p>Unstructured interviews.</p> <p>Respondents answer freely.</p>	<p>Key informants: Village leaders, ICS and translator</p> <p>60 villagers: women and men</p> <p>2 discussion groups: interaction between research respondents.</p> <p>Biography: 2 elderly from each village</p>	<p>Open ended interview questions concerning participant's descriptions, ideas, perceptions and thoughts.</p> <p>Please see appendix for all the specific questions asked.</p>

5 RESULTS AND DISCUSSION

According to CARE's framework (2010) the main influencing factors on transformation of gender roles and women's adaptive capacity with respect to climate change are relations, structures and agency. I therefore chose to address these key elements in my research. The three key elements are from the thesis's conceptual framework inspired by CARE (2010). The framework is the foundation for the results and is used as a tool to navigate the complex dimension between the impacts of climate change and how they affect gender roles. Firstly, the variable 'structure' consists of household structures. Secondly, the variable 'relations' concerns transformation of gender roles and traditional gender roles. Finally, the variable 'agency' is addressing the household's level of income and the amount of livestock, access to resources, adaptive capacity and adaptation strategies.

5.1 STRUCTURE

5.1.1 Household structure

In the village areas land is normally divided per household and every household own a certain piece of land of different sizes depending on their inheritance of land. In every household the land is owned and controlled by the husband because he is considered as the head of the household. The husband is also the owner and the decision-maker of what will be produced. For agricultural production, husbands and wives share one spot of land. Husband, wife and children within a household participate in cultivating that spot of land for production. Most of the time wives and children have more responsibility in this particular spot and have more work hours during the day than the husband/father. This is the same structure for both monogamous and polygamous who live in one territory or houses.

For the polygamous unions which have more than one territory or houses, their land and farms will still be owned by the husbands and separate farms and spots of land will be managed by husband and wives separately. So, each wife is given a spot of land for cultivation but she

does not own it or control it, she only works there for her husband in addition to working on the spot which the husband uses for cash crops only.

In few circumstances the members of polygamous households work together but in most circumstances each wife have a separate spot land under the ownership of the husband. Traditionally it is husbands who owns land and therefore a wife cultivates in a land which is given by a husband. So, if a husband is polygamous he will be responsible to provide land to all his wives. In all polygamous households, each wife has to have her own house or room, cook her own food and cultivate her own farm. But the husband owns all the spots of land as he also "own" the wives. It is not about helping their husband when they are cultivating on the spot of land owned by him, but it is considered as a part of their job and gender role because each wife is responsible for taking care of her family including her husband.

The environmental impacts caused by climate change on household structures are similar in both polygamous and monogamous households. All of the rural villagers experience an increase of drought, shorter rain seasons, more inconsistent rainfall patterns and unreliable weather seasons. These impacts caused by climate change indicate less access to resources for everyone living in Mwamanimba and Mwashata. Both monogamous and polygamous household structures have insufficient access to important resources such as water, food, land, livestock and other products that nature provides. The perceptions of these worsened environmental conditions by local farmers and villagers are very much similar and they all agree that the environment is a great challenge for their livelihoods and survival.

However, the socio-economic impacts caused by climate change differ between household structures. The environmental issues which have led to less access to vital resources influence their ability to adjust to these constraints differently. A polygamous household encounter more challenges in adjusting to the current environmental changes much due to oversized households. Polygamous households generally consist of 3-8 wives pr. husband with 7-10 children with each wife. 30-40 children, or more, in a household is then common for polygamous unions. The key informants are particularly concerned with this high number of people in a household but the younger generation and other monogamous women and men also expressed a strong concern for overpopulation in these household structures. During interviews, concerning the polygamous household structures, key informants and focus groups expressed

questions such as: is there enough food for all the members in polygamous unions? Who will provide food for everyone? Where will you get enough land to cultivate in order to provide enough food?

Population growth is the foremost challenge at both household level and community level because it results in food insecurity and less available land. The majority of monogamous households perceive the polygamous households as a major concern, particularly because of high food insecurity in these type of households and in the community. Additionally, oversized households result in an overpopulated village and no access to land for cultivation.

Furthermore, since the impacts of climate change have led to less access to vital resources, the issue of time management has come to the fore. Adaptation to these changes are time consuming and daily activities are more demanding than before. Women in polygamous household structures are badly influenced by time management and there is a concern for “lack of time” and “waste of time” among the polygamous women.

Respondents from the two villages and key informants mentioned that it is more challenging to plan domestic and productive activities for both women and men in a polygamous households. One thing, is that the issue of time management brings more workload on the women and time is just not enough for them to accomplish all the daily activities and chores. The other, is that seeing that the husbands decide and instruct their wives on most activities, at home and at the farm, the lack of time also affect the husbands. A gendered expectation is that women need permission for something to happen or an agreement to perform their roles. Often men fail to inform all the wives what they are supposed to accomplish during a day and the wives end up doing very little, or nothing, because they do not have the husband’s consent. Since the husbands have many houses to attend to, and because the wives lives in separate houses, the husbands struggle to make ends meet. They often fail to instruct and inform all the wives on their activities.

In contradiction, monogamous households have fewer members and time management is less of a burden for women and men. Respondents and key informants state that a monogamous structure is able to improve the livelihood and have better opportunities to adjust to the changes. Planning adaptation strategies in a monogamous household is less time consuming and it is therefore a better chance for them to deal with the environmental constraints.

