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Original Research Article

Climate Change and Its Effects on Livelihood Strategies of Peri-Urban Coastal Communities in Tanzania

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This study was conducted to analyze the effects of climate change on livelihoods of the peri-urban coastal communities of Tanzania. Peri-urban coastal communities constituted the focus of the study because they are rapidly transforming albeit with limited attention in terms of planning and management. Four settlements were purposefully selected, two each from Dar es Salaam region and Kisarawe district. The methods for data collection included; interviews, observations, focus group discussions, key informant interviews, mapping and official interviews. Livelihood strategies were reflected upon using the sustainable livelihood framework. Results show that while a thirty year trend data for rainfall is decreasing, the temperature is on the increase. These trends have negatively affected agriculture, which is the main livelihood activity of the local communities. Climate change has contributed to food shortages, stress on water resources and households' diminishing propensity for savings. A half of the respondents (50 percent) were aware of these changes have been coping by shifting from water dependent to drought resistant crops such as cassava, engaging in petty trading and casual labor and migrating to other regions with adequate rainfall. As a way forward, it has been recommended that the government in collaboration with key stakeholders should engage in developing practical interventions for alternative livelihood strategies that will assist local communities to effectively adapt to the threats of climate change.

Key words: Climate change, livelihood, peri-urban coastal communities, Tanzania.

INTRODUCTION

The adverse impacts of climate change on the environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure are already noticeable in many parts of the developing world including Tanzania (URT, 2010). With changes in precipitation and hydrology, temperature, decreased length of the growing season and frequency of extreme weather events, significant efforts are required to prepare developing countries to deal with climate-related impacts in community livelihood activities (FAO, 2007). This is of great importance because most of the developing countries depend on primary activities such as agriculture, livestock keeping and fishing as their main economic activities. This change has influenced people in different locations, especially in peri-urban areas to shift from primary to secondary activities. The fact that there has been a shift from rural to urban populated world around 2012, peri-urban areas have attained more importance because they are primarily the recipient of the population migrating from rural and from within urban centres. More than 95 percent of the net increase in the global population will be in the cities of the developing world, which will approach 80 percent urbanization level of most industrialized nations of today (Grimm et al.,

2008). The Intergovernmental Panel on Climate Change (IPCC) observes that the two major problems facing the world today are global climate change and population growth and the link between the two are food quality and quantity. Unfortunately, climate change has badly affected food availability and many people find it hard to meet their basic needs (IPCC, 2001).

Climate change tends to disproportionately affect the most vulnerable segments of society especially the poor and the marginalized, as they are already living in locations that have high vulnerability, (Turner et al. 2003). At the same time, developing countries have comparatively little capacity to adapt, given the speed with which climate change is taking place. Indeed, poverty has been identified as the most significant barrier to adaptation to climate change (Michel and Pandya, 2010). Climate change has affected the livelihoods of people living in peri-urban areas where mixed life style (of urban and rural) is practiced and more so to natural resource dependent households. Activities such as farming and animal keeping largely depend on the status of climate to provide a favorable environment to thrive. Variation in climate will have a direct effect on these activities.

The increasing evidence that climate change is happening and that its impact is strongly affecting the African continent puts additional challenges for future development (Adger et al., 2007; Haile, 2005; Huq et al., 2004; Kurukulasuriya et al., 2006). While global temperatures have been reported to increase by approximately 0.6°C (1°F) over the last century, the Intergovernmental Panel on Climate Change (IPCC) concluded that the majority of warming over the past 50 years is a result of human activities. In addition, the IPCC (2001) projects that average global temperature will increase from 1.4 to 5.8°C (2.5 to 10.4°F) this century. The challenges associated with climate change will have severe impacts on ecosystem services, agricultural production and livelihoods (Odada et al., 2008; Sivakumar et al., 2005). The limited resilience and high vulnerability characterizing regions dominated by poor economies, subsistence food production, and a low and highly variable natural production potential will pose more challenges of adaptation to these impacts.

Among other stress factors, climate change and variability as manifested through fluctuation in precipitation and temperature is likely to disrupt livelihood of the majority of urban and peri-urban residents. Adjustments to cope with these impacts will push affected communities to stretch and overspill to surrounding natural resources, thereby distorting ecosystem services emanating from these resources. Typical threats have been revealed from the study areas of peri-urban coastal communities surrounding Kazimzumbwi and Pugu forest reserves in Tanzania and the Offin Basin catchment area in Ghana. Variation in climatic condition has affected communities' livelihoods forcing them to solicit livelihoods from adjacent forest reserves.

Despite considerable international research focus on climate impacts, context specific studies analyzing the relationship between climate change and peoples' livelihoods have been scanty. It is against this background that this paper attempts to present findings emerging from a study that was done in the peri-urban coastal communities of Dar es Salaam attempting to answer the following questions; What has been the trend in climate change and other stress factors that affect the livelihood activities of coastal communities?; how do coastal communities cope with climate change in terms of livelihoods? What policy options and strategies ought to be developed to enable susceptible communities cope with climate change?

