

## **ROLE OF GENDER ON THE IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION STRATEGIES: A CASE OF MANICA AND TETE DISTRICTS IN MOZAMBIQUE**

**By Blandine Sanginga.\***

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### **Abstract**

Climate change is eliciting more severe and more frequent storms and drought, resulting in changes in timing which brings about changes in the pattern of seasonal storms, seasonal diversity and amount of rainfall which cast destruction on agricultural production. The effects and consequences of life-threatening weather related- disasters are gender-biased and that woman experience greater impacts and higher defencelessness than men. The study explored the role of gender on the implementation of adaptation strategies against the climate change hazards among the rural agricultural households in Tete and Manica Districts in Mozambique. A descriptive research design was adopted with a target population of 4450 members residing in Tete and Manica districts. A combination of stratified random and purposive sampling techniques were used to select the sample size of 405 respondents. The study found out that the perception the residents have is that human activities are responsible for climate change which has resulted to the reduction of agricultural production due. The study also found out that there are various sources of accessing information so that the households of Tete and Manica can be able to cope with climate change such as media, community meetings, reliable sources such as family, friends or relatives other access information through reading of books and magazines while others rely on awareness programs done by Mozambique Red Cross Society. The study further found out that the role of women in decision making on climate change adaptation strategies in Tete and Manica Districts is based on dispossession level, education, urban/rural classification, ethnicity or number of children.

\*key words: Climate, Climate change, Adaptation Strategies and Gender

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**\* MA student Catholic University of Eastern Africa**

## Introduction

Climate change is eliciting more severe and more frequent storms and drought, resulting in changes in timing which brings about changes in the pattern of seasonal storms, seasonal diversity and amount of rainfall which cast destruction on agricultural production (Osman-Elash, 2009). This undesirable disparity in seasonal sequence combined with environmental degradation like deforestation, soil erosion, and desertification have had a very negative outcome on the global standards of health and livelihood. This is predominantly affects poor countries, where, inconsistently, people discharge the least per capita, but pay the highest price for the emissions of wealthy, high-emitting countries (Arora-Jonsson, 2014).

Climate change unevenly impacts wealthy and low income countries, as well as the rich and poor within countries, it is also unsatisfactory in terms of gender. Emerging evidence indicates that women and girls will experience even greater inequality through the impacts of climate change. It has been well-documented that women are differentially impacted by calamity. It is obvious that women suffered extremely in nearly all disasters: elderly women died at higher rates than older men in the European heat wave in 2003; women vastly outnumbered men in tsunami deaths in 2004; women outnumbered men in cyclone deaths in 1991 and 2007 in Mozambique, and the list goes on (Haigh & Vallely, 2010).

A study of 4,605 natural calamities found that calamities shortened women's life expectancy is significantly more than men's (promisingly, this association is reduced where women's status is more equal). Many women are made vulnerable by their lack of access to sources of emergency information, as well as their lack of decision-making power in disaster prevention and preparedness programs; they are also often excluded from disaster recovery operations and from planning at the national level (Osberghaus, Finkel & Pohl, 2010).

The model of vulnerability has been the focal point of much importance in the developing discourse about the hazards of climate change and adaptation strategies. Some studies arrive at the conclusion that effects and consequences of life-threatening weather related- disasters are gender-biased and that woman experience greater impacts and higher defencelessness than men. This does not mean that men are not affected or that all women are in weaker positions than men

regarding vulnerability under disaster induced environmental situation. The two main policy responses to climate change are the mitigation and adaptation. Mitigation addresses the root causes of the changes through reduction of greenhouse gas emissions as adaptation seeks to lessen the risks emanating from the consequences of climatic changes. These two responses are important to deal with the already witnessed global changes (Clark, 2012).

### **Statement of the Problem**

To adapt to the negative impacts of climate change, women must have a voice and be engaged in leadership and decision-making roles not only by assuming political office, but by participating in the planning and implementation of sustainable natural resource management practices, as well as climate mitigation and adaptation interventions. Disaster Risk Reduction the practice of systematic analysis and mitigation of the causes of disasters, including reducing exposure to hazards, lessening the vulnerability of people and property, wise management of land and environment, and improving preparedness and early warning for adverse events is only effective when women and girls are involved (Brown, 2011). And they must share in the fruits of these efforts. Current research has shown that when women are in decision-making and leadership roles there is a positive impact on sustainable natural resource management and climate adaptation activities (Arora-Jonsson, 2011). Since adapting to a changing climate is an inescapable reality even if emissions are halted today advocacy and decision-making efforts must also include the voices of adolescents and youth, as they have an essential role to play in future efforts related to climate mitigation and adaptation (Bradshaw, 2010). It is in this background that this study intends to examine the role of gender on the implementation of adaptation strategies to climatic change hazards among the rural agricultural households in Tete and Manica Districts in Mozambique.

