

Livelihood Continuity and Change: Adaptation to Climate and Environmental Change in Northern Unguja, Zanzibar 1916-2016

Khatib, M.M¹⁸, William, C.P¹⁹, Shaghude, Y.W²⁰. Kangalawe, R.Y.M²¹.

Abstract

Coastal community continuity and change in livelihoods become a prime adaptation strategy worldwide because of climate and environmental change. The changes in climate and environment along the coast have been associated with natural and human induced factors. This paper analysed the livelihood continuity and change as adaptation measures in northern Unguja, in relation to temperature and rainfall change. Archival and current reviews, interview and observation which represent the livelihoods change over last 100years were used. The paper also, analyzed how local community processes of continuity and change have interconnected with local climate events and changes over last 100 years. The results reveal that there were societal change both North Western Zone and North Eastern Zone in livelihoods activities as an adaptation mechanism due to gradual environmental changes, such as coastal erosion, coastal floods, unreliable rainfall and droughts. Such scenario increases the risk and vulnerability to the local community. The study also reveals that the identification of risks and vulnerability depends on the local community perceptions of what functions the coastal and terrestrial land should provide, as they informed by past experience, histories and current situation. Therefore, the successful adaptation from the local perspective should go beyond protecting what is already there and allow for future development of the village.

Keywords: Livelihood, Climate change, Coastal Change, Adaptation

Introduction

Climate and environmental change are among the influenced factors in livelihood change and shift or continuity in North Western Zone (NWZ) and North Eastern Zone (NEZ) for over a century. However, economic and socio-political processes also play a major role on livelihood dynamics (Sheriff and Ferguson, 1991). The northern Unguja history is characterized by coastal natural resources extraction and export of coconuts and spices, where fishing is followed by agricultural activities. More recently, tourism and aquaculture such

¹⁸ Department of Geography, University of Dar es Salaam, Tanzania

¹⁹ Department of Geography, University of Dar es Salaam, Tanzania

²⁰Institute of Marine Science, University of Dar es Salaam, Tanzania

²¹ Institute of Resource Assessment, University of Dar es Salaam, Tanzania

as seaweed have been pursued as an economic development strategy (Msuya, 2012; Lange and Jiddawi, 2009). The historical overview and development in coastal areas of NWZ and NEZ such as the development of tourism and the establishment of coastal and marine protection strategies have significantly altered communities livelihood in NWZ and NEZ over the past 100 years and led to change and diversification in the livelihoods activities (Middleton, 1961; Sheriff and Ferguson, 1991; Gilbert, 2004; Makame, 2013). The resulting livelihood activities have caused patchy transformation of livelihoods, with local communities dependence on agriculture and fishing being increased (Makame, 2013, Makame et al., 2015; Kyhayo et al., 2015).

Increasingly, coastal management strategies, diversification, transformation, shift and change of livelihood activities are among the means promoted for climate and environmental change adaptation (Mustelin et al., 2009; Magigi and Ramadhan, 2013; Makame, 2013, Makame et al, 2015). Evaluation of climate and environmental change risks, vulnerability and adaptation is commonly the identification of current conditions and exposures, and the past and present strategies the local communities have used to deal with changes (Sheriff and Ferguson, 1991; Makame et al., 2015).

Since adaptation to climate and environmental change considered urgent in northern Zanzibar, (Mustelin et al., 2009; Makame et al., 2015), it is important to extend the understanding of livelihood adaptations and transformation beyond present concerns. Adaptation to climate and environmental change cannot work without inclusion of livelihood activities, because livelihood activities shape local communities way of life. Hence, socio-economic and cultural processes intersect with people, local events and environment in profound ways, where historical contexts can improve analysis of connections between past and presents effects and adaptation measures.

This paper therefore examines and analyses how processes of livelihood continuity, shift and/or change as a processes of adaptation have unfolded in the coastal communities in Unguja over last 100 years. The study contributes to current debates on adaptation by underlining the change characteristics of livelihoods, and emphasising the influence of history and socio-economic in shaping adaptation measures.

Materials and Methodology

This study was undertaken in ten villages in northern Unguja, in Zanzibar. Data collection was undertaken using interviews, observation and literature review. Household Interviews involved collection of socio-economic data, including the status of the local community and their perception of climate change risk, vulnerability and adaptation processes. Interviews also involved consultations with key informants that included village elders and Shehas, staffs from the Department of Forestry and Non-renewable (DFNR) and NGOs operating in the study area. Field observation provided supplementary information acquired through direct observation in the field. Direct observation was undertaken together with selected members of local communities to provide an in-depth account of the population under study as described in Bryman (2004). Secondary data was collected through review of various publications to support and/or complement the information collected from the primary sources in relation to the climate change impacts, people's perception on risk, vulnerability and adaptation in the study area. Secondary data included among others, climatic data from the Tanzania Metrological Agency (TMA) and Zanzibar National Archive (ZNA).

Various approaches were used in data analysis. Climate parameters such as temperature and rainfall data acquired from TMA and ZNA was used to analyse the patterns of change for different periods over the 100 years data. Extreme events of temperature and rainfall changes and long time departure from the mean were also analysed using time series graphs, and points showing climate shifts (changes) were also detected. Trend analysis for different time scales (100 and 50 years) was done to clearly demarcate the extent of which climate was changing for a given period of time (trend line slopes were used). Socio-economic data was analysed using content analysis, Statistical Packages for Social Sciences (SPSS) software and Excel. The analysis was used to differentiate various opinions of which people perceived over time based on their livelihood activities.

Results and Discussion

The section broadly presents the livelihood adaptations to climate and environmental change and depicts the main trends and changes. Around 1920s NWZ and NEZ livelihoods activities had been divided between officially recognised sectors centred on export of spices such as cloves, copra, coir, and chillies. The second set of livelihood activities directly descended over time in involving production of subsistence crops such as cassava, rice, yams, maize, and vegetables (Middleton, 1961; Gilbert, 2004; Ingrams, 2007). In 1920s NWZ

and NEZ indigenous communities' settlements were long-settled in clusters, with streets; whereas, in these settlements shifting subsistence agriculture and fishing were economically important (Middleton, 1961; Ingrams, 2007). However, their economies were largely based on the export of cash crops and seasonal labour contract (in clove plantations), and a considerable proportional of their food was imported (Ingrams, 2007; Middleton, 1961).