In group discussions with men from both household structures some of the polygamous men expressed fear of failing to perform their gender role as a man. Firstly, due to time management but also due to a greater responsibility of providing for more wives. Secondly, because the monogamous men have more control of their household; meaning that it is easier for them compared to polygamous men to control the income from cash crops and livestock because they can cooperate with one wife. Some monogamous women share control of the income from vegetables and this is accepted by the husband.

In group discussions with women from both household structures most of the polygamous wives stated that they are unsatisfied with their household situation and time management. Whereas the monogamous wives expressed anxiety of their husband marrying more wives. Firstly, due to the fact that the husband will leave them behind and favor another wife. Secondly, they expressed fear because a polygamous husband pays a very high bride price (since he has more wives) and due to this women have to repay their husbands by working harder. Thirdly, the monogamous women fear polygamy because there is less negotiation between genders and that power relations between husband and wives are unbalanced. Polygamous women can try to negotiate but it is harder for the household with more women because all the wives wants to decide during household discussions. The husband will get more complaints with the other wives if they do not get the same as the other (i.e. an opinion of theirs to be decided for, a dress, or new equipment).

Furthermore, the monogamous wives expressed fear of their husbands deciding to change the household structure and marry more wives. They claim that their position as a woman in the household would be challenged by this because they have to share their husband with other women. There is an ongoing competition so to speak between the wives in polygamous households. They compete for the attention of their husband and many mentioned they have to work hard in order to get more respect and acknowledgement form their husband.

Village executive officers claim that less access to resources caused by the impacts of climate change will slowly transform polygamous household structures because this household structure is unsustainable for the members if the impacts of climate change continues. Less access to water and food is a bigger challenge to polygamous unions because there are too many people to provide for. However, this transformation does not mean that households which already are polygamous will change and become monogamous. The polygamous husbands will not end their marriages. What it means is that there is a higher probability now that the new generation of men, i.e. the younger men who are not married yet, choose monogamy. The younger male respondents in both villages agree that monogamous household structures are a way of adapting to climate conditions. This is mostly an unconscious phenomenon but some recognize the impacts of climate change and chose consciously to only have one wife. The younger generations perceive the existing environmental constraints as worsened conditions and are aware of the influence of less access to resources and therefore approach monogamy

However, education has also contributed to transforming polygamy and gender roles. I also consider that Omariba and Boyle (2007) associates the decline of polygyny with Westernization and modernization of sub-Saharan Africa. Even though polygamy is synonym with wealth and masculinity, and that it is considered high social status for men to have many wives, education, less access to resources and modernization combined are slowly changing this household structure.

Therefore, I state the main finding and greatest shift of gender roles; are the impacts of climate change transform polygamous household structures gradually. Moreover, a way of adapting to these impacts such as less access to resources is that the younger generation choose monogamous household structures over polygamous.

This finding affects gender roles and contributes to transform the roles of women and men in polygamous and monogamous household structures in Mwanimimba and Mwashata. Since polygamous unions encounter more challenges due to oversized households, population growth is a major concern both at household level and community level. It results in food insecurity and less available land. Thus, a decrease of polygamous household structures and smaller village populations probably leads to greater access to resources which again leads to a better adaptive capacity for women. They will be able to improve their livelihoods and have

opportunities to adjust to the changes. Arguably, will planning adaptation strategies be less time consuming and therefore women will have a better chance to deal with the environmental constraints.

Time management will be less of a burden for both women and men if the number of polygamous household structures decreases. This is a very important factor for their adaptive capacity in the context of climate change. Time will be easier to manage and bring less workload for women performing daily activities and chores. Men can easier decide and instruct their wives and will probably not fail to inform the women what they are supposed to accomplish during daily routines. Since the husbands will only have one house to attend to they will be able to instruct and inform the women on time. Communication and decision-making will therefore be more sufficient and less time consuming.

Furthermore, power relations between women and men will be more balanced if there is an increase of monogamous households. Women in Mwamanimba and Mwashata argued that it is less negotiation between genders when there are many wives involved during household discussions. Monogamy will therefore enforce women's empowerment by participation in negotiations and decision making. In a sense they will be "freer" to do and say what they want because there are fewer individuals involved and to take into consideration.

5.2 RELATIONS

5.2.1 Transformation of gender roles in Mwamanimba and Mwashata

The impacts of climate change have transformed gender roles in Mwamanimba and Mwashata. They are continuing to transform and can be defined as dynamic. Increased drought and unreliable seasons, which are the central environmental issues, are the indirect drivers behind gender inequality and the development of the two villages. However, a minimum amount of monogamous male and female respondents with medium level of livestock still claims there is no specific change of gender roles during the past 5-10 years. They believe women and men perform the same roles as they did before climate change.

The triple role of women is a great challenge with respect to climate change. This role brings a heavier workload because women have to perform three roles whereas men only have two roles. Women have a reproductive role, a productive role and a community role. Men only have a productive role and a community role. Men do not perform domestic chores which are activities belonging to the reproductive role. Drought and inconsistent rainfall patterns caused by climate change bring heavier workload and responsibilities for women because drought is a threat against food security. Subsequently, since women are in charge of collecting water, collecting firewood and making food preparations, this impact women strongly. Heavier workload and more responsibilities lead to major changes for attributed roles of women when drought and unpredictable environmental disasters hit the two villages. Their adaptive capacity is challenged by this and their roles as women becomes more difficult and demanding.