### **Objectives:**

1. To examine the role of women in decision making on climate change adaptation strategies in Tete and Manica Districts
2. To assess the role of gender on the formulation of climate change adaptation strategies in Tete and Manica Districts

### **Critical Review of Relevant Theories**

This study was guided by the Cultural Theory of Risk for Climate Change Adaptation and the Prospect Theory theories. The way people perceive climate change threats is highly informed by their social interactions and cultural perspectives which detail their ultimate beliefs of their society and nature. Therefore, people's perception of the climate change risk and their vulnerability coupled with their myths about nature functions influence the acceptability of climate adaptation planning, policy making, and implementation (Bryan, Ringler, Okoba, Roncoli, Silvia, & Mario, 2010). Appropriate policies meant to motivate efficient adaptation and mitigation of climate change risk should not be understood on economic basis alone, but also take advantage of well-researched alternative behavioural patterns.

Cultural Theory of Risk is important to this study because it provides an explanation for why certain risks become politicized while others do not by showing that people with different worldviews vary in levels of support for certain actions that either align or do not align with their worldview (Tansey & O'Riordan, 1999). Assessing cultural worldviews provides additional insight and added explanatory dimensions into how public opinion is formed and why certain policy measures are supported or not, especially amongst individuals with limited knowledge or attentiveness towards a specific issue (Gastil et al., 2011).

Prospect theory provides a number of climate-relevant insights, such as the view that evaluations of outcomes are research dependent and the importance of perceived certainty of outcomes. Prospect theory thus proposes for empirical research on these effects (Nzeadibe, Egbule, Chukwuone, Agwu & Agu, 2012). This theory is related to the study because it attempts to prioritize and integrate social responses in identifying loss aversion as one of the drivers why people make decisions deviating from expected utility maximization. It shows that reference dependence can contribute to explain why some actors prefer aggressive climate mitigation and adaptation, while others are more reluctant to climate-related action. By the perception of certainty, outcomes which are perceived as certain get a disproportionately high decision weight, higher than expected utility theory with plausible risk aversion can accommodate. This certainty effect may also be present in in transparent, sequential decision problems, such as the ex-ante evaluation of

## **Methodology and Design**

A research design is a mode in which it helps the researcher to achieve the research objectives. It can be defined as a means for a study and the plan by which the research is to be executed. Research design specifies the procedures for data collection, measurement, and analysis (Neuman & Robson, 2009). Mixed methods involve combining or integration of qualitative and quantitative research and data in a research study (Tashakkori & Teddlie, 2010). The study adopted mixed methods of research which included both qualitative and quantitative data collection methods. Both quantitative and qualitative research approaches were employed to adequately address the research objectives. The quantitative methods included structured cross-sectional household survey and the qualitative methods included key informant interview, direct observation, focus group discussion and in-depth interviews.

## **Sample and Sampling techniques**

Marshall and Rossman (2010) states that sampling is the process of selecting a sufficient number of elements from the population, so that a study of the sample and an understanding of its properties or characteristics would make it possible for us to generalize such properties or characteristics to the population element. Purposive sampling was used to all respondents who participated in the sample; this sampling method involved purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe. The technique was used because some of the respondents were not available at the time of data collection as others were assigned duties out of the office or were very busy in their farms.

## **Sample Size**

A sample is a subject of the population. It comprises some members selected from it. In other words, some, but not all, elements of the population would form the sample. A sample size is defined by Creswell (2012) to refer to the number of representatives respondents selected for interview from a research population. The number depends on the accuracy needed, population size, population heterogeneity and resources available. The sample size of this study was determined using Daryle (1960) tabulated number of sample size as stated below:

$$S = X^2 NP (1-P) \div d^2 (N-1) + X^2 P (1-P)$$

S = required sample size.

$X^2$  = the table value for chi-square 1 degree of freedom at the desired confidence level (3.841).