Conceptualizing livelihood

The conceptual underpinnings and variables of livelihood have been well discussed by DFID from the Department of International Development, (DFID, 1999) of UK popularly referred to as the sustainable livelihood framework. They attribute the framework to five key variables of capital assets that include social, physical, natural, human and financial. These assets form the key elements of livelihood. If these assets are affected by either natural or man-made factors, then the livelihood of communities is threatened. The DFID-sustainable livelihood framework identifies the vulnerability context to include trends, shocks and culture which act upon the capital assets. If the transforming structures interact well

with capital assets the emerging livelihood strategies will lead to increased income, well-being, reduced vulnerability, improved food security and more sustainable use of non resource base (Figure 1).

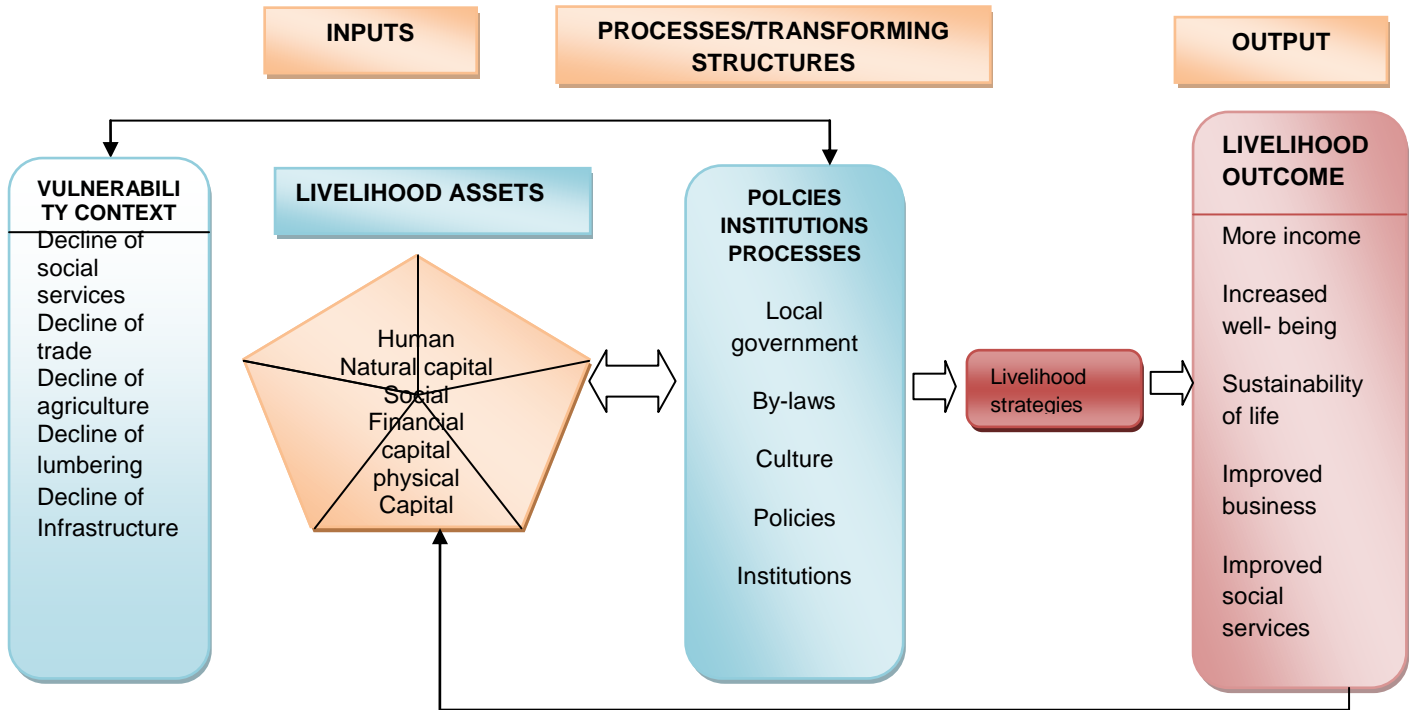
Putting into context the DFID sustainable livelihood framework for this paper, the following guiding questions can be raised; to what extent climate change has impacted on livelihood patterns of peri-urban coastal communities of Tanzania? Are these changes in capital assets truly a result of climate change? What have been the roles of transforming structures to address shocks created by climate change? What is the livelihood strategy by the people? How do people perceive climate change and cope with their effects?

Location of Case Study Area

The project area transcends across the administrative boundaries of the Dar es Salaam Region and Kisarawe District. It lies between 38.7E and 39E and 6.5S to 7.08S. It has an estimated coverage of 465 square Kilometers. The larger part of this area is covered by the non-forest and non settlement areas covering 338.5 square kilometers or 71.8 percent of the total area followed by the two forest reserves, which occupy a total area of 65.5 square kilometers or 13.9 percent of the total area. Settlements bordering with the two forest reserves (Kazimzumbwi and Pugu) included the agglomeration at Pugu Kajiungeni that comprise the settlements of Pugu Kajiungeni, Mwakanga and Majohe; Buyuni and other agglomeration at Chanika. These two major settlement agglomerations are located within Dar es Salaam region. On the part of Kisarawe District, the settlements considered were Kisarawe town, and a series of village settlements along Kazimzumbwi Road that included Vigama, Kazimzumbwi, Kisanga, Sungwi, Masaki and Gumba (Figure 1). At the centre of this area are the two forest reserves of Kazimzumbwi and Pugu covering 38 and 27.5 square kilometres respectively.