However, the same group (monogamous male and female respondents with medium level of livestock) stating that there have been no change in gender roles also believe some of that drought increases the workload for men. This is because they have to walk longer distances looking for food and move the cattle further looking for pastures.

It is not only the roles of women which are transforming. The role of men are also changing, especially for the men in polygamous household structures because this structure is declining. However, many men perceive their role as static and that people were born into a patriarchal society which is impossible for outside factors to influence and change. The men perceive gender roles as a “way of nature” and the gender roles women and men have are given by nature.

Religion and belief systems also contributes the perception of men having static roles. Moreover, according to some male respondents the role of a woman is perceived as more dynamic because they can do “men’s work”. The men however cannot perform domestic activities or do a “woman’s job” as some of the respondents refer to it. This is a contradiction because women are not allowed ownership, they do not have control or same degree of access to resources as men. Furthermore, they are not decision-makers and they are not allowed to be the head of a polygamous or monogamous household if they are married, or marry several men as men are allowed to marry several wives.

Another contradiction is that some men have started to fetch water, and since year 2000 some men have started to assist their wives with food preparations, which is clearly women's responsibilities according to traditional gender roles. Subsequently, there has been a change since 2005, due to the intermarriages between the tribes, in some other tribes outside the villages men can do domestic activities such as cooking and watching the children and women also plough with oxen and walk with livestock searching for pastures.

There are strong gender roles and identities in Meatu district. For example, the activity of women walking with oxen was discussed in the group discussion among females, and in Mwamanimba this was laughed at. The wives considered this a punishment from their husbands. If women see other women ploughing or walking the cattle they would laugh at them and thinking about what she could have possibly done to upset her husband in this way.

If a man fail to act his role as a man there is a high probability for him to run away in shame. During crisis it is common that men flee the village and leave women and children behind. Since men feel they are unable to change their roles, for example, not provide enough food for women to prepare, they turn to alcohol and escapism.

5.2.2 Traditional gender roles in Mwamanimba and Mwashata, Meatu district

Due to culturally dependable domestic activities, a man cannot make dinner, care for babies, wash clothes or clean the house. A man can only (and rarely) play a domestic role if there is no other alternative, when for example his wife is sick.

Workload is traditionally divided between genders; the most important role for a woman is to give birth and the most important role of a man is to make an income. Women have the responsibility for fetching firewood and water, they have to walk long distances which increases with drought. It is very risky activity because there is a high possibility of rape. Many women have gotten aids from being raped outside the village when they are walking these long distances out in the bush.

Men also have to move further with cattle and some feel they are forced to move to other areas. It is too far to walk back to their homes, so they emigrate to other villages where pastures are available. Women are then left behind because some men never return.

Women in Mwamanimba and Mwashata sell vegetables and sweet potato, whereas men sell livestock and cash crops. Men mostly use the ox-cart, they transport the products from field to their home and women milk the cows. The rural women have community roles where they offer labor force when the village need to build new schools and dispensaries. They prepare food when there is a wedding ceremony or a funeral in the village. Women also take care of sick villagers as witch doctors are mostly women. Men’s community role consist of building houses, churches, schools, dispensaries, etc. The table underneath presents the traditional gender roles in the Meatu district.

Table 4. Traditional gender roles in Meatu district

Women’s role		Men’s role	
Dry season	Wet season	Dry season	Wet season
Domestic chores.	Domestic chores.	Build houses.	Ploughing.
Collect firewood.	Weeding.	Make bricks.	Weeding.
Cultivating sweet potato vines.	Gather vegetables.	Look for pastures and move cattle.	Grazing the cattle.
Cultivating green vegetables.	Prepare sweet potato chips.	Digg wells.	
Dry vegetables.	Prepare for dry season.	Clear land.	
Community labor force.		Labor force in other farms.	

5.3 AGENCY

5.3.1 Level of income

Agriculture is the main income activity in Mwamanimba and Mwashata, but production has gone down. A respondent claims that 7 years ago they did not need to worry about getting enough income from their cash crops or sufficient amount of food from their crops for own consumption. Now, the rural people in the villages are very frightened and worried that the environmental changes result in decreased level of income and hunger crisis. The majority of the respondents consider the overall situation for their village and households bad, meaning they do not have sufficient access to food, water or income. Moreover, they fail to produce cash crops that supports their livelihoods.

There has been a change in income level during the past 5-10 years. The level of income has decreased due to harsh impacts of climate change. Few of the respondents claim there has been an increase. New technology and better farming equipment make cultivation easier to handle. But, most of the respondents claim a decrease in production and that the change in the past 5-10 years is unfortunate because of the severe drought and worsen conditions of the environment. The villagers in Mwamanimba and Mwashata used to produce a lot more 10-15 years ago, now most cash crops are absent and many households are cultivating only for their own consumption.