The Influence of Population Trend in Livelihood Activities Change

The results revealed that there were profound changes in population growth and livelihoods in the study sites. Figure 7.1 represent the population trends in North Unguja over last 100 years, where the trends has experienced a fairly steady population increase over time. The increment of the population are associated with indigenous births and immigrants from various areas of mainland and Indian ocean travelers (Sheriff and Ferguson, 1991). For instance between 1923 and 1930 at total of 21, 699 mainlanders immigrated into Zanzibar of whom 3,876 never returned, either because of death or because they settled down as squatters (Sheriff and Ferguson, 1991). During the colonial period the population of the rural areas of North Unguja are sparsely distributed and much of them remained land consists of uninhabited coral land to the NEZ and deep fertile soil in NWZ (Middleton, 1960). The population increase over time influenced on livelihood activities in various ways, such as subsistence cultivation and fishing activities.

Furthermore, the population increase associated with land use land cover (LULC) change in the area, which driven by increasing of supply and demand to the local communities and nearby areas. For instance, Middleton (1960) noted that during 1950s plots near the settlements are cultivated on an average for three years, then left to rest for two to five years; whereas, more distant fields are cultivated for three years and left to rest for anything from eight to fifteen years. While currently due to population increase the shifting cultivation have changed by reducing the period from eight to fifteen into two or three years which are used to make the soil rest and regenerate. This practice done mainly in NEZ where the soil are richer in nutrients but are thinner, low water retention and are found in some pockets of earth (Klein, 2008; Ingrams, 2007). In NWZ are changed mainly by practiced intercropping and crop rotation in the same area due to the deep and fertile soil and rainfall are more reliable than NEZ (Middleton, 1960). Whereas, timeline of livelihood activities, population growth, LULC change and climate changes and variability provides an outline of history of adaptation in the study sites (see Figure 1, 2, 3 and 4).

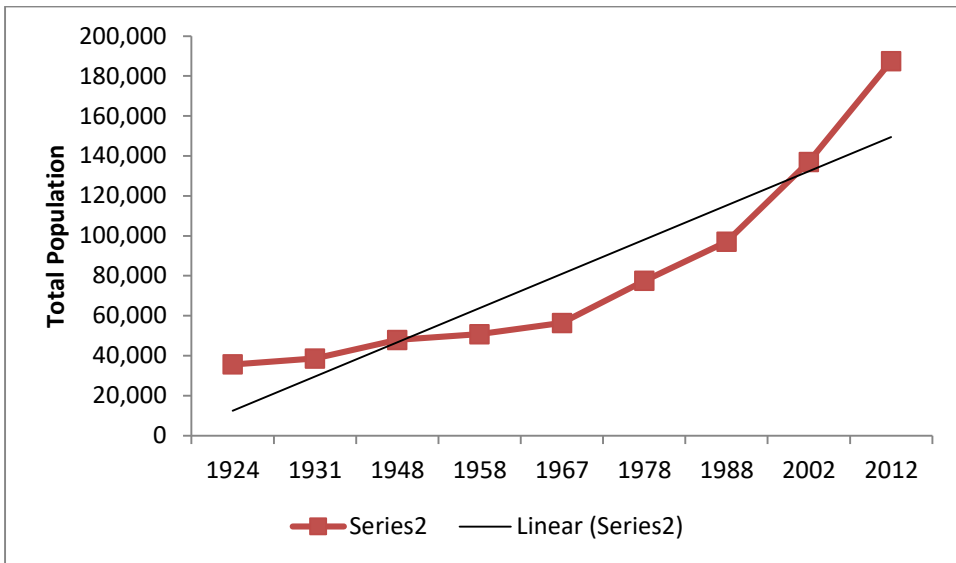


Figure. 1 Population Trends in North Unguja Over 100 years. B: Data Derived from ZNA (2016) and National Statistics of Zanzibar (NSZ)

3.1 Vulnerability of livelihood activities to extreme weather events

Livelihood activities such as small-scale cultivation was vulnerable to extreme weather events, evidenced by severe drought in 1918-1923, 1933-1934, 1943-1946, 1949-1951, 1953, 1958, 1983, 1987, 1996, 2001, 2003, 2009, and 2012/2013 as depicted from the Standardized Precipitation Index (SPI) (Figure 2). In addition, there was a severe drought during 1946 which caused shortage of food and led to famine (Sherriff and Ferguson, 1991). The famine of 1946 led the rural population to require additional incomes by harvesting massive mangrove bark to sell to merchants and opening farms for subsistence farming, which ruined the mangroves and impacted in its generation (Sherriff and Ferguson, 1991). In the local historical narrative, this way of life was disrupted by different factors including climate variability, poor economic development and/or colonial policy which granted land alienation for cash crops like cloves and coconuts (Sheriff and Ferguson, 1991). The land alienation to large plantation such as cloves and coconuts reduced the amount of fertile land available to local communities for food crop cultivation, such as in the north-western parts of Zanzibar.

