

# Challenges of Women Adaptation to the Impact of Climate Change in Tanzania: Case of Same District

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## Abstract

*The impact of climate change is more serious in semi-arid and 'drought-prone' areas where there are significant risks from climate change including shortage of water, rise in mean temperature and changes in precipitation. However, there is unclear information on how women adapt climate changes in semi-arid areas. The study on challenges of women's adaptation to the impacts of climate change was conducted in Same District, Kilimanjaro Region. The study employed documentary review as secondary source; questionnaires and interviews to obtain primary information from 100 respondents. The simple random technique was employed to obtain 10% of the women from Mwembe and Bangalala villages. Descriptive analysis was used to analyze data. Results showed that 75% of women engage in small scale business as their adaptation strategy to climate change. However, efforts to adapt effects of climate change was obstructed by inadequate production tools, lack of inputs, lack of capital, lack of formal markets, lack of knowledge in improved production. Thus, the Government of Tanzania through the ministry responsible for women affairs and natural resources conservation should strengthen women's ability to adapt climate change.*

**Keywords:** Adaptation, Semi-arid, Climate change, Women

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## Introduction

Climate change is a dynamic event and this is because it has natural year to year variations, extremes in temperature and weather events which have occurred throughout history (Bhattarai & Ford, 2015). The lives and livelihoods of people around the world are endangered by climate change and as a result, climate change is viewed as one of the gravest threats of the present and future of humanity (Niang, 2007). CISDE and CARITAS (2009) assert that key sectors which are mostly likely to be affected by climate change are fishing, water resources, agriculture, public health and infrastructure. The magnitude of the impacts of climate change, however, is contingent upon vulnerability and adaptive capacity of the affected people and sectors (Ngigi & Birner, 2017).

The climate change discourse has

engendered considerable international debates that have dominated the environmental agenda since the mid-1980s. Therefore, addressing the threat of climate change has emerged as a global priority (Chersich & Wright, 2019). In this context, debates regarding identification of gender perspectives and the involvement of women in addressing climate change have risen (UNFPA & WEDO, 2009; Dankelman, 2002).

The impact of climate change is not homogenous as the poorest countries and communities are more vulnerable to the impact of climate change (IPCC, 2007). Men and women are also differently impacted on and vulnerable to climate change. The anticipated gender differential impact is attributed to existing inequalities such as unequal access to resources, gendered divisions of labor and decision-making power which affect the ability to respond to the effects of climate change (UNFPA & WEDO,

2009).

Evidence of real changes has been witnessed as noted by Enda *et al.* (2007) who assert that a reduction in rainfall in various areas of the continent ranging from 15% to more than 30% has been recorded between the period of 1970's and 2000. In terms of waterways, the reduction in flows has been even more pronounced with decrease ranging from 30% to 50% (Djouidi & Brockhaus, 2011). This can mean spending as much as 8 hours a day carrying up to 40 liters of water on their heads or hips (Cap-Net, GWA & UNDP, 2006). Girls are often given the task of collecting water, carrying 15 to 20 liters of water from the water point to their homes (Dow & Downing, 2007). The strain of water collection already causes ill health in women, and often their children, since mothers often take their children with them, feeling it is unsafe to leave them while they travel long distances for water. During a scenario of increased water stress, women have to walk further to collect water, leaving even less time for other activities, such as gaining an education and earning an income (Lebel, 2013).

In Africa, women are often involved in subsistence agriculture whilst men are generally involved in commercial farming and larger livestock keeping. Abegunde *et al.* (2019) indicated that, women produce 80% of crops in sub-Saharan Africa. In Tanzania, for example, women's economy depends heavily on agriculture whereby about 90% of the able-bodied population is engaged in agricultural activities. However, their status is still low both economically and socially (URT, 2012). Since women are always reliant on rain-fed agriculture and farm on marginal lands with relatively less access to key productive assets and services such as land, labour, water, rural infrastructure, technology and information, the effects of climate change marginalize their economic growth status (World Bank, 2012 & Alston, 2013). Climate change is expected to exacerbate these gender inequalities with women being more affected by depletion of natural resources and reduced agricultural productivity (Lema, 2008).