Topographically, the area rises from 80 meters from east to about 750 meters above mean sea level towards the southern slopes in Kisarawe, east of Sungwi Village that marks the southern border between Dar es Salaam and Kisarawe. In terms of accessibility, the Dar es Salaam-Maneromango Road that passes through Kisarawe town is the main spine that links Dar es Salaam with the settlements in Kisarawe District. The Pugu Kajiungeni-Chanika Road serves the Buyuni and Chanika agglomeration with ultimate link to Chamazi settlement in Dar es Salaam. The climate of this region falls within the coastal tropical zone characterized by hot and humid weather throughout the year. Average annual rainfall is approximately 1,100 mm. In a normal year there are two rainy seasons: "the long rains" in April and May and "the short rains" in October and November. Temperatures are relatively high, ranging between 23 and 29 degrees Celsius.

Figure 1: The sustainable livelihood framework



Source: Adopted from DFID UK, Department for International Development, (1999)

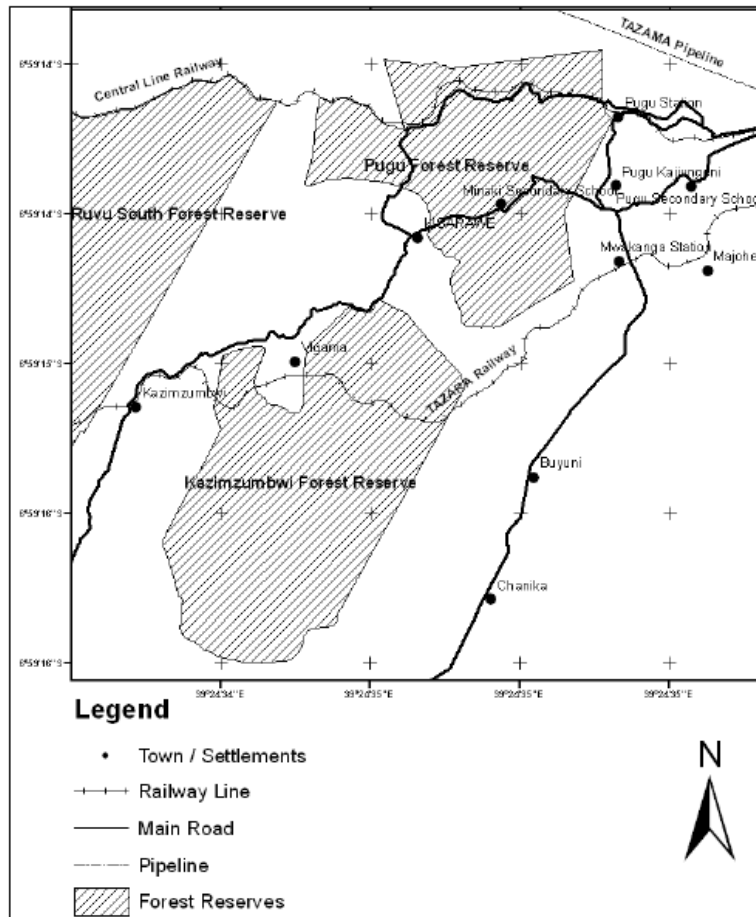
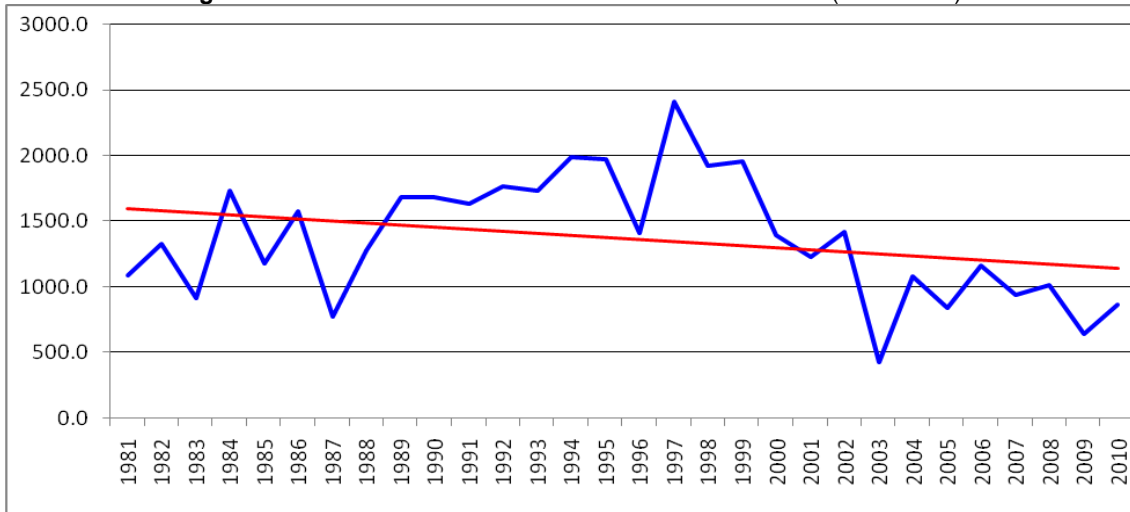


