

Fachbereich 8: Sozialwissenschaften

**Reef fisheries and livelihoods in coastal villages of
southern Tanzania: Lessons for adaptation to
environmental change?**

Dissertation

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Robert Eliakim Katikiro

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Erster Gutachter: Prof. Dr. Michael Flitner
Zweiter Gutachter: PD. Dr. Hauke Reuter

Dedication

To my parents, especially my mother who left us in the middle of this work, and my father for supporting my studies over many years, and to my son Eleazar.

Abstract

The crucial importance of the reef fisheries to the livelihoods of communities associated with coastal areas in developing countries cannot be overemphasised. However, these important resources are increasingly threatened by destructive human activities and continued overexploitation. Therefore, understanding how the degradation of fisheries resources increases the vulnerability of the livelihoods of coastal households, and the coping strategies employed by them, is critical for planning sustainable livelihoods. This thesis looks at how households currently residing in coastal villages of the Mtwara district in southern Tanzania—an area with a history involving dynamite-fishing activities—sustain their livelihoods. In particular, it examines the existing livelihoods strategies, the ways these strategies are developed in response to changing socio-ecological conditions, and how livelihood trajectories of the households can be conceptualised and interpreted in that context. Further, through scenario planning, it examines whether current coping strategies predispose the community to adapt more easily to unprecedented threats of environmental change, more specifically the effects of climate change to their livelihoods. Drawing on perspectives of sustainable livelihoods, and the ideas of political ecology and scenario planning, the study examines the changing nature of livelihood strategies in coastal areas. By combining insights from political ecology and the thinking around sustainable livelihoods, it links a critical review of the degradation of natural resource discourse and policy with micro-level studies, and thus provides an enhanced understanding of the processes of human–environment interactions. The fieldwork was carried out in two phases: phase one from February to July 2012, and phase two from November 2012 to January 2013. A mixed-method approach, involving qualitative and quantitative methodology for data collection, was adopted. The main techniques for primary data collection were household survey, key informant interviews, participant observation, focus group discussions and life history interviews. A sample of 297 household heads and 46 key informants were interviewed, and 58 people participated in focus-group discussions. Secondary data were obtained through documentary review. Data were analysed both qualitatively and quantitatively. The findings demonstrate that the majority of study respondents are driven to the trajectory of livelihood diversification for subsistence where gradual improvements in the livelihoods are interspersed with more abrupt declines. It is clear that, despite significant constraints linked to destructive fishing activities, coastal households seem to retain a very high level of agency, which allows them to pursue their own, sometimes contested, economic and political objectives. Different social networks and local village groups appear to play a key role in facilitating this process, however, they offer less evidence in understanding the opportunities that households and individuals have to cope and transform their livelihoods. By presenting scenarios for the future of livelihoods, the thesis argues that although households constantly adjust their adaptive strategies to survive, their coping strategies in their current form are weak in terms of being able to transit to climate-resilient livelihoods. This situation calls for efforts that take more determined approaches towards sustainable livelihoods with particular focus on the role and viability of a natural-resource base to manage risk and build resilience in a changing social, environmental, institutional and political conditions. The results contribute to our understanding of how households negotiate livelihoods under conditions of rapid socio-environmental change and increased vulnerability.