N = is the population size (which for this study is 4450)

P = is the population proportion (assumed to be 0.05)

d = is the degree of accuracy expressed as a proportion f (0.05)

The sample size will therefore be 445 respondents

Four hundred and forty-five participants were selected to represent the population of residents in Tete and Manica.

### Data Analysis and Presentation

The study sought to find out the age categories of the respondents. They were therefore asked to give this information. A summary of the findings is presented in table 2 below.

**Table 1: Age Categories of respondents**

Age Categories	Frequency	Percent
30-39 years	88	21.7
40-49 years	151	37.3
50-59 years	137	33.8
60-69 years	29	7.2
<b>Total</b>	<b>405</b>	<b>100.0</b>

The research categorized the respondents in four different age brackets i.e. 30-39, 40-49, 50-59 and 60-69 years of age. Those within 40-49 age bracket made up 37.3% of the respondents, those in the 50-59 were 33.8%, the age bracket of 30-39 were 21.7% and the last age bracket of 60-69 years and above constituted 7.2%. The age distribution of 92.8% being between 30 and 69 years more or less reflects the national age distribution in which majority of the population is 30 to 59.

The age of the respondents was analysed across gender and Chi-square test which showed that age did not differ significantly ( $X^2=2.447$ ,  $df=3$ ,  $p=0.485$ ). A study by Krishnamurthy & Dejan, (2009) on household livelihoods in agricultural areas has shown similar results of both male and female gender involvement in the formulation of adaptation strategies against the climate change hazards among the rural agricultural households.

The study sought to find out the marital status of the respondents. They were therefore asked to give this information. A summary of the findings is presented in table 3 below.

The study sought to find out the who is the head of the family. They were therefore asked to give this information. A summary of the findings is presented in table 4 below.

**Table 2: Household head**

	Frequency	Percent
Men	287	70.9
Women	118	29.1
<b>Total</b>	<b>405</b>	<b>100.0</b>

The findings of the study show that 70.9% of the household's heads were men while 29.1% were headed by female. This ensured that most of them understood and could compare gender roles in decision making on climate change hazards of the area as they were settled in villages for a long time.

The study sought to find out the education level of the respondents. They were therefore asked to give this information. A summary of the findings is presented in table 5 below.

**Table 3: Education level**

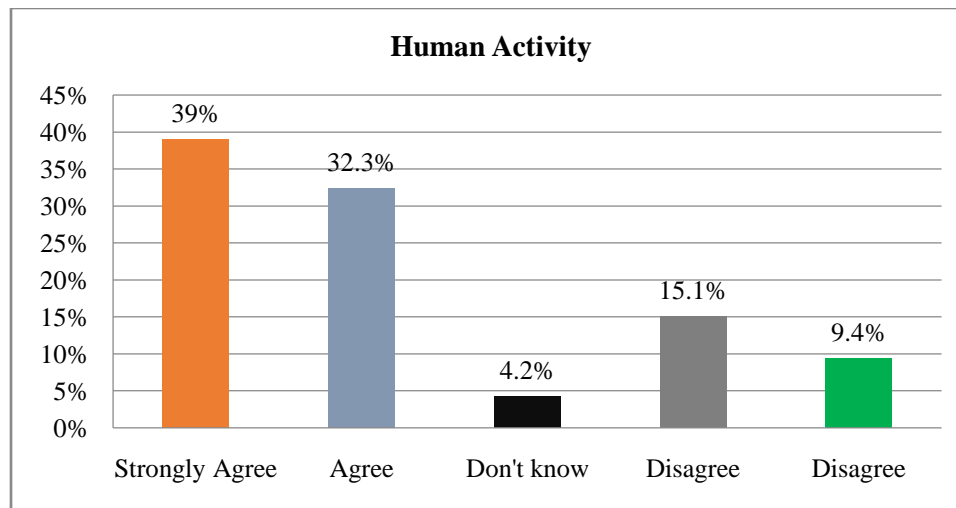
	Frequency	Percent
University	16	4.0
Tertiary	26	6.4
Literate	50	12.3
Secondary	125	30.9
Primary	145	35.8
Illiterate	43	10.6
<b>Total</b>	<b>405</b>	<b>100.0</b>

Education levels acquired by respondents varied significantly as summarized in (Table 5). 35.8% of the respondents had attained primary level of education, 30.9% had secondary level of education, 12.3% were somehow literate, 10.6 % were illiterate, 6.4 % had attained tertiary level of education while 4% had attained university level of education. As the level of education

increased, the number of respondents with such qualifications decreased accordingly with 6.4% having attained tertiary level and only 4% having attained university education. Chi-square test results revealed significant gender differences in education level attained ( $\chi^2=10.208$ ,  $df=3$ ,  $p=0.017$ ). The results showed that significantly more males than females had college and university education.