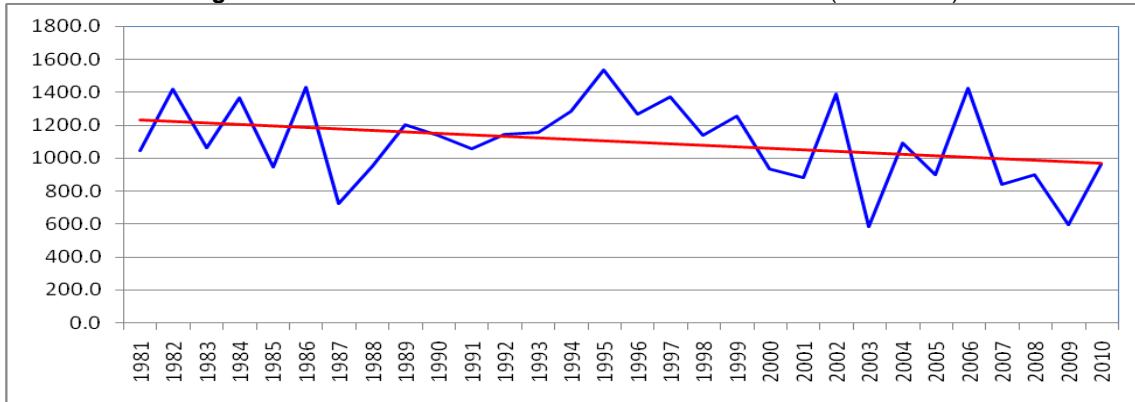
Figure 2: Study area; Dar es Salaam-Kisarawe agglomeration

Figure 3: Trend in rainfall amount for Kisarawe in millimetres (1981-2010)



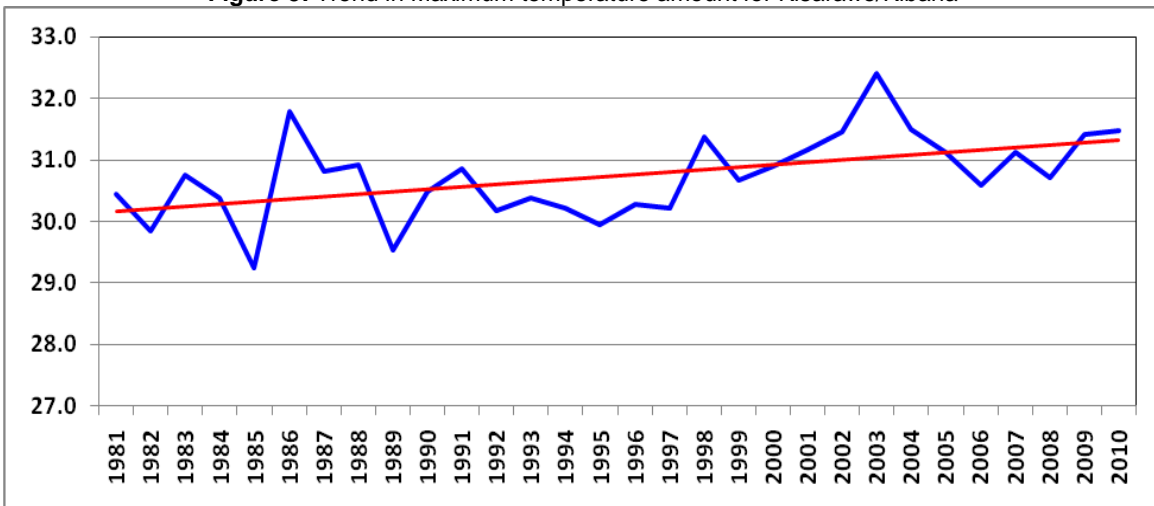
Source: AIULUCC Project 2013 with data collected from TMA

Figure 4: Trend in rainfall amount for Dar es Salaam in mm (1981-2010)



Source: AIULUCC Project 2013 with data collected from TMA

Figure 5: Trend in Maximum temperature amount for Kisarawe/Kibaha



Source: AIULUCC Project 2013 with data collected from TMA

METHODS

Although the study areas had a wide coverage of settlements surrounding the two forest reserves, empirical evidence to

capture the relationship between climate change and livelihoods of communities was collected from the four settlements of Pugu and Buyuni (Dar es Salaam side) and Kazimzumbwi and Maguruwe settlements (Kisarawe side). A

total of 212 questionnaires was administered in the four settlements through direct interviews. Other methods that were used to collect evidence included documentary review and more specific trend data that were collected from the Tanzania Meteorological Authority (TMA). Data from TMA provided an opportunity to corroborate responses collected from household interviews and other sources. Physical observations, including transect walks were also carried out to identify livelihood activities and on the ground effects of climate change of variables that could be verified. This was documented by taking photographs. The field data that were collected from interviews were analyzed using SPSS (Statistical Package for Social Sciences) version 16, while Arch GIS was used to prepare maps for spatial data. The analysis of the spot and trend data was done using graphs, tables and trend lines and bar graphs from spreadsheet. Where applicable, observation data were presented in the form of photographs. The synthesis of locally collected data was reflected upon the sustainable livelihood framework as developed by the Department of International Development, (DFID, 1999) of the UK.