Tanzania like other countries is experiencing

the impact of climate change. It is reported that the mean annual temperature and the average daily temperature will rise by between 2°C to 4°C by 2075 as a direct consequence of climate change. The report also indicated that climate change in Tanzania will increase to extreme weather events (Measham *et al.*, 2011). The extreme weather events are associated with flooding, droughts, cyclones, tropical storms all of which are projected to be more intense, frequent and unpredictable. The vulnerability of the country to extreme weather events can specifically be looked at in terms of the recurring drought conditions and the El Nino seasons of 1992-1993 and 1997-1998. In terms of impact to the society, the named El Nino episodes were very significant because they were accompanied with heavy socio-economic losses (Measham, *et al.*, 2011 & Paavola, 2005).

The consequences of extreme weather events comparatively affect the women rather than men as they take longer to recover from economic loss (Goh, 2012). In additions, gender barriers and the increase of women's multiple roles provide obstacles to involvement of women to reconstruction work. Natural disasters often lead to a sustained increase in the workload of women (Lambrou & Piana, 2006). Same District is one of the semi-arid and 'drought-prone' areas in Tanzania. The economy of the District depends largely on agriculture, livestock keeping and service trading. These activities contribute greatly to the Gross Domestic Product (GDP). However, due to climate variability the agriculture activities contribution to GDP is very minimal compared to the projected rate (Harvest Choice, 2012 & URT, 2013). The District also experience challenges associated with shortage of water, rise in mean temperature and changes in precipitation (URT, 2003 & URT, 2007). The informal sector provides an alternative source of employment and income as one of the adaptive strategy for the climate change in the District, but the livelihood of the majority is still poor (URT, 2013).

Efforts to adapt climate change have been taken into consideration in order to improve the women's livelihood in Same District. These efforts are the use of crop rotations, mixed

cropping, the integration of bushes or trees, use of leguminous crops as part of the farming system, use of manure and compost to maintain soil fertility and use of local seeds and crops which tolerate extreme conditions such as heat, drought, cold or flooding just to mention few (Muthoni & Wangui, 2013). Together with the efforts taken, their livelihood is still a problem. Thus, this study identified the challenges faced by women in adapting to the impacts of climate change in Tanzania specifically in Same district in Kilimanjaro region.

$$nh = \frac{Nh n}{N} \dots\dots\dots(1)$$

(Andrea, 2011)

Where;

- Nh Total women in each village= Mwembe village = 501 and Bangalala village = 507
- n Total sample size of the study population = 10%
- N Total number of women in the study area = 100
- nh Sample in each village = 50

**Materials and Methods**

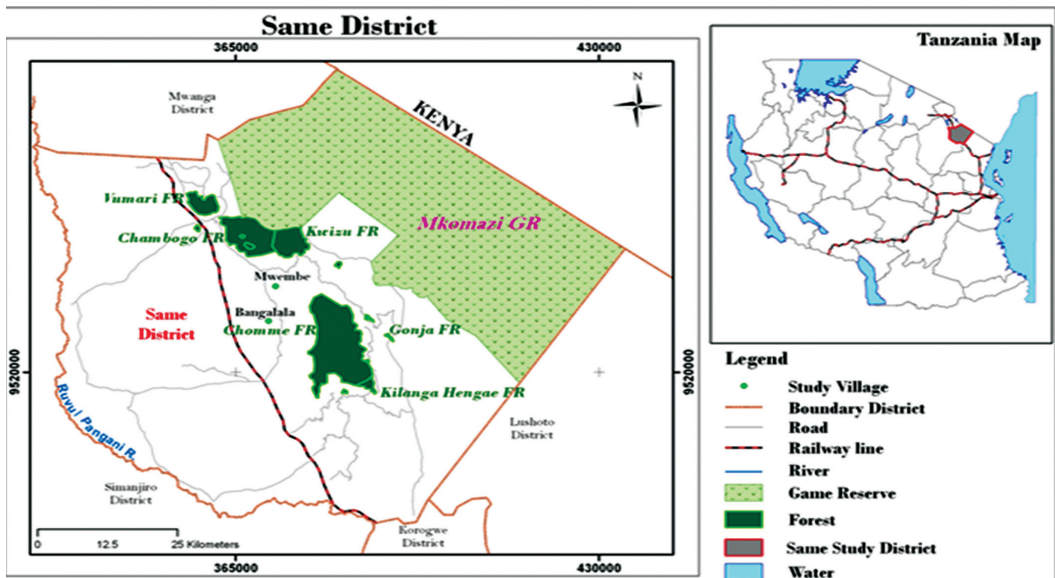
The study was conducted in Same District to analyze the challenges of women adaptation to the impact of climate change. Same District is one of the six Districts of Kilimanjaro Region with a population of 269,807 people out of which 138,292 are women (URT, 2013).