The average seasonal income is approximately between 300.000 - 600.000 Tanzanian shillings. However, some rural villagers tend to claim a higher income level because they feel ashamed. Nonetheless, rural people from the focus group with low level of income stated as little as 100.000 Tanzanian shillings, or less/none, pr. season. Those with medium level of income earn 500.000- 600.000 and those with a high level of income earn about 2 million, or more, as their seasonal income.

The main difference between the focus groups is that those with high level of income and livestock are experiencing the impacts of climate change less. They can afford available resources in order to adjust to the situation. Their higher status prevents them from suffering from hunger crisis and few of the respondent mentioned that starvation was a concern. The impact of climate change is therefore different for rural people with medium and low level of

income and livestock. Female and male respondents with medium level of income point out the importance of adaptation strategies and to set aside income if a season is abundant. Respondents from low level of income and those with no livestock are the most vulnerable to the impacts of climate change and they are unsuccessful in setting aside income which make them experience greater barriers to their adaptive capacity.

5.3.2 Adaptive capacity and adaptation strategies

There is a strong relationship between household structure and vulnerability because the structure of the household determines the choice of adaptation strategies and adaption strategies is determined by vulnerability (exposure and sensitivity). Polygamous household structures are more vulnerable than monogamous households because the workload is heavier, more time consuming and the burden of the triple role of women increases.

Men and women are affected by drought but women are more vulnerable. The main reason for this is the absence of men during crisis. Many husbands leave the women, children and the elderly behind due to shame, but also for their own survival. When a man is not able to provide for his family he will most probably move to another village. Furthermore, heavy workload, the triple gender role, no control of income activities and less access to resources also make women more vulnerable.

Women adapt by saving water in big containers that will be enough for consumption in a household during drought, they also gather vegetables during wet season and dry them so to save and use later when crisis hit. They gather a lot of vegetables during the wet season to prepare and try to increase their productions, especially sweet potatoes.

Men mostly adapt by selling cattle, goats and sheep and save money. Men also adapt by trying to cultivate more land and to prepare for more cultivation. To ensure higher production, they use drought resistant crops. To handle threats and risks caused by the impacts they grow sorghum and cotton which is drought resistant. The village leaders emphasize that everyone have to cultivate drought resistant crops, at least 2 acres, and food crops to make sure there are enough food. Many households are using seeds that mature earlier as an adaptive strategy so they can

produce during times of short rains. The husband decides what adaptive strategy to use. Men considers the risks and threats and then decide what to do with them.

The village leader of Mwashata is waiting for the government, through agriculture extension officers to interfere and provide information about drought resistance and new adaptation strategies. The department of agriculture disseminate the technologies to farmers so that they can produce enough food crops for their households by using their own agricultural resources. Respondents mentioned that there is not any formal or informal institutions that supply them with resources needed for adaptation to climate change, such as information, training, skills, financial support or technological inputs. ICS provides agricultural inputs such as seeds that matures earlier. The government brings maize when there is hunger crisis, but a very small amount which does not provide for all family members; 17kg of maize cannot sustain a household. Polygamous and monogamous households get the same amount of food aid so the government do not consider how many members there are within a household. Farm animals is not included either, and respondents are worried that their animals might not survive during crisis.

5.3.3 Access to resources

Access to available resources are scarce in Mwamanimba and Mwashata. Having access to land is the main access people need. Land is vital because it leads to other important resources. The second access which is considered highly necessary is livestock. People can only have access to important resources if you have capital, thus access to cattle is most definitely needed because cattle is considered as capital.

The resources needed for the households to cope with the impacts of climate change are access to land and cattle. However, access to land is insufficient. A common issue is that many households are not able to access resources when they are needed, many have access to livestock but not enough land, and the majority need more land for pasture and cultivation. Education is also very important to have access to. Key informants stress the importance of education and more villagers are now sending their children to school. Still, there are many children who

unfortunately do not have access to education. Boys in a greater extent than girls are achieving education.

Access to resources have changed drastically during the past 5-10 years, especially access to land, water and food. In general food security is absent during drought crisis caused by climate change in the villages. Nevertheless, monogamous households with medium and high level of income stated that they have food security during crisis.

Furthermore, information concerning climate change is absent. The rural people have no access to information regarding climate change and environmental issues. The officer of agriculture controls the agricultural activities in the village, and is regarded as the decision-maker concerning agricultural issues in Mwashata. In Mwamanimba most villagers are not aware of who owns and controls the agricultural resources in the village, and who the final decision-maker is in their community. So, overall there is a lack of access to information and knowledge in reference to climate change and adaptation strategies.

There is a strong relationship between gender roles and access to resources. Women have less access to resources and 70% of the respondents claim there are no equal rights in relation to access between genders. One explanation for men having easier and more access is because they have paid the bride price so they are married by ownership of the wife/s. This is also one of the reasons why many women are denied possession of livestock (men pay the bride price with cattle). However, if the husband dies they are titled cattle. Furthermore, women are also denied ownership of land when they are married. Men do not want them to possess land. Male respondents fear that if they get a divorce the women might take their land and sell it. Nonetheless, in Mwashata some married women are allowed to rent land.

A woman who is not married have access to resources because no man decides for her, or control her. She is then head of the household. Of the total of 60 respondents (not including key informants) there were only two women who were head of the household, both were widows.