### Climate change perception that influences adaptation strategies

The study sought to find out the human activities that are responsible for climate change. They were therefore asked to give this information. A summary of the findings is presented in figure 1 below.



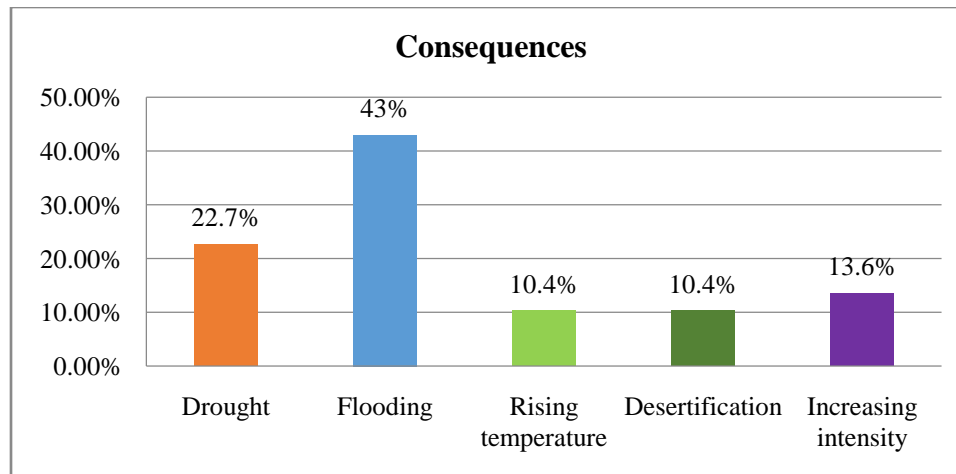
**Figure 1: Figure 1 Human Activity**

The finding of the study indicates that 39% of the respondents agreed that the human activity is responsible for climate change, 32.3% strongly agreed, 15.1% disagreed, 9.4 strongly disagreed while 4.5% of the respondents did not know whether human activity is responsible for climate change or not. The households in Tete and Manica stated that majority of the households advocated that the major activities responsible for climate change, which encompassed change land use for mining, urbanization, recreation, overgrazing and expansion of farmland that led to environmental degradation through loss of biodiversity and soil erosion.

### The consequences of climate change in Mozambique

The study sought to find out the consequences of climate change. They were therefore asked to give this information. A summary of the findings is presented in figure 2 below.





**Figure 2 : Consequence of climate change**

The findings of the study show that 43% of the respondents stated that floods will affect Mozambique as a consequence of climate change, 22.7% of the respondents stated drought, 13.6% of the respondents stated increasing intensity while 10.4% of the respondents respectively stated rising temperature and desertification. The findings concurs with study done by Arora-Jonsson (2014) that that the consequences of climate are particularly pertinent, where extreme weather events such as floods and droughts and climate variability recurrently affect agricultural production and put pressure on the use of land. These pressures are usually compounded by large-scale investments in agriculture and other natural resources activities and competition for land in fertile areas along growth corridors.

The verbatim quotes below serve to support the above-discussed findings.

*In FGD in both districts (Tete and Manica), farmers concurred that they had experienced severe floods and droughts in several years, although, most farmers recalled year 2014 as a year of floods and the year 2015 as the year of severe droughts that culminated in losses of livestock and crops. Loss of livestock and crops was translated as food shortage and decrease in crop yields by the locals, hence their perception of increased hunger.*

*Source: FGD Seven.*

### **The economic and social patterns**

The study sought to find out the economic and social patterns of the respondents. They were therefore asked to give this information. A summary of the findings is presented in table 6 below.