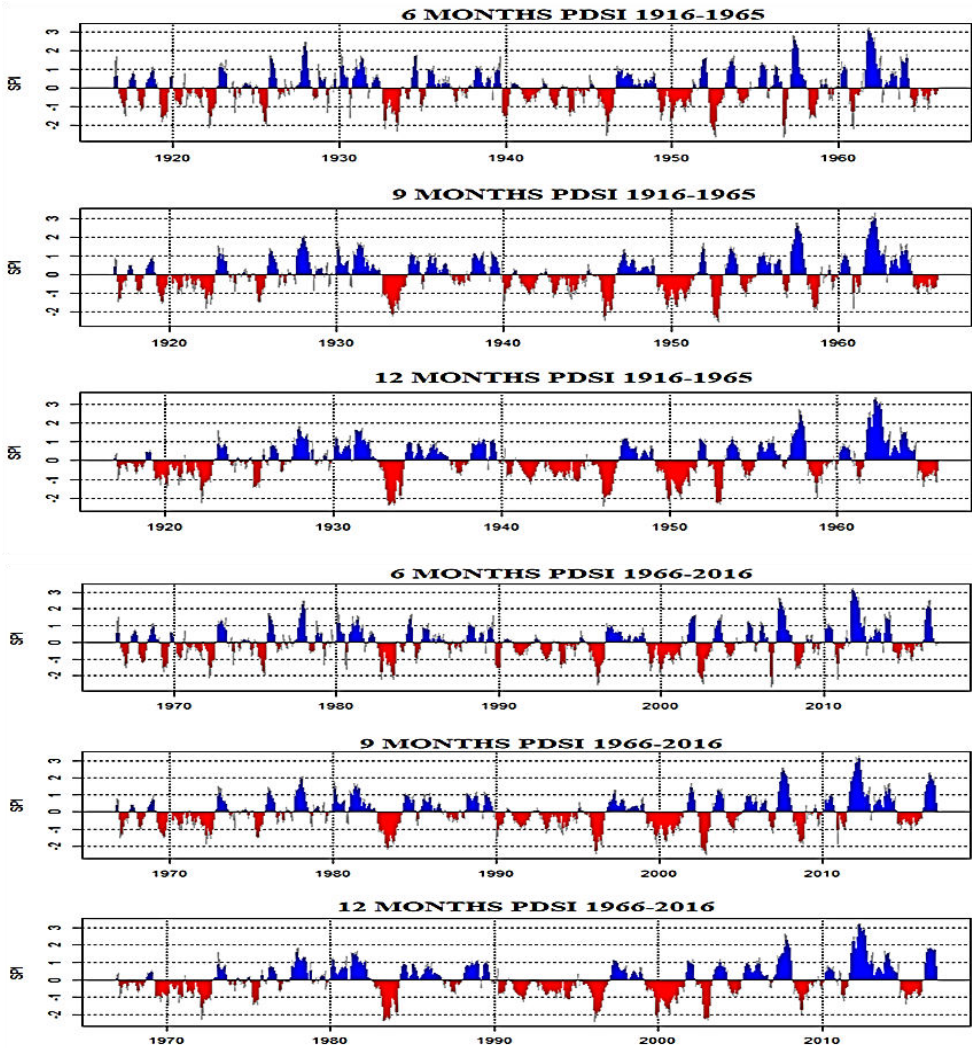


Figure 1: Standardized Precipitation Index (SPI) for the past 100years
N.B: Blue colour represent wetness; Red colour represent dryness

The hunger which was caused by droughts that struck the area frequently between 1946 and 1953, are collectively regarded as a historical markers. These drought events were also associated with maximum and minimum temperatures increase between 1940s and 1950s (Figure 3). The period was followed by a cooling phase (low temperature) especially in drier seasons, which reduced the subsistence food production as noted by one elderly man (aged 81 years).

"I remember in previous days when we were young, there was drought and severe food shortage in our village. The food shortage was associated with drought called "Kigubi". The food shortage was due to the lack of rain and

the crop plants failed to produce food as it was expected. I remember there was a day when I fell asleep while starved and our late mother cooked stones until we got asleep while waiting for food. For long periods we continued to experience the shortage of food, while previously we owned substantial foods and we enjoyed for eating and drinking without fear".

The above quotation exemplifies how the local community related the climate events to changes in their livelihood practices, especially cultivation. As a response to drought which led to declining of food production and subsequent food shortages, the local community that were adjacent to mangroves vegetation (such as NWZ communities) diversified their livelihood activities by cutting mangrove poles and bark for sell to the merchants. This was a market response to an increasing demand for mangrove trees in the United States, India and Arabian countries (Gilbert, 2004; Sheriff and Ferguson, 1991). Gilbert (2004) noted that by the middle decades of the 20th century, the mangrove wood had become the single most important product carried to Arabian countries by long distance traders. While in NEZ communities diversified their livelihood activities by increasing demands in fishing activities between 1928 and 1961 (Sheriff and Ferguson, 1991), the number of fishermen was double to 9,500 and fishing activities changed from subsistence to commercial (see Figure 1). Another livelihood activity that was commonly practiced in the NEZ was lime production. However, this activity faced competition from imported cement, which caused the price of lime to decline in the 1940s (Middleton, 1961).

Furthermore, the droughts during mid-1940s to 1950s were followed by a decline of clove prices in 1958 (which served as the monetary income that helped people to import rice from far east), and the change of policies and struggling for independent movements led to local communities finding it difficult to improve their farming practices. For instance, apart for climatic events, the policy during the colonial period led the subsistence food production to gradually decrease due to the local communities being forced out from fertile land to the coral rag land where land allows only shifting cultivation, but due to intensive cultivation followed by very short periods of recovery of land, made the crop yields to become gradually smaller which eventually led the food shortage to be greater during those periods (Sherriff and Ferguson, 1991).

Education and socio-economic development

Social development and the livelihood activities are associated with educational development (Ellis, 2000), where the human capital is widely considered as a key to successful livelihood by diversification and delivery of quality of

education and skills acquisitions. During the colonial era, the education system which was virtually confined by the state promoted education to the privilege groups only, which entrenched the status quo (Loimeier, 2009; Bhagat and Othman, Un). As such, by 1948 out of the 265,000 people in Zanzibar, 190,000 had had no access to schools. In the rural areas of Unguja only 7,900 out of 56,900 children under 15 years of age had attended or were attending school (Sherrif and Ferguson, 1991). This situation shows that most of the local communities have limited educational opportunities. This position changed a little in the period before independence where various strategies were put in place in order to achieve quality education (RGZ, 2016). However, educational level in the study sites is generally still low, and is among the factors that inhibit socio-economic development in the area.