As all resources are owned by the husband there is unbalanced rights to access to resources. Men argue that women are equally capable of accessing necessary food requirements but it is the husband who grants and controls the access. Some claim that women and men have

equal access to food but the husband grants the access to resources like livestock, land, food, water, loans, technology, and cash.

Often the men, as the head of the household, in polygamous structures feel superior to women and do all decision-making because they have many wives. It gives them credibility and status and thus they claim to have more rights. Religion is also a part of this belief; God has chosen men to rule. Several men and women believe gender roles are made by God and that people are born into their roles.

However, there is room for discussion in the households but the husband has the final say. He is the decision-maker as all the men are heads of the households. Many have family meetings where they sit together and discuss, but if the husband thinks that the wife/wives will not accept what he proposes, he does not conclude her/them in the discussion. The other wives will not approve therefore he just precedes without their approval.

Access to resources will depend on the certain type of household structure and what status people have in their community. In polygamous households there are less negotiation between males and females because men do not want to lose their superiority in the household, he is obliged to control all his wives. The men claim that they cannot negotiate with their wives because they are not as aware of the situation as the men and there are too many opinions to consider. It is evident in monogamous household structures that women and men have more balanced access to food and other resources, whereas in polygamous the tendency is the opposite.

6 DISCUSSION OF RESULTS AND LITERATURE REVIEW

6.1 LACK OF GENDER AWARENESS IN THE CONTEXT OF CLIMATE CHANGE

The concerns for gender and climate change are clearly presented in scientific research and literary studies. Recently, it has been recognized that women will be worse affected by the impacts of climate change due to gender inequalities (Nelson, 2011). Firstly, Nombo's research (2015) on gender relations and climate variability in semi-arid areas of Tanzania shows that uneven division of labor between women and men, in the context of climate change, overburden women with more responsibilities. Secondly, the negative impacts on production systems, agriculture and livestock has led to increased labor burdens on women in Meatu (Synnevåg et al, 2015). Nombo's research (2015) clearly confirms that climate variability increases unequal gender relations. Additionally, prejudiced cultural norms authorize men to control household incomes and development strategies on climate change should be sensitive towards gender and context explicit.

However, further field research is recommended and needed to explore gender roles and climate change in the light of development. It is necessary with a representation of gender issues in climate change policy and decision-making from the local to the international levels. There is most definitely a lack of adequate gender analysis (Nelson, 2011). Areas for further research which is recommend are how different impacts of climate change, between women and men in agro-pastoralist households, should have a focus on the influences on household wellbeing and relationships between marriage breakdown and climate variability (Synnevåg et al, 2015). Women remain vulnerable and poor even though they account for approximately 80 per cent of the agricultural sector in Africa (Denton, 2002). Subsequently, 70 per cent of the people living in extreme poverty are women. It is therefore imperative that the consequences of climate change should not bring vulnerable women into further deprivation (Denton, 2002, p.1).

Dinar, Hassan, Mendelsohn, and Benhin (2008) state that there is a serious deficiency in African impact research and little data on how serious the effects of climate change will be in the future. Moreover, they urge for an “immediate and comprehensive analysis of likely climate change impacts and adaptation options” (p.7). The eradication of gendered disadvantages and

vulnerable groups is an efficient way to better promote adaptation strategies and development in general (St. Clair in O'Brien, St. Clair and Kristoffersen, 2010). But, there is a lack of gender awareness in aid and development policy. Women and men's gender roles are neglected in the context of climate change and often affect women's rights and equality are affected by the fact that women are not being present in developing projects concerning climate change. Therefore, in order to conduct a comprehensive analysis which Dinar et al. (2008) ask for, the connection between gender and environment need to be recognized and incorporated into the climate change and international development agendas.

The recognition by international development agendas of gender awareness is essential because environmental changes concern gender relations because rural men and women experience the impacts of climate change differently. Evaluating rural men and women's roles in semi-arid areas are therefore crucial for sustainable development in order to avoid gender-based disadvantages. Women in Tanzania are more vulnerable to environmental changes because of their "limited access to employment, markets and public services" (Paavola, 2008, p.1). The women are not able to implement changes to the same extent as the men. As head of the household the men stand better chances to respond to climate challenges because of greater access to resources (Paavola, 2008, p.1). There are barriers to women's equal participation in decision-making processes, access to education and skills training (Nelson, 2011). Types of barriers can be indirect and direct risks females struggle with which are influenced by the status people have within their community and household structures.

In FOKUS's recent report (2014) regarding the involvement of women and their participatory activities, there is a great concern of how women's right and equality are one of the five pillars of Norwegian aid and development policy, yet nothing has been directly implemented to empower women. They argue their rights is only "on the paper" and in order to really create gender equality and get rid of the disadvantages there must be a clear policy on women's rights and that this policy must be reflected in budget and spending.

The report also claims that women's rights in the context of climate change are just sub-objectives in most projects, if they are evident at all. Only two projects which the rapport analyzes had gender as a sub-objective, none had this as their main objective. This shows how important it is for future projects to involve the issue of gender and gender roles, and particularly

women's' rights and empowerment. Emphasis on equality cannot be enhanced if women are still neglected in the context of climate; to have rights on the paper does not mean gender equality. (FOKUS, 2014). The report illustrate the gap of gender awareness and importance of gender equality and emphasizes the disregard for gender-focused policies.