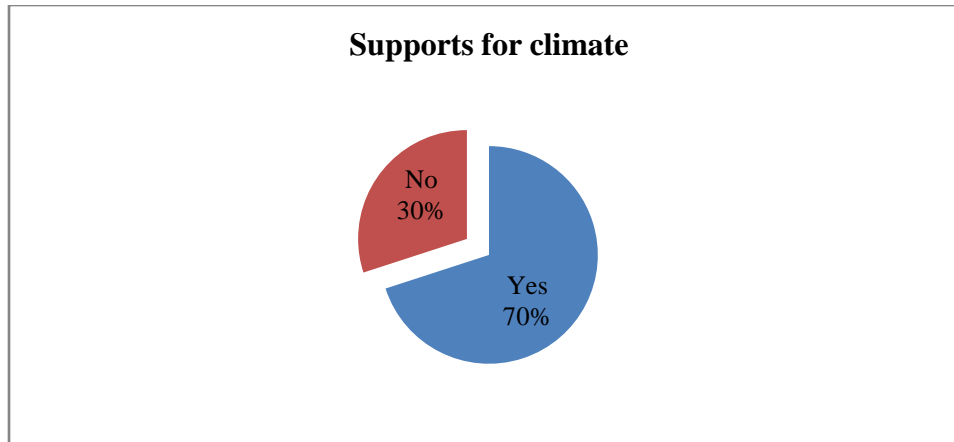
The findings of the study indicate that 73.8% of the respondents stated that both the men and women have the same views on the on the economic and social patterns in the rural households while 26.2% of the respondents stated that they do not. Studies have shown that, the economic status of the rural women in a community is low and it's a known fact also because of the women position in society and also because of their responsibility as a mother, wife and daughter hence there are many reason behind the low economic status of the women compared to men (Lwoga et al., 2010b). Even to this day there are inequalities irrespective of social status and sex, the most common inequalities prevalent in rural areas are social status and sex, In Mozambique there still an age old tradition that the son inherits the fathers land and property, women and men's differential access and physical goods or resources is one of the key dimension of gender inequality.

*The members stated that they have been receiving assistance from the government through training, being informed on climate changes, provided with improved seeds, fertilisers and tools to plough their lands and detect weather changes as well as collectively taught on how the agricultural land could be used differently to avert climate changes. They also stated that the government have been focusing on developing women's leadership in key government ministries that relates to climate change. On the part of non-governmental organisations, they have been offering assistance to the community through boosting their skills and knowledge with regard to climate change impacts, policy, financing, and negotiations.*

*Source: FGD Four*

### **Supports for climate change adaptation or mitigation among the rural households**

The study sought to find out if the rural households receive any support for climate change adaptation or mitigation. They were therefore asked to give this information. A summary of the findings is presented in figure 3 below.



**Figure 3: Supports for climate change adaptation or mitigation**

From the findings of the study, majority of the respondents (70%) state that they receive support for climate change adaptation or mitigation among the rural households while 30% of the respondents stated that there was no support for climate change adaptation or mitigation among the rural households. The respondents stated that they have been receiving support from various organisations such as the Canada-Mozambique Cooperation in Climate Change Project, which is funded through the Canada Climate Change Development Fund (CCCDF) and it is administered by the Canadian International Development Agency (CIDA), which aims at increasing the contribution of women to decision-making on climate change adaptation strategies by empowering them to participate equally in the development and implementation of climate-change-related policies and programmes. Arora-Jonsson (2014) asserts that the level of susceptibility that provides this cause can be decided jointly and communities can continue receiving support from scholars and stakeholders, preferred based on past experience or defined according to policy.

*From the FGD, one of the members by the name Rosalia said that “despite the support from various institutions, some men often prevented their women from attending such forums because of insecurity purposes, while some men often treated women’s meetings about non-traditionally female topics (e.g. resource management) with suspicion*

*Source: FGD Three*

*She further stated that there is need to also engage men in discussions about the benefits of women’s involvement in decision making processes – for the women but also for the community*

*as a whole and by empowering women to participate equally in the development and implementation of climate-change-related policies and programmes in Mozambique will be of great benefit to the community and the entire country*

*Source: FGD Eight*

### **The role of women in decision making on climate change adaptation strategies**

This section sought to find out how age and family structure of women influences the decision making power, the platforms where environmental problem are discussed, women's independence in decision making and the role of men and women in decision making.

### **Age and family structure of women influence the decision making power**

The study sought to find out if age and family structure of women influences decision making power. They were therefore asked to give this information. A summary of the findings is presented in table 7 below.