Livelihood shifts/changes

Figure 3 presents the livelihoods change trends in the two communities over the last 100 years.

During the colonial era and the early years of independence era the export market constituted the export of fisheries products, cultivated products and dietary products (Gilbert, 2004). Domestic cooperatives such as fishing, copra, and milk processing industries were established during the colonial era and continued during the independence period to ensure that revenues remained within local communities and business men. However, the cooperatives did not provide appropriate incentives for local communities to become skilful for what they produced and, therefore, did not bring significant social development to many local coastal communities (Sheriff and Ferguson, 1991).

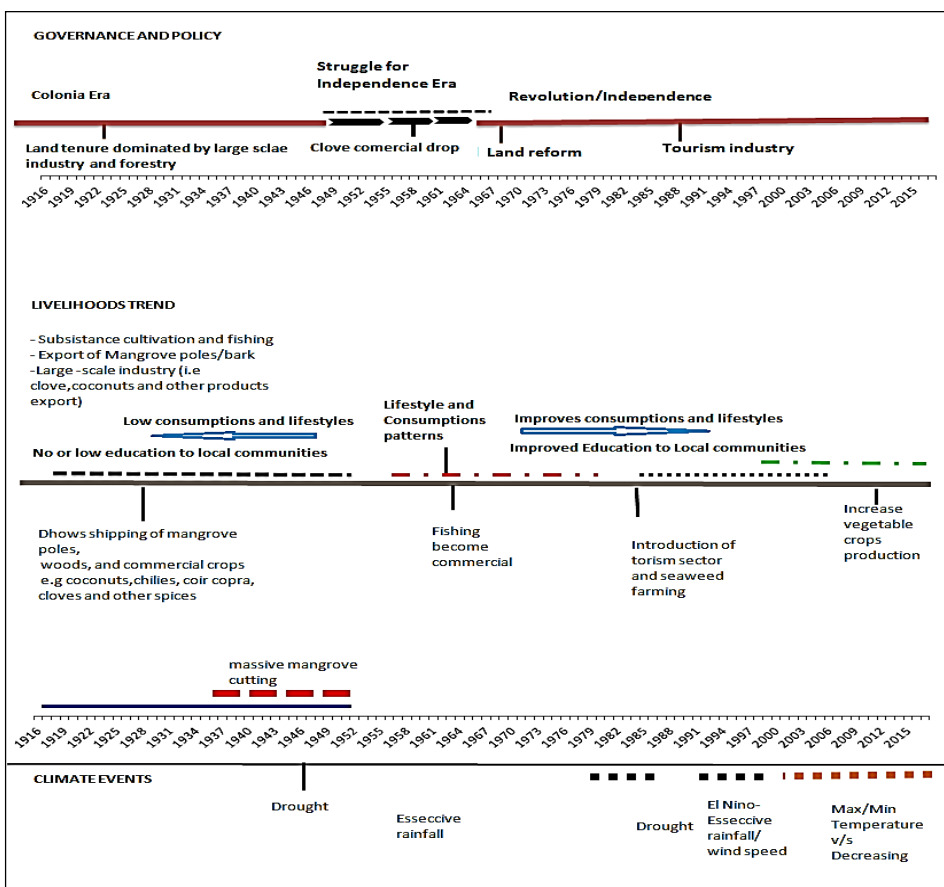


Figure 3: Timeline of livelihood patterns over the last 100 years in northern Unguja, Zanzibar Source: Field survey

The livelihood shift from large-scale cultivation of cloves and coconuts to commercial fishing and mangrove pole/bark cutting was considered to have contributed to exacerbation of poverty and ecological disturbance of many mangrove areas. As noted by Sharriff and Ferguson (1991), the development of capitals of production has cut the life strings of smallholder production in agriculture, destroy the peasants' self-sufficiency and impoverished him. The dismantling of the clove price control led to further poverty to local communities, who continued to practice subsistence cultivation on their land that did not constitute an important source of income. Instead, local communities increasingly relied on commercial mangroves poles/bark and small-scale fisheries (Gilbert, 2004; Sherrif and Ferguson, 1991).

For fisheries activities, the local production of fish declined as imported outboard motors and fishing gears, which many local fishermen could not afford

to buy, which led the larger merchants began to dominate the fishing business (Sherrif and Ferguson, 1991). The average catch and revenue per fisherman and per fishing boat decreased considerably, indicating the dwindling resources, which could be associated with over-fishing, resulting from increased fishermen population and/or unsustainable fishing practices (Kangalawe and Lyimo, 2010). Local respondents in the study currently being reported also frequently cited increasing population led to increasing numbers of fishers (from our communities and elsewhere) as a contributing factor to declining of fish catches. Sherrif and Ferguson, (1991) argued further that the shortage of rainfall also affected the clove harvest, which has led the local community to divert to frantic mangrove bark gathering for sale, which has ruined mangroves for generations.

In the beginning of the 1970s the economic situation in the study area was described as a hand-to-mouth existence (Gilbert, 2004). With the emergence of tourism industry and exportation of seaweed to Europe, Asia and North America in the mid-1980s, the local communities' livelihood activities began to experience some moderate incomes from tourism and living standards nearby coastal areas gradually started to change. The changes were due to economical development from tourism, seaweed farming, improvement of fishing industry and commercialisation of many farm products (Quinn and Philip, 2017; Sherriff and Ferguson, 1991). As the development based on natural resources, it fuelled coastal resources degradation that turned around to impoverish these same local communities.

Today most of the local communities combine multiple livelihood activities such as fishing, cultivating, small business and tourist activity for income generation (Figure 3) as adaptation strategies to climate change. However, climate change related challenges have led to decreasing capabilities of local communities to diversify their livelihood activities. For instance, the tourism sector is under stresses due to coastline erosion, temperature increase, environmental pollution and increase of strong winds during the monsoon periods. Invasive diseases to mariculture like seaweeds also reduce the economic development of the local communities.