6.2 GENDER & CLIMATE VULNERABILITY

Significant pressure from impacts of climate change and environmental constraints are major global concerns. However, countries in Africa are most vulnerable to climate change (Dinar et al, 2008, p.4). The vulnerability and risk are higher for livelihoods of rural populations in developing countries. Social and economic vulnerability to the impacts of climate change pose great challenges to communities who are vastly dependent on nature's resources. It is necessary to recognize and do further research because of the severe implications the environment in African countries poses, particularly to the most vulnerable social groups like women.

Gender influence vulnerability to climate change because gender shape women and men's different experiences of climate change (CARE, 2010). Women are more vulnerable to environmental changes because of less access to productive activities, technology and ownership (Paavola, 2008). However, although women suffer more from climate change it is important to recognize that women are not 'victims' or weaker than men (Okali & Næss, 2013). It is important to keep in mind when discussing the term 'vulnerability' that it is often associated with connotations of powerlessness. This is a discourse that can become a self-fulfilling prophecy (Nelson, 2011, p.15). Stating that women are more vulnerable than men do not mean that women are powerless.

However, women and men in the Meatu district also share certain vulnerabilities. There are multiple stressors which affect them equal and both genders share the same environmental burdens. It is not like the men do not suffer from the impacts of droughts and that women are the only ones who struggle with the environmental influences. But, men's capacities give them abilities to recover to changes and it is therefore easier for them to adapt. For instance, impact of climate change on agriculture affects them differently than it affects the women (Paavola, 2008).

Denton (2002) argues that women are absent from decision-making and that women's contributions to environmental resource management are ignored. However, women are still key stakeholders in agriculture and resource management. Leaving women out of the decision-making process results in gender inequalities. Women having less or no access and control over resources leads to unequal social rights. Different access to knowledge and time, with which to cope with the impacts of climate change, also contributes to women's vulnerability and gender inequality. This is evident in both villages, Mwamanimba and Mwashata.

Through socially constructed roles women lack adequate power and assets. Dankelman (2010) claims that women in general have less access to resources and a heavier workload than men which make them less prepared to mitigate and rehabilitate from environmental constraints (p.59). The triple burden of women's productive, reproductive and community roles add great challenges for their gender and vulnerability aspects.

To illuminate social and cultural vulnerability Anderson (2009) suggests an understanding of gendered dimensions of disaster risk reduction and climate change reduction is necessary. Gendered awareness can secure people's livelihoods and better respond to climate change. However, in many developing countries gender inequalities are omnipresent and belief systems which stem from older generations can be difficult to change. Adaptation strategies in order to reduce individuals' vulnerability and empower women might not be enough. Therefore I argue for a more holistic way to transform and adjust to environmental constraints and risks. It is needed in order eradicate gender inequality in Mwamanimba, Mwashata and other areas where gender and climate vulnerability is a huge threat to women's empowerment.

A holistic way to respond to climate change can include the contextual vulnerability framework which is a contrast to the outcome vulnerability framework. The contextual vulnerability framework is based on multiple processes and a more multidimensional view of climate-society interactions. Climate change here is "considered to occur in the context of political, institutional, economic and social structures and changes, which interact dynamically with contextual conditions associated with a particular 'exposure unit'" (O'Brian, Eriksen, Nygaard and Schjolden, 2007, p.76). This point of view, means that combatting vulnerability involves transforming the context climate change occurs, so that individuals can better respond to environmental changing conditions. The contextual vulnerability framework also emphasize

the “need to mitigate climate change on the basis of equity and justice” (O’Brian et al, 2007, p.76).

The core concept of the principle ‘transformation’ is a new view in how to deal with vulnerability and adaptation. It seeks to evaluate everything again, then transform and adapt. It is important here to think outside the box, or maybe even get rid of the box. Sen’s view (1981) on vulnerability back this principle of transformation. He claims that vulnerability to environmental events also have non-environmental causes and that poverty and social exclusion has greatly shaped concepts of social vulnerability. This view applies to gender awareness.

6.3 HOUSEHOLD STRUCTURES AND CLIMATE VULNERABILITY

There is uncertainty in determining vulnerability (Vincent, 2007). So, what constitutes a vulnerable household? This is an important question to ask in order to identify the adjustments rural people establish at household level and their livelihoods. Household vulnerability is decline of well-being caused by risky events. However, measuring well-being is difficult, so poverty lines, health and nutritional status are often used. Therefore, are individuals and households, described as vulnerable to climate change if risks result in loss that pushes individuals and the household below the well-being benchmark, for example the poverty line (Heltberg, Bennett and Lau Jorgensen, 2009). Vulnerability depends on the risks, exposure and sensitivity to the risks, expected impacts and losses, and risk management capacity (Heltberg et al, 2009). Furthermore, at the household level adaptive capacity also depends on knowledge of climate change. Knowledge concerning climate change can enable the household to foresee change and identify new livelihood opportunities, which can reduce the vulnerability of the household by bringing further access to resources required to achieve a better adaptive capacity (Vincent, 2007).