**Table 4: Age and Family structure**

Age	Decision making power				Total	P-value
	Yes		A little			
	No.	%	No.	%	No.	%
30-39 years	70 (17.3%)		18 (4.4%)		88 (21.5%)	
40-49 years	100 (24.7%)		51 (12.6%)		151 (37.4%)	.000***
50-59 years	90 (22.2%)		47 (11.6%)		137 (33.8%)	
60-69 years	27 (6.7%)		2 (0.5%)		29 (7.3%)	
Total	287		118		405	

. \*\*\*  $p < .01$  the value declared that the age of the respondent and the family structure in decision making power on climate change adaptation strategies are highly significance. (P value is based on chi square statistics)

In the above table we can see that out of 21.5% of the respondents age group 30 to 39, where 17.3% of the respondent stated that age and structure of women influences the decision making power on climate change adaptation strategies and 4.4% of the respondent have a little influence, and the age group of 40 to 49, where 24.7% of the respondent stated that age and family structure of women have influence and 12.6% of the respondent stated that age and family structure of women has a little influence, likewise 50 to 59 age group of respondents among them 22.2% stated that age and family structure of women had influence and 11.6% stated that it had a little influence. Lastly 60 to 69 age group of respondents stated that 6.7% had influence in decision making power and 0.5% of the respondents had a little influence on decision making power on climate change adaptation strategies, we can clearly say that the age and family structure of women has a great influence when it comes to decision making on matters related to climate change adaptation strategies. Manyatsi, Mhazo & Masarirambi (2010) that women's independence in decision making is associated with her age, ethnicity, dispossession level, urban/rural classification, education, and number of living children.

## **Conclusion**

Irrespective of the level of understanding of climate change adaptation strategies, the study found a high level of awareness about the effects of climate change. Drought and flooding were the most commonly mentioned results of climate change. As impact of climate change, loss of agricultural crop, food, health hazards and housing hazards were reported widely. A large majority of the respondents in Tete and Manica said that their households have already been affected by climate change. It is clear from the study that climate change resulting in higher frequency of natural disasters is most likely to have great consequences on social, economic and political aspects of people's lives. The study population adopted whatever means that they could afford to adapt to climate change. They also utilized their existing knowledge in dealing with disasters to explain the changes and identify adaptive measures. However, limits of such measures are also clearly conceptualized by the study population. Yet, many people are unaware whether their existing ability would be sufficient to adapt to the changes. A large number of people are uncertain about the solution to the problems they are already experiencing.

Climate change does have distinctive gender dimension in the sense that women are more exposed to its consequences, and that they have less influence over decisions related to climate change adaptation strategies. The literature does not debate this, as it does not debate the need to push beyond gender mainstreaming and begin to address social stereotypes more aggressively for it is very plausible that this is one of the more prominent root problem causes of women's role in decision making and implementation of climate change adaptation strategies. Needed are scaled efforts to improve women's access to land, control of credit, agricultural inputs, and useable technologies. The study concludes that there is need for instituting social, technological, institutional and policy measures to overcome barriers hindering full participation of both genders in decision making on climate change adaptation strategies.

### **Recommendations**

Rural households do perceive their microclimate variations and are able to cope and adapt. There is an urgent need for the integration of local knowledge in critical climate policies to improve climate change adaptation strategies. For example, rural households adapt to drought through an array of adaptations such as crop diversification, sale of livestock, construction of water pans, migration and search of employment. The views of the rural households suggest that people's perceptions and their agricultural practices provide insights to what rural households really need and prefer in adapting their agriculture to climatic variability. Rural households' knowledge points out what needs to be improved to enhance adaptive capacity. However, the study did not explicitly elaborate on who adapts to climatic variability. For this reason, we propose econometric analysis in order to determine who exactly adapts to climate change and variability. Such analysis may give insights on the direction of local adaptations strategies in the future

With an increasing awareness of climate change as a development issue not only requiring scientific but also social, political, economic and behavioural solutions, there is need to ensure these solutions are gender-responsive and should be self-evident. Global phenomenon, the impacts and perceptions of climate change vary at the local level and they also vary between women and men. By including both men and women in decision-making process on climate change adaptation strategies and understanding the reasons for and implications of their different

roles, responsibilities and capabilities is therefore very vital for poverty reduction and gender equality as well as successful climate-resilient and low-carbon development.

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