Farming has involved a diverse set of crops (Figure 5). In the study sites, alternative livelihood projects intended to diversify local communities' incomes include small business, tour guiding, introducing of fruits and vegetable cultivation such as watermelon, okra, tomatoes, eggplants and cucumbers which seem as highly profitable compared cultivating traditional foods crops such as yams, sweet potatoes, cassava and rice. However, the diversification of crop

production is based to age group. Many younger communities prefer to grow water melon and vegetable crops rather than elderly people (Figure 4) because it can generate quick money, while middle and elderly people consider food security in their households.

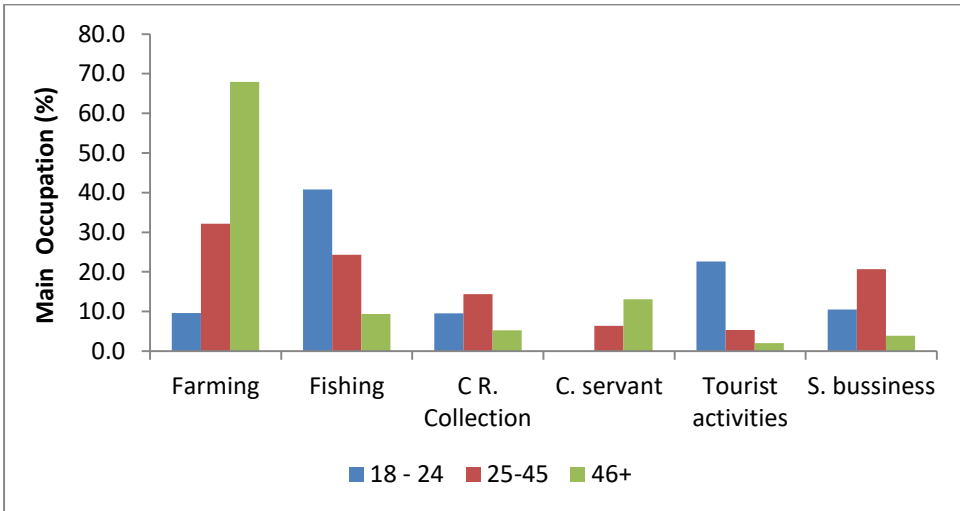


Figure 4: Combination of multiple livelihood activities as adaptation mechanism v/s age group

Since farming and fishing remain the main livelihood activities of local communities, challenges to subsistence cultivation and fisheries sector have direct impacts on the community livelihoods. Local farmers and fishers have experienced a decline in crop production and fish catch and many of the informants considered the future of the subsistence cultivation and fisheries industry as being not promising.

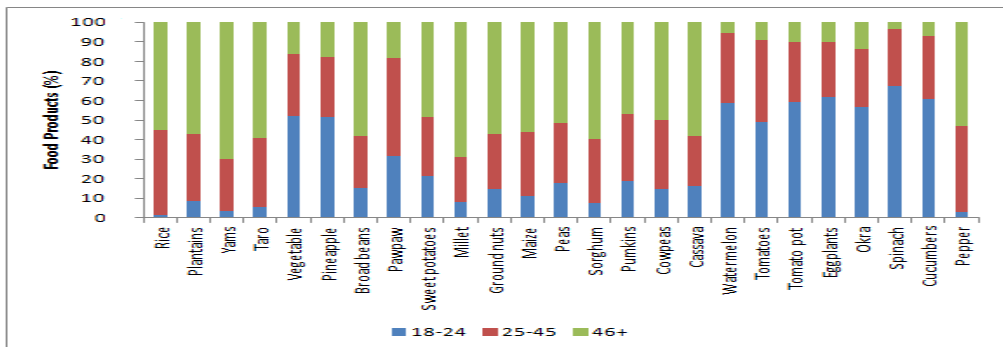


Figure 5: Crop diversification based to age group

Apart from articulated factors for fish catches and food production reduction, the prices for marine and subsistence crops are locally considered to be lower when compared to the amount of labour input during productions. Findings from this observation are similar to the study by Anderson and Juma (2011) who noted that the locals have inadequate capital from their cultivated products, which in turn has led to local communities to be not satisfied with what they earn from agriculture. Farmers commonly claimed to respond to decreasing market prices by diversifying their subsistence products and by engaging in the production of short term crops rather than long term crops.

Decline of coastal resources and its impacts on local livelihoods

Destruction of coral reefs due to human induced factors and coral bleaching due to climate impacts associated with increasing temperature are also considered to impact fisheries based livelihood. Fishers and coastal resources collectors are vulnerable to climatic events such as strong winds and temperature increase. This is mainly due to their dependency on fisheries based incomes. For instance, during strong winds fishers are forced to stay ashore and cannot earn any income. Adaptation strategies often entail fishing in different areas during periods of low productivity or adverse weather conditions. Furthermore, the coastal resources collectors reported to experience a decline in marine resources over time as a lady noted hereunder:

It is not many years ago we are collecting so many coastal resources such as oyster, mussels, conchs, prawns, squids, octopus and crabs adjacent of the coast, we just used few hours to fill up our baskets. Even the climate was harmonious to us even in "Kusi" and "Kaskazi" we found the "Bavua" days and collected so many coastal resources. But in recently years during the Kusi and Kaskazi there have been strong winds which have led us to cancel our plans for collection of the resources. Also, we have observed a tremendous decline of those resources; some days we come back home without anything and other days we come with little products which are too little for our own subsistence.

The above quote signify that the declining state of the coastal resources such as mangrove, coral reefs and increasing climatic events has led to negative impacts on the welfare of the local communities dependent on coastal natural resources for their livelihood. The observations above are similar to the findings by study by Quinn and Philip (2017) who noted that in Zanzibar there have been significant negative impacts as incomes of local people rely on coastal

resources. Diets are affected by a reduction in availability of food from marine and other coastal resources, and reduction in the tourism values.