Results

Climate change in the study area

A thirty year period trend data on annual rainfall for Kisarawe/Kabana and Dar es Salaam was gathered from the Tanzania Meteorological Authority indicates a significant fluctuation and an overall trend of decreasing the amount of rainfall. While the notable increase is seen in the period between 1990 and the year 2000 peaking up to approximately 2500mm, there is a sharp decrease of rainfall between 2000 and 2010 with the lowest recorded amount of approximately 500mm between 2002 and 2004. The same trend is notable for Dar es Salaam as shown in Figure 3. The decreasing trend in rainfall amount not only affected crop farming and food security but has also compounded the problem of water shortage in many parts of Dar es Salaam and Kisarawe District.

Livelihood activities for the communities in the study area

In the four settlements where detailed studies were carried out a variety of livelihood activities were conducted by the communities. The dominant activity was agriculture that constituted 56 percent of all respondents, followed by petty business activities (23 percent) and wage employment 9.8 percent. Other activities were livestock keeping and charcoal business (Table 1).

Manifestation of climate change from community responses

Responses from household interviews indicated that climate change has been manifest in the form of a decrease in the amount of rainfall, a variation on the onset and cessation of rainfall season, decrease in the amount of water from water sources, decreasing propensity for community members to save and food shortage. These items are discussed as follows:

(i) Decrease in the amount of rainfall

Responses from household interviews revealed that about half of the people (about 50 percent) experienced climate change

in the form of a decrease in the amount of rainfall. Others (constituting 32 percent) reported on late on-set of rainfall. (Table 2). These responses tally well with statistical trend data that were obtained from the Tanzania Meteorological Authority. Rainfall amount which was translated in rainfall, length was seen to decrease over the years. The communities indicated that about 20 years ago, they used to have relatively longer rainfall seasons of about three months (starting from March to late June). The current situation is different, whereby rainfall is unreliable and in most seasons, it falls within a period of two months. The short rainfall season is much more unpredictable. Respondents pointed out that the increase in temperature and a decrease in rainfall amount is presently affecting agricultural productivity due to diminishing water for crop farming and domestic use.

(ii) Variation on onset and cessation of rainfall

Climate change was also related to variation on the onset and cessation of rainfall. Despite the fact that the communities had no means to measure the accurate difference in elements of weather, they were able to differentiate and compare variations on onset and cessation of rainfall and length of rainfall period. Many respondents (47 percent) indicated that unlike in the past (from the 1970s to 1990s) whereby the long rainfall season was starting in mid March and ending on May up to June, in the recent years, there has been fluctuations on the start and ending of the rainfall season. Other respondents viewed these changes from late and early onset of rainfall periods; constituting 32 percent of the respondents.

(iii) Drying of water sources

Climate change has affected water availability where water sources have decreased in number and recharge capacities. In the four settlement areas, water shortage was observed to be a common problem. Respondents attributed water availability problems in relation to decreasing number of water sources, decrease in volume and decrease in the amount of the water from the point sources (59 percent).

(iv) Decreasing propensity for community members to save

One of the key variables of the Sustainable Livelihood Framework is the financial capital and the ability to save. Propensity for saving is largely linked to excess in production to meet the household demands and create a surplus. Savings in the form of agricultural products, cash in banks, financial support from relatives and government pension were very limited in the study areas. Although Credits and Savings Associations are wide spread in Tanzania and provided room for borrowing, there were very few households who were either members of these credit associations or those who had accessed credits from these associations. As climate change affects livelihood activities individuals and households' capacity towards savings was also decreasing providing a threat in case of severe shocks and extreme events. About 39 percent responded to have no savings (Table 2).

Table 2: Manifestation of climate change from peoples' perspectives

Settlement	Decrease in the amount of rain		Late on set of rainfall season		Fluctuating onset & cessation of rainfall		Decreasing of amount of water from the sources		Limited capacity to save (no savings)	
	No	%	No	%	No	%	No	%	No	%
Pugu	26	43	21	34	29	48	37	61	14	23
Kazimzumbwi	29	57	13	26	22	43	30	59	32	63
Maguruwe	26	52	13	26	24	48	34	68	19	38
Buyuni	25	50	21	42	28	56	24	48	16	32
Average (%)		50		32		47		59		39

Source: Household interviews, July 2012

Table 3: Experience of food shortage by the communities

Settlement	Mostly affected		Moderately affected		Not affected	
	Number	%	Number	%	Number	%
Pugu	11	18	36	59	14	23
Kazimzumbwi	19	37	29	57	3	6
Maguruwe	22	44	23	46	5	10
Buyuni	17	34	27	54	6	12
Total	69	33	115	54	28	13

Source: Household interviews, 2012

(v) Food shortage

Responses from household members with respect to food shortage and climate variability indicated that the majority of them were moderately affected constituting 54 percent of the respondents. Approximately 33 percent of the households responded that they were mostly affected and only 13 percent were not affected (Table 3). These results tally with a study by (Kahyarara, Mbowe and Kimweri; 2010) who reported that household expenditure on food in these settlements was as high as 53 percent of their income.