Sample size of 100 respondents was obtained using equation 1. Purposive sampling and simple random sampling techniques were the main sampling methods used to obtain respondents from two villages of Mwembe and Bangalala (Fig. 1). From the sampling process 10% of the women were obtained from each studied village (Table 1).

**Table 1: Sample composition**

| Village      | Number of women | Sample size (10%) |
|--------------|-----------------|-------------------|
| Mwembe       | 501             | 50                |
| Bangalala    | 507             | 50                |
| <b>Total</b> | <b>1008</b>     | <b>100</b>        |

Both secondary and primary data were used in order to address the objectives of the study. Secondary sources included published research papers and relevant reports, rainfall and temperature data kept by the Meteorological Department and internet search. The questionnaire with both closed and open-ended



**Figure 1: Map of Same District showing location of the study area**  
 Source: GIS Lab, IRA (University of Dar es Salaam, 2020)

questions were used to provide opportunity for respondents to provide clarification in relation to the needs of the questions. The method helped to get real situation on the effect of climate change and how it affects women's livelihood. With the aid of Statistical Package for Social Sciences (SPSS) software, statistical analysis including frequency, percentages, tabulations and cross-tabs of responses was used to analyze the data. Crosstabs was done to show relation between education and adaptation strategies to climate change, regression analysis was also used to analyze the challenges faced by women in adapting to the impact of climate change.

## Results and Discussion

### Indicators of climate change in Same District

One of the key aspects of this study was to determine to what extent the study area is affected by climate change. This enables to analyze the impact of such changes on women livelihood activities. In order to determine that, respondents were asked whether the indicators of climate change manifests themselves in their area.

**Table 2: Experience of climate change**

|   | Bangalala  |        | Mwembe     |        |
|---|------------|--------|------------|--------|
|   | Yes (%)    | No (%) | Yes (%)    | No (%) |
| Already experiencing the climate change | 96         | 4      | 100        | 0      |
| <b>Total</b>                            | <b>100</b> |        | <b>100</b> |        |

With regard to incidence of change in climate within the study area, findings in Table 2 showed that more than 90% of women in the selected two villages were already experiencing the climate change. When the respondents were further asked as to what entails such changes, a number of indicators of climate change were identified as follows; delayed rainfall season, low rainfall, increased incidents of drought, increased temperature, recurrent food shortage, increased wind velocity and outbreak of diseases (Fig. 2).

It was also noted that, rainfall is locally perceived as one of the climatic variables. The amount of rainfall has decreased in the recent two decades coupled with rainy season changes and unpredictability. The changes in the rain

seasons were locally associated with short rains termed as 'vuli' which is commonly experienced from September contrary to the current situations where rains may begin as late as January or sometimes never come at all. Similarly, mean annual rainfall from the Tanzania Meteorological Agency (TMA) over the past thirty years from 1990-2020 showed that the amount of rainfall has slightly been falling in the study area. However, a correlation of coefficient ( $R^2 = 0.056$ ) of the rainfall data over the past thirty years showed a slight decrease in rainfall, though not significant. Also, it can be observed that the equation from the graph is negative ( $-1.89x+3937.3$ ) which also indicates decrease in rainfall in the area (Fig. 3) (TMA, 2020).

Mean annual temperature trend for the past 31 years from Tanzania Meteorological Agency (TMA) shows a slight increase in temperature in the study area though not significantly with a correlation of coefficient of ( $R^2 = 0.2$ ) (Figure 4). However, respondents' views reflected TMAs data which showed temperature increase from 1990-2020. According to meteorological data, monthly temperatures over the last

thirty years in Kilimanjaro region are already showing an upward trend (URT, 2007). The mean temperature for Tanzania, as noted by the TMA is also projected to increase throughout the country particularly during the cool months by  $3.5^\circ\text{C}$ , while annual temperature increases between  $2.1^\circ\text{C}$  in the Northern parts of the country (URT, 2003).