Most of the young men commonly responded to decreasing fish stock by increasing their effort and complementing their fishing activity to other income generating activities such as sand extraction, gypsum extraction and sculpture of stone bricks (Figure 6 and 7). Diversification into sculpture of stone bricks was observed both at NWZ and NEZ, whereas the sand extraction was common in the NWZ whose physical landscape is formed of deep soil (Middleton, 1961). Gypsum extraction and sculpture of stone bricks are common in the NEZ because the landscape is mainly formed by coral rag. Figure 7 presents some houses under construction using the sculptured stone bricks.



Figure 6: Matemwe (NEZ) sculpture stone bricks area (left) and Dongemchangani sand extraction area (NWZ) (right).

Source: Field survey, 2016



Figure 7: Some new houses built of stone bricks in Matemwe village.

Source: Field survey, 2016

Sand extraction, gypsum extraction and sculptured stone bricks are sold both within the villages and outside the villages, and most of the young men commented that those activities provide quick incomes, as one young man claimed:

"...We sculpture the stone bricks and extract gypsum for income generation, because these products are very useful in our village as many people need them for building materials. the stone bricks are very strong and live long when you compare with cement bricks, ... as you may know our environment is harsh somehow especial during the hot season - it become very dry and very hot, so people choose to build their houses from these materials in order to reduce the heat within the houses, and the houses that are built from stone bricks are very strong and resistance to diverse conditions. For instance, you cannot see any house built of stone bricks being degraded or make faults due to temperature change, while the houses built with cement bricks do that".

Some young people have invested their efforts in gypsum extraction (Figure 8) as a diversifying activity, which is viewed to broaden their livelihood options similar to sand extraction and sculpture of stone bricks. Yet, this specialisation has rendered the village vulnerable to environmental degradation.



Figure 8: Gypsum extraction sites at Matemwe (top) and Kiwengwa (bottom)

Source: Field survey, 2016

Shifts of livelihood trends due to changing climate

Historically, the local communities in the study area rely much on food crop production, including rice, cassava, and bananas to mention some. These local communities have also diversified into short term vegetable crop production. Since 2010s the local communities have also been involved in the production of water melon and other vegetables to further complement their livelihoods.

Farmers claimed that as a result of climate variability and change they have also experienced changes in the types of crops produced (Figure 9). For instance, following the drought of 2009-2010 local communities have shifted to planting resistant crops such as sorghum, peas, bulrush millet and yams instead of rice and cassava. When the climate variability continued to persist in the following years, farmers diversified their crop cultivation by planting water melons and diverse vegetables. It was argued these fruits and vegetables are managed in small plots, which with irrigation they are highly productive. Eventually they get good profit because such products are readily marketable. This local community adaptation strategy shows that they have improved their awareness on their environment by working out more appropriate and are manageable livelihood options for them.

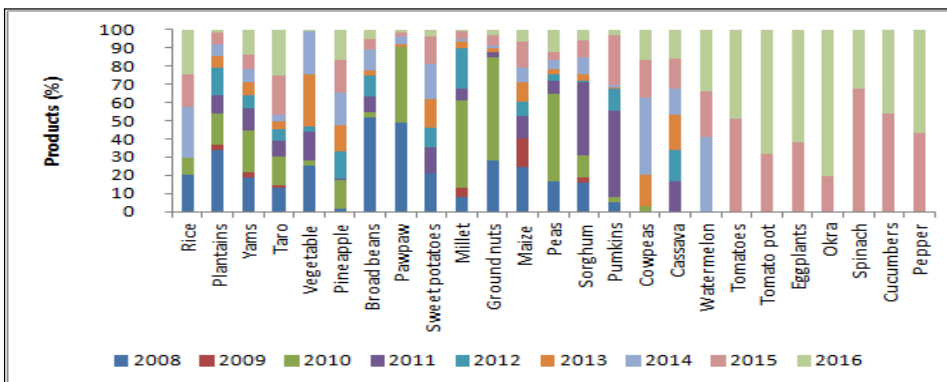


Figure 9: Variations in types of crops produced over time due to climate variability

The vegetable and fruit production provide considerable profit, and increasingly providing sustainable livelihood to farmers. This observation is also acknowledged by the RGZ (2008) who noted that fruits, vegetable and spices are increasingly being profitable and providing livelihood to several farmers. However, climate related events such as increased crop plant diseases, shortage of rainfall and droughts in some years has reduced the levels of production. This seems to challenge the Zanzibar Agriculture Transformation Initiative of the

2000s that was established with the aim to increase food production (RGZ, 2008).

Fishers have been responding to decreasing price by diversifying the sell market. For instance, instead of send their fish to Unguja seaport for sells, they send them Dar es Salaam.

Tourism sector is increasingly having a major impact on livelihoods of the local communities in northern Zanzibar due to increasing of demands on fruits, vegetables and fish in local and urban markets. For example, the production of water melon and vegetable is increasing due to their demand in hotels and in urban areas. Thus, the tourism industry has a positive impact in increasing profitability of farmers’ and fishers’ produce.

Changes in climate, access to natural resources and their implications

Changes in climate and access to natural resources over time and processes such as market price fluctuations emerged as important factors influencing livelihood adaptations in the study area. For instance, the drought episodes of 1919, 1933, 1941, 1946, 1983, 1987, 1996, 2001, 2003,2009, and 2012/2013 combined with excessive rainfall episodes such as in 1925, 1927,1938,, 1951, 1957, 1961, 1986, 1997/1998 and 2006/2007 (Figure 3), resulted in forced diversification of livelihood activities, which occurred through land use/cover changes in mangrove resources of the study sites. Over the 100 years time period studied, subsistence cultivation and fishing livelihoods have evidently been highly vulnerable to climate events, and it appears that their capacity to recover from episodic climatic events has been unmanageable as resources became more scarce.