In the exploration of the socio-cultural dimensions of adaptation and vulnerability to climate change my research results show that monogamous household structures achieve a better adaptive capacity than polygamous. Polygamous household structures are a characteristic of the African family union and this structure is most prevalent in Western Africa (Omariba and Boyle, 2007). Although Omariba and Boyle claim there is a modest decrease of polygyny due to

westernization and modernization, I also argue that the impacts of climate change also contributes in reducing polygamous household structures because they are more vulnerable than monogamous households. How this will affect women's adaptive capacity and women's empowerment is yet unknown. But, research shows that women in monogamous unions are less deprived than those in polygamous unions. Women in monogamous relationships have better health and other advantages than women in polygamous relationships (Omariba and Boyle, 2007).

6.4 CLIMATE CHANGE, GENDER & ADAPTATION STRATEGIES

St. Clair (in O'Brien et al., 2010) states "that the regions, communities and individuals that are already being affected by climate change and will be hardest hit in the future are those with the least capacity to cope with the consequences" (p.181). The interaction between climate change, livelihoods, poverty and gender roles matter in climate change discourses. Former research have indicated that education, gender, age, household level of income, information and social capital influence the choice of adaptation strategies (Deressaa, Hassan, Ringler, Alemu and Yesuf, 2009).

Women and men are affected by climate change differently and adaption strategies therefore also varies. Their ability to adapt to environmental changes depends on access to resources. Some resources can be income, employment, technology, skills, education, infrastructure, management and capabilities (Masika, 2002). Different household structures adapt numerous strategies to cope with climate change and their access to certain resources decides their vulnerability. For instance, the degree of access to natural resources, such as land, livestock and water typically decide their vulnerability. Furthermore, human resources, such as education, family, heritage, skills and training matter to how vulnerable they are. Subsequently, social resources, such as social networks, clan, and local institutions participates as well in deciding the degree of vulnerability. Infrastructure, politics, economic resources, land ownership and land-rights also contribute. Women have less rights to land and insecure access to land because their rights are poorly defined. So, there is a gender dimension to adaptive capacity because of lack of equal participation in the decision-making processes (Nelson, 2011).

Nonetheless, it is confirmed in the Kilimanjaro region in Tanzania that women are becoming decision makers relating adaptation strategies. For example, their participation in water committees and cooperation with NGOs in the area bring forth the voice of women. Even though the adaptation capacity for women are in the very early stages, attempts by women have proven to be helpful in adaptation to climate change. Activities such as green water harvesting, using drought resistant crops and preservation of moist land have contributed to women's control over adaptation strategies and agriculture (Itemba, 2013).

Although this is not the case in Mwamanimba and Mwashata, where the women are not engaged in any participatory projects or adaptation focused committees, the rural women have found ways to adjust themselves. By means of survival they develop their own agency and use of local knowledge which strengthen their local adaptive capacity. But, since they lack overall access to resources they are unfortunately unable to influence collective decision-making with their own adaptive strategies. The men are the ones currently shaping social relations and decide the adaptation strategies, both for women and men. This is a barrier towards women's empowerment.

7 CONCLUSION

This qualitative research has studied the transformation of gender roles and women's adaptive capacity in the context of climate change in the semi-arid areas Mwamanimba and Mwashata in Tanzania. The research's results verifies that the impacts of climate change, such as increased drought, results in individuals having less access to resources such as food, water and land. This contribute to the slow process of the decrease of polygamous household structures.

This social process is caused not only by the impacts of climate change and reduced access to resources but also the influence from education, modernization and Westernization. It is not a conscious strategy women and men put into practice in order to adapt but more like a social phenomenon which is a result of strong influences from the environment. But, importantly to notice is that village leaders consciously emphasize the current transformation of household structures to the villagers and urge women and men to reduce the size of the household by monogamy in order to adapt and thus empower themselves and their community.

A decrease in polygamy transform the roles for women and men leading to enhanced adaptive capacity for women, more equal rights between genders and improved relations between women and men. It is obvious that climate change is not gender neutral in Mwamanimba and Mwashata and the thesis conclude that gender roles and adaptive strategies are slowly changing due to the impacts of climate change.

Furthermore, the thesis's results show that work and social conditions for women at the household and community level have worsen in the resent years due to women's triple role and the heavy burden of increased responsibilities it brings with it. With respect to climate change, the triple role of women is particularly a threat to women's adaptive capacity and empowerment.

The roles of men are also transformed. Although, many men perceive their role as static or fixed and that individuals are born into a patriarchal society which is impossible for outside factors to influence and change. But, results state that men in polygamous household structures is transforming because this household structure is decreasing. In addition, some men have started to fetch water and to assist their wives with food preparations, which is part of women's responsibilities according to traditional gender roles.

According to the thesis's conceptual framework the key elements relations, structure and agency participate in the transformation of gender roles and determine people's adaption strategies. The essential research question "if and how the impacts of climate change has transformed gender roles" was answered in the light of these key elements. It provided an understanding of climate change and how it transforms gender roles and identifies the barriers for women's adaptive capacity.

After an analysis of how women are affected by environmental degradation and constraints and how women respond to these issues the thesis argues that further research must be conducted and emphasize the importance of gender and gender relations with respect to the impacts of climate change. I argue for a more holistic way to transform and adjust to environmental constraints and risks in semi-arid areas and to include gender awareness during research. It is needed in order eliminate gender inequality and enhance adaptation strategies towards climate change in areas where gender and climate vulnerability is a huge threat to women's empowerment. A holistic response will transform the context which climate change occurs, so that individuals can better respond to environmental changing conditions. It will be a gender sensitive response to the effects of climate change and close the exciting gap between climate change and gender, which is very much needed in development agendas.