Coping strategies for impacts caused by climate change

The impacts of climate change have compelled people and communities in these areas to develop alternative coping strategies. Some of these strategies included; change or addition of livelihood activities, change in the type of crops grown focusing on drought resistant crops, change in farming areas, working as casual laborers and migrating to other areas.

(i) Change or addition of livelihood activities

Findings indicate that about 84 percent of the respondents had adopted additional livelihood besides as their primary activity so as to cope with diminishing production in agriculture. These strategies included; engagements as casual laborers, especially during the off-farming season that accounted to 24.5 percent of all households, engaging in petty business

(approximately 22 percent and charcoal making and selling (about 15 percent). Other activities included; livestock keeping and food vending. (Figure 7 and Photo 1). These activities were conducted both inside and outside the settlements. The businesses were conducted by community members to enable them earn money and buy food for their families. Apart from community members who transported vegetables to the urban areas, other community members conducted their business within their settlements as shown in Photo 1.

(ii) Change in types of crops grown

In terms of agricultural crops, many community members had changed from maize to cassava cultivation because the latter is more drought resistant. This was revealed by the large number of respondents (about 82 percent in Kazimzumbwi, 78 percent in Maguruwe and 67 percent in Buyuni as compared to 15 percent, 22 percent and 13 percent for the same settlements in 1990). William et al. (1990) shows that before 1990s, the dominant crops that were grown in the settlements of Kazimzumbwi, Maguruwe and Buyuni were maize followed by cassava, sweet potatoes and few people grew pineapples. As time went on and presumably due to climatic change, this pattern has changed whereby cassava, a more drought resistant crop has gained dominance over maize (Tables 4 and 5).

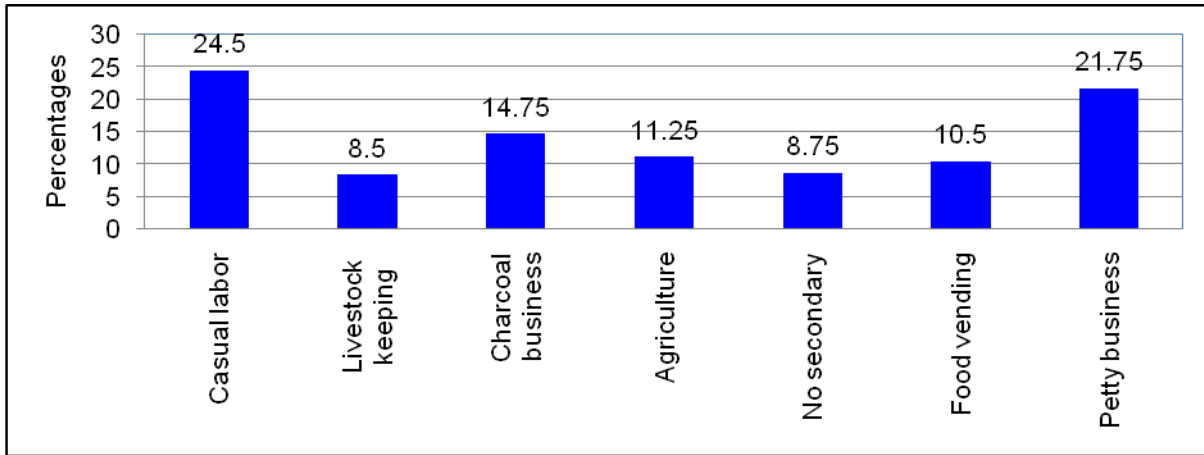


Figure 7: Alternative economic activities (Source; Household interview, July 2012)



Photo 1: Alternative income generating activities at Pugu

Table 4: Crops grown by the communities in 1990 (%)

Settlement	Maize	Cassava	Sweet potatoes	Millet	Pineapples	Paddy	Oranges	Total
Kazimzumbwi	48	15	9	-	16	4	8	100
Maguruwe	42	22	13	2	10	2	9	100
Buyuni	39	13	12	1	18	12	5	100

Source: William et al., (1990)

Table 5: Crops grown in the case study areas in 2012 (%)

Settlement	Maize		Cassava		Rice/Paddy		Sweet potatoes	
	Response	%	Response	%	Response	%	Response	%
Kazimzumbwi	2	5.2	31	81.57	2	5.2	3	7.89
Maguruwe	5	10.2	38	77.5	-	-	6	12.2
Buyuni	3	11	18	67	-	-	6	22
Total/average		13		69		5		13

Source: Household interviews, July 2012

(iii) Migrating to other areas

Shifting to other farming within the settlement, district and outside the region was reported as another coping strategy for the impacts emerging from climate change. Although the majority of the respondents is still conducting farming activities within the settlements, evidence from household interviews indicated that 32 percent of the farmers in Pugu, 8 percent in

Kazimzumbwi, 6 percent in Maguruwe and 9 percent in Buyuni conducted their farming activities outside their settlements (Table 6). The new areas where households had shifted to include; Morogoro, Kisiju, Maneremango and as far as Iringa region. Farmers who planted crops outside their settlements responded that they were more satisfied with the new areas than farming in their settlements. In these new areas they planted maize, paddy, groundnuts and beans.