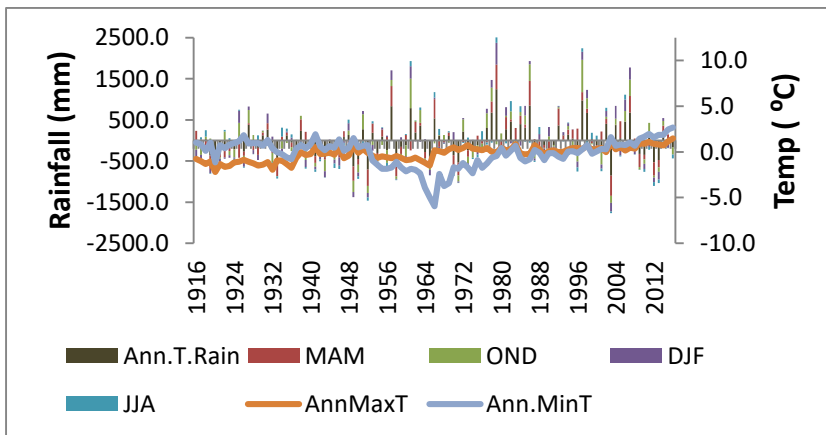


Figure 10: Maximum and minimum temperatures between 1940s and 1950s

Coral bleaching due to temperature increase and marine resources extractions are spatially increasing. However, as livelihood resources have a wider distribution, they are also subject to a larger range of climatic events. The cumulative impacts of threats to subsistence farming and marine resources, such as shoreline erosion, coastal developments for construction of hotels (Quinn and Philip, 2017), climate change and decreasing rainfall constrain current livelihoods, and are likely to compress future adaptation options. Among the contemporary major impacts of climate change in the study sites include salt water intrusion (Figure 10), shoreline erosion (Figure 11), unreliable rainfall and increasing temperature (Figure 3 above).



Figure 11: Salt water intrusion in farm land and near homestead ground in Mtowa Pwani

Source: Field Survey, 2016

The above mentioned climate related impacts have been significantly influencing adaptation and/or mitigation the northern parts of Unguja. The impacts have resulted in what Ellis (2000) referred to as enforced diversification of livelihood activities. The adaptation process also occurred through relocation of cultivation areas by moving more inward away from the ocean, and change location of seawalls that were built as a buffer for coastline erosion more inwards side (Figure 12).



Figure 12: shoreline erosion where new seawall is built inward compared to the former at Pwanimchangani (left) and cliffs fall due to wave erosion at Matemwe (right)

Source: Field Survey, 2016

Historically, during the colonial period, rural local communities' land was mainly dominated by clove and coconuts plantations, which clearly restrained the local adaptation options which somehow led to livelihoods insecurity (Sheriff and Ferguson, 1991). However, the availability of marine resources such as diversity of fish types may explain why local communities, could shift from subsistence to commercial fishing, which enable improved livelihood adaptations. Thus, local communities' socio-economic and development were closely linked to environmental and socio-cultural aspects that enabled accessibility of resources. These were coupled with development of the tourism sector (Lema, 2017). The tourism sector led to new dynamics for the local communities who sold their lands to foreign investors for building hotel apartments. On the other hand such developments have resulted in deterioration of the coastal environment and accelerated coastal erosion (Lange and Jiddawi, 2009).

Changes in life style and consumption pattern have also influenced livelihood adaptations. Local communities during the colonial era consumed less and merely sustained family food needs through farming, and simple clothes (just *Kaniki*), but, as noted earlier, they had low education (Girlibert, 2004; Sherrif and Ferguson, 1991). While the contemporary lifestyle and consumptions of the local communities mimic other parts of the world, which is imbedded with cultural globalisation. This has led to the endorsement of a more consummative lifestyle, which implies more desirable livelihood needs to enable these people

to acquire modern goods such as phones, motorcycles/motor vehicle, good houses, the need for modern clothing and even engaging in educational attainments (Sumich, 2002; Magigi and Ramadhani, 2013). Local consumption patterns demand continued dependence on natural resources base, which play an important role in the conservation of the resources.

Livelihood vulnerability as a dynamic process

The findings of this study underline that vulnerability is a highly dynamic process where livelihood adaptation also creates new sources of vulnerability. For example, during colonial and early independence eras commercial crop production varied based on the fluctuation of global markets, while subsistence food production declined, making the villagers susceptible to hikes in imported food dependence (Sheriff and Ferguson, 1991). Following the decline of food crops production, the local communities and government increased the importation of rice and other products from Asian countries. However, the prices of the imported foods were, in some years, very high. Importantly, the observed wide range of uncertain and unpredictable climatic, environmental and socio-economic factors affected the vulnerabilities in the study sites. These factors have frequently occurred as episodic events with considerable variations over time. Thus, constructing stable and appropriate livelihoods in order to cope with climatic and environmental changes emerges to be inconsistent with historical representation of change, where livelihoods instability is the normal condition which is not easy to alleviate over time.

Challenges to community adaptations to climate and environmental changes

Community members interviewed as part of this study considered that lack of environmental awareness, economic disturbance, and inadequate government support to be the factors that discouraged the success of livelihood options/projects. Subsistence cultivation was reported to be practiced by about 80% of the local community, but it constituted a minor livelihood activity that could not primarily meet local needs. The amounts produced do not meet local needs at times, thereby creating general scarcity of localised food security. Respondents in this study claimed that contemporary subsistence cultivation has been impacted by climate change. They argued that lower and/or excessive rainfall levels have been observed over the last 40 to 20 years, which are also associated with changes in the timing and strength of rain and temperature patterns.