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Acronyms

ASCLME	Agulhas and Somali Current Large Marine Ecosystems
BAFICO	Bagamoyo Fishing Company
BMU	Beach Management Unit
CBO	Community Based Organisation
DoF	Division of Fisheries
DWFN	Distance Water Fishing Nation
EEZ	Exclusive Economic Zone
ESRF	Economic and Social Research Foundation
FAO	Food and Agricultural Organisation of the United Nations
FETA	Fisheries Education and Training Authority
FGD	Focus Group Discussion
GDP	Gross Domestic Product
HHS	Household Survey
IPCC	Intergovernmental Panel on Climate Change
KII	Key Informant Interview
MBREMP	Mnazi Bay-Ruvuma Estuary Marine Park
MCS	Monitoring Control and Surveillance
MKUKUTA	<i>Mkakati wa Kukuza Uchumi na Kupunguza Umaskini</i> (National Strategy for Growth and Reduction of Poverty)
MLFD	Ministry of Livestock and Fisheries Development
MNRT	Ministry of Natural Resources and Tourism
MPA	Marine Protected Area
MPRU	Marine Parks and Reserves Unit
MtDC	Mtwara Development Corridor
NBS	National Bureau of Statistics
NGO	Non-Governmental Organisation
PE	Political Ecology
REA	Rural Energy Agency
REPOA	Policy Research for Development
RIPS	Rural Integrated Programme Support
SACCOS	Savings and Credit Cooperative Society
SES	Socio-ecological Systems
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
TAFICO	Tanzania Fishing Company
TAFIRI	Tanzania Fisheries Research Institute
TAFSIP	Tanzania Agriculture and Food Security
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
VEMC	Village Environment Management Committee
VICOBA	Village Community Banking
VLC	Village Liaison Committee
WIO	Western Indian Ocean
WMO	World Meteorological Organisation

Chapter 1 Introduction

1.1 Context of the study

Humans are an integral component of the ecosystems in which they live and on which they depend (Wilson, 2002). During the past five decades, humans have changed these ecosystems more swiftly and comprehensively than in any other comparable human period, largely to meet the requirements for food, water and raw materials of a growing population (MEA, 2005). Sala and Knowlton (2006:101–105) emphasize that humans are significantly changing the diversity of life on the earth, and most of these changes represent a loss of biodiversity which is crucial to our continued well-being and survival. Although there is also evidence of significant benefits of these changes on economic development and well-being for some people (e.g. Barbier, 2007), as a result others and the environment have suffered (Hughes et al., 2003). More generally, human-induced or natural change alters the functioning of ecosystems (Halpern et al., 2008; Nias, 2013).

All humans face new challenges of adapting their survival to the inevitable effects of environmental change and changes to the provision of ecosystem services (Bryan et al., 2013:31–32; Coultard, 2008:480; Koerth et al., 2013:44). It is worth to mention that adaptation to environmental changes is not a new thing. Scientific evidences indicate that throughout history, human societies have repeatedly adapted to environmental changes including different climates (Parry et al. 2007). This involved among others migrating to new areas, changing crops, building different types of shelter, relying on indigenous knowledge systems, and selective keeping of livestock (Nyong et al., 2007:792–793).

However, in an increasingly interdependent world, adaptation responses of certain communities or group of people are known to have negative effects around the world. For example, over the last few decades a growing world population has increasingly settled in coastal areas, a trend that is expected to continue in the future (Small and Nicholls, 2003:591–594). The Millennium Ecosystem Assessment report (MEA, 2005) clearly indicated that this global trend has caused increasing anthropogenic activities in coastal areas—adding pressure to ecosystem services (e.g. Mora, 2008:768–770; Mumby et al., 2007:100; Waycott et al., 2009:12378). Coastal areas and small islands cover only 4% of the earth's total land area, but host more than one third of the world's population

(Barbier, 2013:213). Such a high dependence of people on coastal ecosystems has contributed to their degradation and overexploitation at a much faster rate than other terrestrial ecosystems (Jackson et al., 2001). Therefore, the issue of coastal ecosystem services and their related livelihoods is a particularly pertinent subject, and fisheries in particular are impacted by human activities (Barbier, 2012).

A review of the patterns of population growth in coastal areas and historical patterns of increases in per capital consumption of fish shows that annual growth in fish demand has skyrocketed, which is an indication that wild marine stocks presently exploited by fishers cannot support the demand of fish for food, fish meal and oil production (Merino et al., 2012). Recent extrapolations of demographics predict that population of coastal communities especially in coastal megacities will soon increase even further (Sekovski et al., 2012:50–51). This will have serious negative implications on the services provided by coastal ecosystems, especially coral reefs which despite supporting diverse species of fish, are reported to be the most endangered marine ecosystem on earth (Bellwood et al., 2004; Hughes et al., 2003, 2010; Wilkinson, 2004). There is growing scientific evidence suggesting that human activities continue to be the primary cause of the global coral reef crisis (Veron et al., 2009).