Table 6: Areas where farmers conducted their farming activities

Settlement	Inside the settlement		Outside the settlement but within the District		Outside the region but within the country	
	Response	%	Response	%	Response	%
Pugu	15	68	3	14	4	18
Kazimzumbwi	37	92	1	3	2	5
Maguruwe	46	93.8	1	2	2	4
Buyuni	30	91	-	-	3	9
Average (%)		86		5		9

Source: Household interviews, July 2012

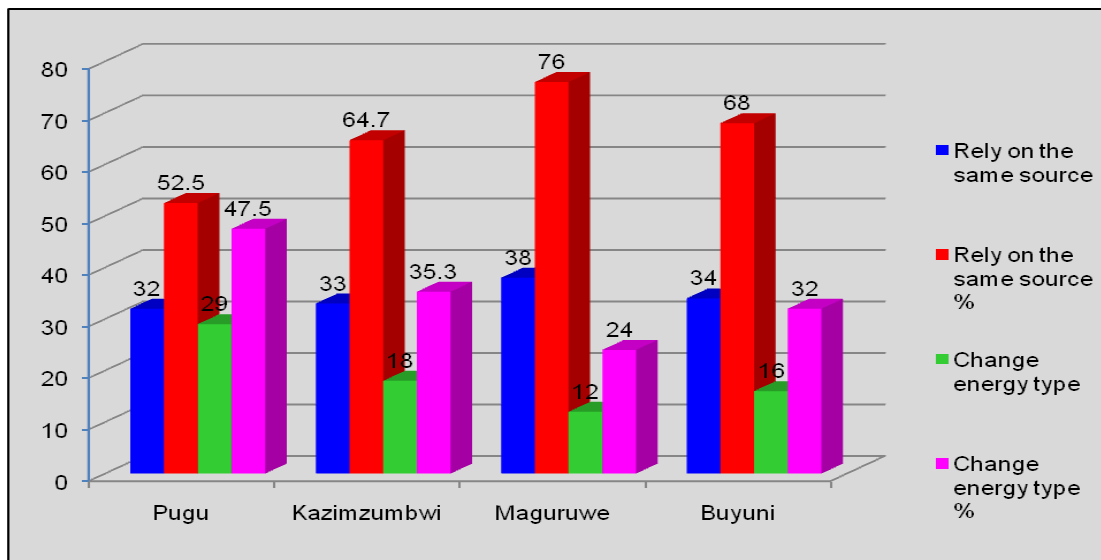


Figure 8: Coping mechanisms to energy shortage (Source; Household interview, July 2012)



Photo 2: Firewood and charcoal making at Pugu (Source; Field survey July, 2012)

(iv) Use of biomass as a sources of energy

Charcoal and firewood were the main sources of energy by majority of community members. Out of 212 interviewed households, 27 percent depended on firewood only, 52 percent charcoal only, 16.2 percent depends on both firewood and charcoal whereas 2.7 used gas and 1.8 used electricity. These energy sources were obtained by purchasing from vendors and a small part collected from the surrounding environment. Environmental degradation and settlements development in the four settlements created a gap between energy needs and

availability. During the focus group discussion and interview it was reported that firewood was not available in the surrounding environment unless someone pruned trees branches to use as firewood. This happened because of the high rate of cutting down of trees for housing development and charcoal making within the settlement areas. The diminishing access and availability of both firewood and charcoal had compelled some of the households to search for alternative energy sources, including gas and electricity (Figure 8). Yet, firewood and charcoal remained the dominant source of energy (Photo 2)

It was further reported by the Kisarawe District Officials that as a result of increased requirement for biomass fuel, incidences of encroachment of Pugu and Kazimzumbwi Forest Reserve in search for charcoal and firewood had increased. The encroachment of forest reserves culminated into tensions and conflicts between conservation initiatives by the District Authorities and increasing need for biomass fuel by the communities. This was evidenced by the increase in the number of court cases that were filed by the District which increased from 96 in 2008 to 156 in 2011.