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8 APPENDIX

Interview questions for focus groups

Transformation of gender roles and climate change

Household structure

(Structure and livelihoods)

1. How many people are living in the household (i.e. eat and sleep at the same place)?
2. How many people in the household provides an income?
3. What is the household's three main income activities?
4. What is the monthly income of the three income activities?
5. How many hectares of land do your household cultivate?
6. Have your household's income level changed during the past 5-10 years?
If yes, why?
7. Do you have sufficient access to important resources such as water, land, livestock, products from nature and food?
8. What do you consider as the main challenges to your income and livelihood/household?
For example, climate change, lack of access to resources (livestock, water, etc.) or population growth.

9. In general, how do you consider the household's and your life situation in the village?

Gender relations

1. How is women and men's workload divided?
2. Which agricultural activities involve women? Which agricultural activities involve men?
3. Do activities vary by season? If so, how? Is the roles of women and men seasonal?
4. Which income activities involve women? Which income activities involve men?
5. How are women and men's work time divided? How many hours do women spend on agricultural activities and how many hours do men spend?
6. Who controls the income in the household?
7. Who is the decision-maker in the household?
8. How do you negotiate between each other (males and females within the same household)?
i.e. negotiation of different activities and responsibilities
9. What gender roles do women play in the household?
i.e productive, reproductive and community role, one role or several roles pr. individual?
10. What gender roles do men play in the household?
11. Have these roles changed during the last 5-10 years? If so, why and how?

12. How would you consider the climate change/ environmental issues have affected your role as a woman/man?
13. Who in the community is most vulnerable to climate change? How? Why?
14. How do women adapt to environmental issues (drought, lack of rain, water)?
15. How do men adapt to environmental issues?
16. If there are different adaption strategies, why?
17. Who decides what adaption strategy to use?
18. When food is not available, what is the alternative, what do you eat?
19. What happens to women during this event/crisis? What happens to men? Who are responsible for getting food, and how?
20. Who is impacted the hardest during drought crisis, women, men, girls or boys?
21. Does anyone seek alternative livelihood activities during drought crisis? If so, what do women do and what do men do?
22. Do households change their farming activities during drought crisis? If so, how?

Climate change

1. What do you perceive as risks and threats caused by climate?
2. What do you do with these risks and threats?
3. Does the household have an adaption strategy towards climate change?
4. What are the resources available for your household for coping with climate change?
5. What are the village/community's resources for coping with climate change?
6. Are there any formal or informal institutions that supply you with resources needed for adapting to climate change? Such as: information, training, skills, financial support or technological inputs.
7. In general, how would you describe the climate changes and the environmental challenges happening here in the village?
8. Do the government interfere or give support?
9. To what extent do you think your household is at risk of facing drought?
10. What risk management strategies do you use in order to ensure you have food and water?
11. What future plans and actions do you have to ensure water and food security?

12. In times of weather disasters, who is responsible for what activities in your household to cope with the disaster? Who makes decisions on what?

Access

1. Are you able to access resources when you need them?

i.e. livestock, land, cash, loans, food, technology and education

- Could you please specify some important resources that is vital to your household?

- Have access to resources changed over time?

2. Are women and men equally capable of accessing these resources that you need?

3. Are women and men equally capable of accessing food requirements?

4. Who grants access to resources in the household?

5. Do you have food security in times of crisis?

6. Do you have access to information regarding climate and environmental issues?

If yes, in what form?

Do you use this information and knowledge? How?

7. Who owns and controls the agricultural resources in the village? Who are the decision makers in the village?

8. How is access to land divided between women and men? Why is it like this?

9. How is access to livestock divided between women and men? Why is it like this?

10. Do you have access to education? Who decides in the household on who gets access to education?

Interview questions for group discussions

1. Please discuss the roles of women and men at the household level and community level.

Why do you think it is like this? Who decides gender roles? Are men and women born this way or is it culture? What determines the roles of women? What determines the roles of men?

2. Has gender roles changed the past 5-10 years? If so, why?

3. Please discuss the relationship between gender and climate change/environmental issues.

Does climate change put more pressure and responsibility on women? If, how? In what ways?

How do environmental issues impact men?

4. How do women plan and organize for adapting to the environment? How do men plan and organize adapting to the environment?

5. Please discuss the relationship between gender and access to resources.

Do women and men have equally access to resources?

6. What do you think can be done in order to adapt to climate changes? What has been done earlier?

7. In total, how has climate change and environmental issues affected your life?

8. What do you think can be done to create better livelihood security for all the households and the village?

For example, protection of crops, adaptation capacity, income activities, training and skills, agricultural extension services.

9. What is your general view of climate change?

10. What is your general view of gender roles? How do you consider the relation between men and women?

I also interviewed key informants who had their own individual set of questions but mostly I just let them talk about the certain topics in my research. Many of them were already familiar with my research and had a lot to contribute without me asking them specific questions. The interviews with the two elderly from each village was biographic so I asked them to talk about their whole life experiences from childhood and up until now.

PICTURES

The semi-arid area surrounding Mwamanimba





Outside the non-governmental organization ICS





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