Most of the local communities claimed to have failed to invest their capital derived from fishing and farming into the basic needs such as to education for their children; and they fail to broaden their livelihood options. These observations are similar to many low income developing countries (Dixon et al, 2001; Quinn and Philip, 2017). However, subsistence farming and fishing as the main livelihoods have rendered local communities vulnerable to climate and ecological changes as well as changes in market and policies. Regardless of challenges with subsistence farming and fishing activities, local people claimed that out of the options available to them, crop cultivation and fishing were still the most preferred and enjoyable activities due to the fact that they are familiar with those activities and can earn the little income without disturbance. They noted, however, that cutting wood in the forest or in the mangrove was more profitable but that activity was not a favourable adaptation option to due to government policies and regulations.

Subsistence cultivation was self-sufficient before the introduction of large-scale export products, where the land was more used for food crop production. Furthermore, the climatic conditions in the first half of 20th century was not harsh as compared with the climate events of the second half and beginning of the 21st century where rainfall has become more severe in frequencies and intensities. The changes in temperature have led to subsistence cultivation being insufficient for local livelihoods. This observations concur with other studies indicating that processes of change in subsistence cultivation need to consider the natural resources base, climate and population increase as factors in rural transitions (Dixon et al., 2001; Makame, 2013; Quinn and Philip, 2017).

Conclusion

Livelihood change/shift and/or continuity are associated with climate and environmental changes and resultant livelihoods adaptation options. Climate change impacts uncertainty such as coastal erosion, sea level rise, temperature increases and unreliable rainfall have the potential to physically and economically alter coastal communities. Therefore, adaptation options should consider climate and environmental changes, which are more contingent on how well local communities are able to respond to changes that they faces in their life.

Therefore, the history of society, environment and livelihoods are an important vantage point towards understanding contemporary interactions between climate, people, environment and political economic of the particular studied communities. The historical analysis of livelihood change/shift and/or

continuity contributes to current adaptation debates by underlining the dynamic characteristics of livelihoods, which influence the understanding of adaptation options.

Reference

- Anderson, W. and Juma, S. (2011) Linkages at Tourism Destinations: Challenges in Zanzibar. University of Dar es Salaam. <http://hdl.handle.net/123456789/1543>
- Bryman, A. (2004) Qualitative Research on Leadership: A critical but Appreciative Review. *The Leadership Quarterly*, 15(6), 729-769
- Dixon, J.A., Gibbon, D. P., Gulliver, A. and Hall, M. (2001) Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO and World Bank, Rome and Washington DC.
- Ellis, F. (1999) Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications. *Natural Resource Perspectives No. 40*. Overseas Development Institute, London
- Ellis, F. (2000) *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press, Oxford.
- Gilbert, E. (2004) *Dhows and the Colonial Economy of Zanzibar, 18600-1970*. Ohio University Press.
- Ingrams, W.H. (2007) *Zanzibar: Its History and Its People*. H.F. & G. Witherby – Ethnology. Frank Cass & Co. Ltd, London.
- Kangalawe, R.Y.M. and Lyimo, J.G. (2010). Population dynamics, rural livelihoods and environmental degradation: Some experiences from Tanzania. *Environment, Development and Sustainability* 12: 985–997. [DOI: 10.1007/s10668-010-9235-y]
- Kayhko, N. and Fagerholm, N. (2009) Participatory Mapping and Geographical Patterns of the Social Landscape Values of Rural communities in Zanzibar, Tanzania. *Fennia* 187: 1
- Kayhko, N., Fagerholm, N. and Mzee, A.J. (2015) Local Framers' Place-based Forest Benefits and Government Interventions Behind Land and Forest Cover Transitions in Zanzibar, Tanzania. *Journal of Land Use Science*, 10(2), 150-173
- Lange, G., and Jiddawi, N. (2009) Economic Value of Marine Ecosystem Services in Zanzibar: Implications for Marine Conservation and Sustainable Development. *Ocean and Coastal management*, 52(10), 521-532.

- Lema, G. (2017) Drivers of Tourism in Zanzibar. *Journal of the Geographical Association of Tanzania*, Tanzania.
- Magigi, W. and Ramadhan, H. (2013) Enhancing Tourism Industry through Community Participation: A Strategy for Poverty Reduction in Zanzibar, Tanzania. *Journal of Environmental Protection*, 4(10), 1108-1122. DOI:10.4236/jep.2013.410127
- Makame, O.M. (2013) Vulnerability and Adaptation of Zanzibar East Coast Communities to Climate Variability and Change and other Interacting Stressors. PhD Thesis. Department of Environmental Science, Faculty of Science, Rhodes University.
- Makame, O.M., Kangalawe, R.Y.M. and Salum, L.A. (2015) Climate change and household food insecurity among fishing communities in the eastern coast of Zanzibar. *Journal of Development and Agricultural Economics* 7(4), 131-142
- Middleton, J., (1961) Land tenure in Zanzibar. London: H. M. Stationery Office, London.
- Msuya (2012) A Study of Working Conditions in the Zanzibar Seaweed Farming Industry. *Women in Informal Employment Globalizing and Organizing*. United Kingdom.
- Mustelin, J., Asseid, B., Haji, T., Khamis, M., Klein, R., Mzee, A. and Sitari, T. (2009) Practical measures to tackle climate change: Coastal forest buffer zones and shoreline change in Zanzibar, Tanzania. *Turku University Department of Geography Publications B Nr 13*, Turku.
- Nielsen J. O., and Reenberg, A. (2009) Cultural Barriers to Climate Change Adaptation: A case Study from Northern Burkina Faso. *Global Environmental Change*, 20(1), 142-152.
- Quinn, G., and Philip, A. (2017), The Nature and Scope of State Parties' Obligations under the International Covenant on Economic, Social and Cultural Rights. *Economic, Social and Cultural Rights*, pg 74
- RGZ, (2008) Zanzibar human development report 2009: Towards pro-poor growth. The Zanzibar Revolutionary Government, Zanzibar, Tanzania.
- Sherrif, A. and Ferguson, E. (Eds.). (1991) *Zanzibar under Colonial Rule*. James Carrey, Oxford England.
- Sumich, J.L. (2002) Looking for the 'other': Tourism, Power, and Identity in Zanzibar. *Anthropology Southern Africa*, 25(1&2),