Discussion

The impacts of climate change are increasingly becoming apparent locally and globally. In areas where the majority of the community is dependent on climate influenced livelihood opportunities, changes in climatic conditions have compelled households to adopt new strategies for survival. As revealed from the case study settlements, people are being forced to change from their traditional production methods and livelihoods to new ways of life. The poor are more affected because their adaptation potentials and opportunities are limited. At times, they have been forced to resort to exploiting of surrounding natural resources, particularly from the forest reserves of Pugu and Kazimzumbwi. A study by Kashaigili et al. (2013) revealed that the closed forest cover of Kazimzumbwi forest reserves changed from 75.7 percent to 32.5 between 1980 and 2010. For Pugu forest reserve the change was noted to vary from 87.2 percent to 57.4 percent within the same period. The decrease in forest cover was attributed to increased human activities in the surrounding areas, but also change in livelihood patterns as triggered by the impacts of climate change. This has created tension and conflict between local communities and the government that enforces forest conservation policies and programs.

From the East African context, WWF (2006) observes that there has been a strong link between climate change and livelihoods. While East African countries depends heavily on rain-fed agriculture, climate variability that results into decreasing trends in annual rainfall makes rural livelihoods and food security highly vulnerable to such as shifts in growing season conditions. The fact that agriculture contributes 40 percent of the region's gross domestic product (GDP) and provides a living to about 80 percent of East Africans, decreased precipitation is already affecting many people. WWF (2006) further observes that from 1996 to 2003, there has been a decline in rainfall of 50-150 mm per season (March to May) with a corresponding decline in long-cycle crops (e.g., slowly maturing varieties of sorghum and maize) across most of eastern Africa. While long-cycle crops depend upon rain during this typically wet season, progressive moisture deficit results in low crop yields in the fall, thereby impacting on the available food supply. Recommending on potential measures towards addressing these challenges, WWF points out to the need of distributing climate data regarding seasonal climate forecasts (based on short-term and long-term forecasts) to rural farming communities. This will enable small farmers to make a more informed farming decision and adapt to the changing climate conditions. Other suggested measure include reforestation with "climate-smart species", integrated land-use and marine planning, as well as activities to improve resource use technology. In the same vein, the Excellensia Consulting (2010) views the following areas as key for addressing climate change agenda in Tanzania; adapting the 'UN REDD' Tanzania and National Adaptation Plan Action (NAPA) initiatives, increased government commitment to climate

change, improved financial resource mobilization, improved capacity of key implementing agencies and intersectoral coordination.

Observation by Amisah et al. (2009) from the Offin Basin in Ghana revealed similar trends as those reported from Tanzania. Forest fringe communities in the catchment area of the Offin Basin were characterized by high poverty levels and relied on rain-fed agriculture with little or no access to modern agricultural technology. Climate change significantly changed their pattern of livelihood shifting from agriculture to forest based products. Between 1990 and 2000, Ghana lost an average of 135,400 hectares per year due to timber exploitation, farming and other land use activities as coping strategies for changed livelihood opportunities. Between 2000 and 2005, the rate of forest change increased by 4.2 percent from 1.89 percent per annum. In total, between 1990 and 2005, Ghana lost 25.9 percent of its forest cover or around 1,931,000 hectares. For the period 1990-2005 interval, Ghana lost 27.6 percent of its forest and woodland habitat (Amisah et al. 2009). In Ethiopia, the drought-hit communities had their main livelihood activities changed from farming to local brewing, firewood and charcoal selling (Amente, 2005).

The Sustainable Livelihood Framework (DFID, 1999) identifies the vulnerability context to include trends, shocks and culture which act upon the capital assets. If the transforming structures impacts well on capital assets the emerging livelihood strategies will lead to increased income, well-being, reduced vulnerability, improved food security and more sustainable use of non-resource base assets. The transforming structures are construed to include; the government, private sector, laws, policies and institutions. Except for the National Strategy for Poverty Alleviation Phase II (2010-2015) that articulates strategies for poverty alleviation thereby touching upon some issues of climate change; policies, legislations and institutions that address climate change and its impact in a comprehensive way in Tanzania are yet to be formulated and implemented. This provides a limitation towards developing comprehensive strategies for community livelihoods and addressing the impacts of climate change.

Conclusion and Recommendations

This paper has empirically shown that climate change is increasingly becoming a reality and impacting negatively on the livelihoods of the local communities in the coastal settlements of Tanzania. This has been evidenced by the decreasing trends in the amount of rainfall and increasing temperatures over the period of about thirty years. The impact of reduced rainfall amounts has affected agriculture, which constituted one of the primary livelihood activities in the areas. Although people have attempted to develop some adaptation strategies including; changing the types of crops grown, migrating to other regions, shifting to forest based products such as charcoal selling and engaging in petty trading, these strategies are not coordinated or supported by the transforming structures. Forest based livelihood activities have contributed to forest depletion of the nearby forest reserves of Pugu and Kazimzumbwi. The latter has compounded the problems emerging from climate change and disturbs the ecosystem services accruing from the two forest reserves. On the basis of these observations, it is recommended that the government in collaboration with other stakeholders should engage in developing practical interventions for alternative livelihood strategies that will assist local communities adapt to the threats of climate change and conserve the nearby forest reserves. It is also recommended that policies and legislations that

address climate change, its impacts and adaptation strategies should be developed to create a balance between resource exploitation for community livelihoods and environmental conservation.

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