Also, the minimum and maximum temperature trend for the past 31 years from Tanzania Meteorological Agency (TMA) shows that the mean average temperature in the study area has not been changing significantly with a correlation of coefficient of ( $R^2 = 0.02$ ) and ( $R^2 = 0.12$ ) for maximum and minimum annual temperature respectively (Fig. 5). However, respondents' views reflected TMAs data which

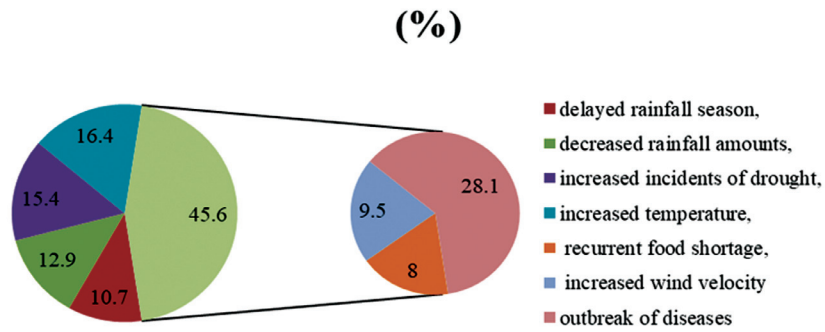


Figure 2: Indicators for climate change

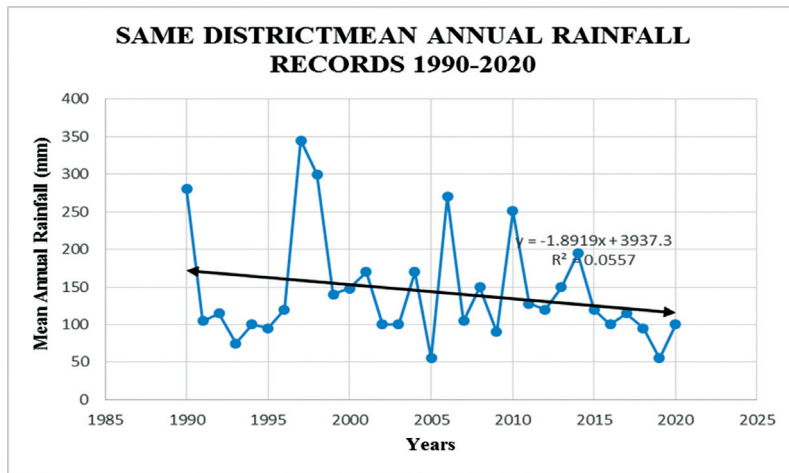


Figure 3: Same District mean annual rainfall record 1990-2020

Source: TMA (2020)

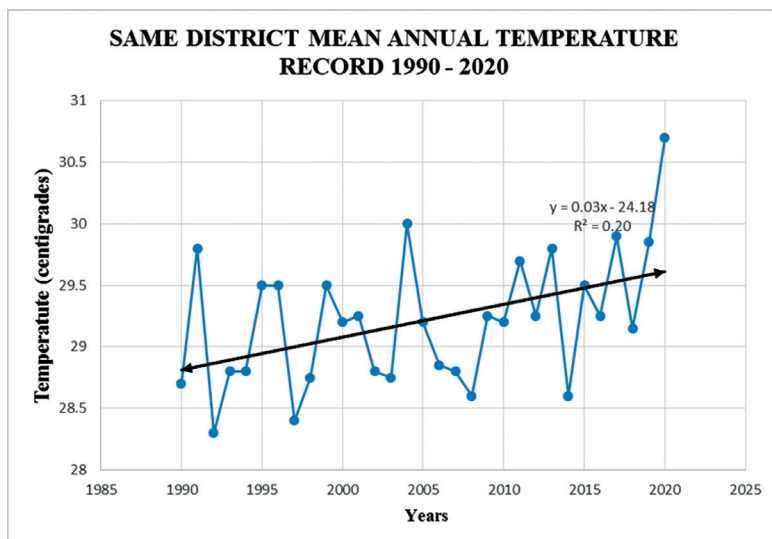


Figure 4: Same district mean annual temperature record 1990-2020

Source: TMA (2020)



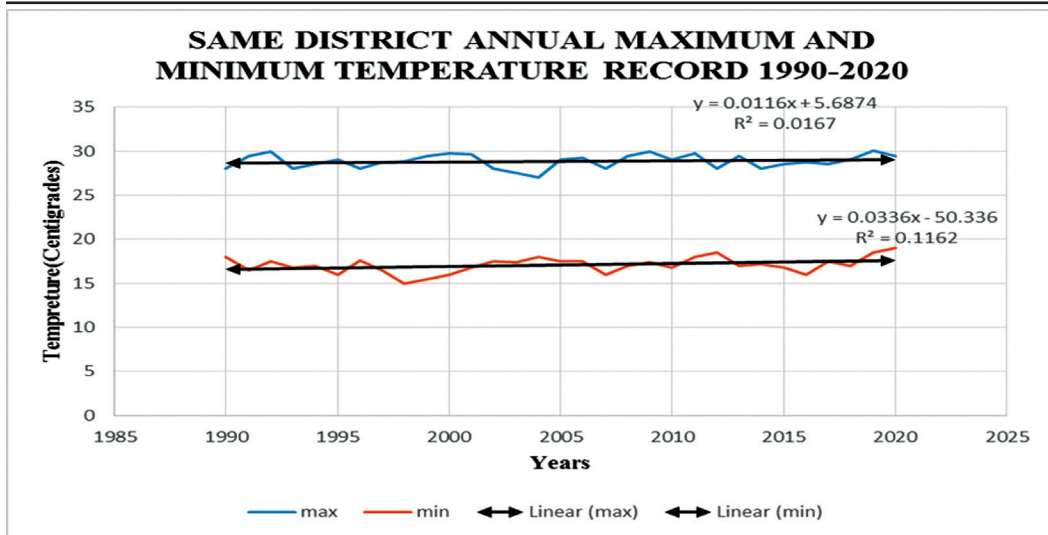


Figure 5: Same district annual maximum and minimum temperature record 1990-2020  
 Source: TMA (2020)

showed temperature increase from 1990-2020 (URT, 2020).

**Impact of Climate Change on Women’s Livelihood**

Climate change has impact on women in the study area whereby they mainly rely upon farming and livestock keeping in carrying out their livelihood activities. The study showed that 28% of the respondents noted that the climate change affects them through crop failure. Also, the study shows that 28% of the respondents noted that climate change results into increased incidents of drought in the area, while 11% of the respondents revealed that climate change results

into low farm produce. Similarly, the findings show that climate change has caused decline in water sources and shrinkage of wetlands in the study area. This has led to the reduction of the amount of domestic water. Despite the fact that, the area is always dry, the distance where water could be fetched kept on increasing as water evaporated in a short time (Lawson, 2019). The study revealed that there was severity of impact of wasting productive time in non-productive activities because of the role of women to spend a good part of the day working long distances to fetch water as indicated by 8% of the respondents (Fig. 6).

The findings revealed further that climate

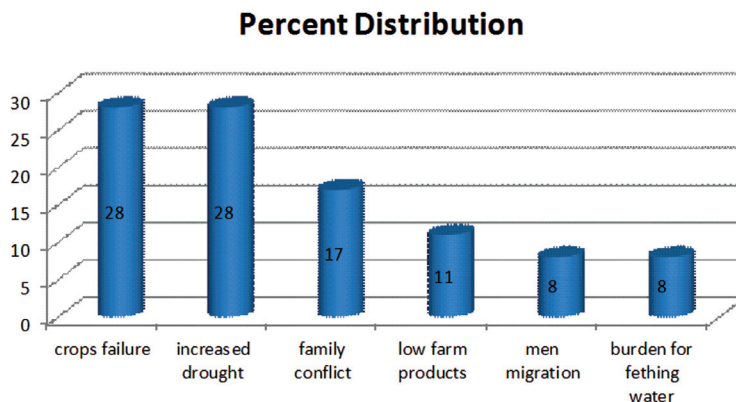


Figure 6: The consequences of climate change on women’s livelihood  
 Source: Survey data (2020)

change increased family conflicts. This was mentioned by 17% of the respondents. Critically, they stressed that conflicts associated with climate change occurred when the family was stricken by hunger. Instead of some men accepting the reality and cooperate with their spouses to face up the situation, they opted to gather with other men to eat and drink out of their homes and their wives to struggle on their own. Such situation caused conflict in the family and women and children were highly affected. Ribeiro and Chauque (2010), in their study on the effects of global warming on the world’s physical landscape, they pointed out that climate change leads to conflicts, especially to destabilize already vulnerable regions, like the Horn of Africa.

Furthermore, 8% of the respondents noted that climate change led to migration of men to town in search of casual labour. However, migration is considered as one of the means to climate change adaptation but it has negative impact to the family. Migration is also one of the causes of increased burden on women in addition to many other responsibilities including some which ought to be done by their husbands. It is argued by UNFPA and WEDO (2009) that population movement is likely to intensify as changing climate leads to the abandonment of arid and harsh environment including areas with persistent food shortage and hunger, a situation which is happening in the study area. A study by Morton (2012) revealed that the

climatic conditions of most of the semi-arid areas of Tanzania are characterized by short and unreliable rains, which resist the suitability of the land for crop cultivation, hence results in low yield. According to Mushi (2012) variable climatic conditions including occurrence of droughts and floods can result in erratic food supplies and low farm produce.

**Women’s Adaptation Strategies to Climate Change**

Findings in Figure 7 show the impact of climate change in the study area. Having taken note of the study looked at how women have gone through adjusting their livelihood activities to such changes. It was found that various strategies have been used by the respondents in the study area to respond to impacts of climatic change. Women in the study area are changing their cropping calendar to prepare their farms in December instead of November and sow in January instead of December. Women have been using early maturing seeds of a variety of crops which are resistant to drought in the study area. Similar results were reported by Joto Africa (2011).

Women as main players in the households have developed various strategies which signify economic diversification (Fig. 7). It was found that 75% of women engage themselves in small scale businesses as an adaptation strategy to climate change, that include petty trading of buying and selling small products such as

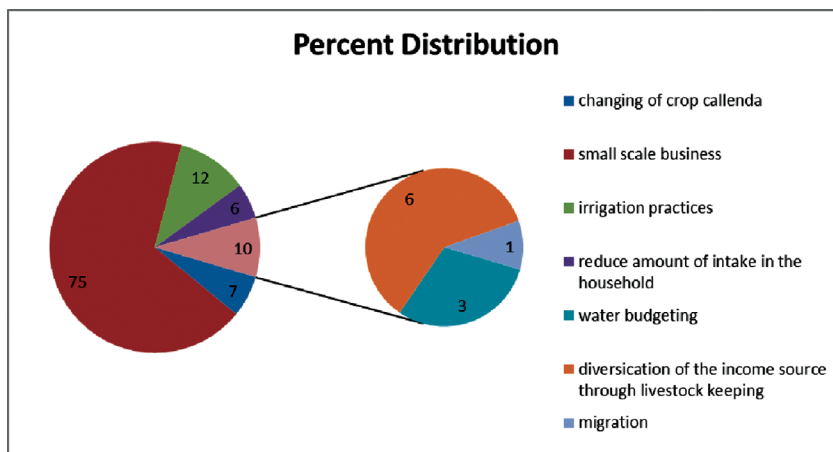


Figure 7: Women’s adaptation strategies to climate change

Source: Survey data (2021)

precious stones, traditional herbs and other medicines. Others operate small retail shops selling exercise books, pens and cooking oil. Rural livelihood diversification into off-farm activities is a common risk management strategy that is generally recognized as a beneficial way to increase income in unfavorable environment as reported by Adger (2003).

Findings in Figure 7 also showed that 12% of the respondent's practices irrigation as an adaptation strategy to climate change especially those living near streams. Although there are two streams in the study area the amount of water has been decreasing day after day due to prolonged drought. Notwithstanding the fact that amount of water from the streams cannot support every one, some women have planted maize and a small number of varieties of food crops to support their families. Others have responded to drought stress by reducing the amount of food intake in the household, water budgeting and sell assets such as chickens and goats/sheep.

Seid (2016) pointed out that drought will add a burden of work to women, a situation which is frequently observed in study area. Furthermore, studies conducted by Measham *et al.* (2011); Carr and Thompson (2014); Lawson

induced shocks often result in negative coping strategies that deplete livestock assets. Selling of livestock to escape from stress is a short-term adaptation strategy that erodes the asset base and can have long term consequences and, ultimately, a household's chances of long-term capacity to adapt with climate change or escape from poverty.

### Challenges faced by women in adapting to the impact of climate change

Women in Same district decided to change cropping calendar, engaged in small business, used irrigation to secure crop husbandry, reduced amount of food intake within their household, practiced water budgeting, practiced livestock keeping and migration to other fertile areas as adaptation strategies to the impact of climate change as it shown in Figure 7. Despite of these strategies, it has been difficult for the women in the district to improve their livelihood due to various challenges (Table 3) which are; inadequate production tools, lack of inputs, lack of capital, formal markets and knowledge of improved production were the challenges affecting the efforts for women's adaptation to climate change in Same district

**Table 3: Challenges for women's adaptation to climate change**

| Challenges                               | (%)        |
|--|------------|
| Inadequate production tools              | 36.8       |
| Lack of inputs,                          | 17.4       |
| Lack of capital credit services,         | 16.8       |
| Lack of formal markets                   | 11.2       |
| Lack of knowledge on improved production | 17.8       |
| <b>Total</b>                             | <b>100</b> |

*et al.* (2005) and Majule *et al.* (2008) attested that, adapting to decreasing rainfall may include adjusting water management such as water budgeting and proper utilization so as to increase sources of water supply, improve distribution and conserve available water. Studies by Nyanga (2011) showed that diversification of income sources through livestock farming can be a key strategy for escaping poverty. Contrary to that, a study by Euster (2009) revealed that climate

Respondents revealed that due to reliance on rain-fed agriculture most smallholder women farmers lack fund for hiring labor and buying new seed varieties. Thus, they cannot adapt sufficiently to changes in climate. It was revealed that use of hand hoes, local seeds and poor crop husbandry are major source of post-harvest losses in the study villages. Furthermore, smallholder women farmers who do not have access to agricultural input, loans or credit and



market limit their potential level of adaptation. Due to such challenges women in the study area continue to grow unsuitable varieties rather than improved seed varieties. As reported by Niang (2007), availability of better climate and agricultural knowledge helps farmers make comparative decisions in relation to alternative crop most relevant to their environment. These observations are also in broad agreement with Lambrou and Piana (2006) who noted that availability of information on appropriate adaptation option allows smallholder women farmers to choose better strategies that fit with climate change. In addition, Lebel (2013) noted that households with access to transportation networks, tractors, heavy machines and animal power have better chances of taking up adaptation options.

**Conclusion and Recommendations**

Climate change has impact on women in their livelihood activities. Climate changes lead to crop failure, increased incidents of drought, low farm productions, decline in water sources and shrinkage of wetlands hence reduction of the amount of domestic water as well as the increase of family conflicts in Same District. Changing of cropping calendar, the use of early maturing seed variety and the drought resistant crops were some of the strategies used by women in the study area. Small scale business activities were also carried out as well as irrigation practices as an adaptation strategy to climate change.

It is unfortunate however that despite the adopted strategies to overcome the effects of climate change, there have been various bottlenecks in the course of their implementation, which include lack of appropriate farming tools, inputs, lack of capital, lack of knowledge of markets and improved farming methods.

Thus, The government through Ministries responsible for agriculture, water and irrigation, natural resources and tourism in collaboration with Agricultural Universities and Colleges, decision makers, local authorities and civil society organizations need to ensure the women are involved in decision making, strengthen women’s ability to contribute and exercise their unique and valuable perspectives and

expertise on climate change, bring women into the planning, adaptation, financing and implementation of climate responses, promote women’s access to agricultural extension services and training on farming adaptation techniques and, enable access for both men and women farmers to information about the climate change.

**Nomenclature**

- GDP Gross Domestic Product
- FAO Food and Agriculture Organisation
- GIS Geographical Information System
- IPCC Intergovernmental Panel on Climate Change
- IRA Institute of Resources Assessment
- MDGs Millennium Development Goals
- SUA Sokoine University of Agriculture
- TMA Tanzania Meteorological Agency
- TV Television
- SPSS Statistical Package for Social Sciences
- UN United Nations
- UNDP United Nations Development Programme
- UNFPA United Nations Fund for Population Agency

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