Parallel to the increased degradation of environments, coastal socio-ecological systems (SES)—the interactions between people, institutions, seascapes and landscapes—are adjusting to these changes (Smit and Wandel, 2006). In certain cases people and institutions may be able to cope with these changes, whereas in other cases the effects may be devastating. The term ‘adjustment’ refers to both short-term (coping strategies) and long-term responses (adapting strategies) (Adger et al. 2007). These ‘changes’ refer to any kind of economic, social, political, cultural and environmental perturbation creating stress, shocks and/or crises in the coastal socio-ecological systems under investigation.

Socio-ecological systems are systems in which people are integrated within their environment (Berkes et al., 2000). For the purpose of this thesis, the definition of SES is adopted from Glaser et al. (2012:199) who state that: “[is] a bio-geophysical system with its associated social agents and institutions in a problem context.” Social-ecological

systems recognizes the complex interconnectedness and interdependence between the dynamics of natural system and processes and human societies and activities; linkages that are nested across spatial-temporal scale (Folke, 2006). It is worth to mention that in this study, the SES of interest is the coral reef fisheries of Mtwara rural district, Tanzania.

From ecological resilience perspective (see e.g. Adger et al., 2005; Folke, 2006; Walker et al., 2004; Walker and Salt, 2006), coral reefs are recognized as more dynamic and complex ecosystems than previously thought (Folke et al., 2004; Nyström et al., 2008) and that they are becoming increasingly vulnerable to changes by losing their resilience (Hughes et al., 2007, 2010). Studies have shown that changes happening could make coral reefs to shift to undesirable alternative ecosystem regimes such as from coral to macro algal dominated states, or to rubbles, amongst others (Norström et al., 2009:297–300; Nyström et al., 2008:797–799). As a result, important ecosystem services provided by coral reefs such as fisheries could be eroded, hence compromising livelihoods of people dependent on reef fisheries (Cinner et al., 2012:16).

People dependent on goods and services provided by coral reefs may need to adapt their resource-use patterns to maintain the flow of goods and services (Cinner et al., 2013:1). Because of this, widespread and faster action and greater institutional capacity to cope with changes in coral reef fisheries is urgently required to enable and support policies and programmes aimed at environmental, ecological and socio-economic sustainability. Furthermore, from the vulnerability, adaptation and resilience perspective, lessons learnt from local adaptive responses on coastal livelihoods based on reef fisheries can be ‘up-scaled’ to wider spatial scales and risks, including those induced by climate change which generally affects the same people that are affected by livelihood change. Unfortunately, there is little scientific and data-based framework to report the link between ecosystem services, specifically provisioning services, and associated livelihoods in many areas of the developing world.

In this introductory chapter, firstly a brief general picture of the coastal and marine environment in Tanzania, the location of the study, is presented. The problem, purpose and significance of the research are then introduced. Finally, the research setting is outlined and the structure of the thesis is succinctly described.

1.2 Background on the coastal environment in Tanzania

1.2.1 Overview of the coast

The coastline of mainland Tanzania forms part of the Western Indian Ocean (WIO), with a coastal zone of approximately 30,000 km². It runs approximately in a north-south direction and is over 800 km in length (Shao et al., 2003:11). The coastal topography is unfavourable to fisheries due to its narrow continental shelf (8–10 km wide), but the width extends to 40 km around the islands of Mafia and Zanzibar (Francis et al., 2002:1). The total area of the continental shelf is estimated to be 17,900 km² (ASCLME, 2012:21). The territorial sea has an area of 64,000 km² and the total area of Tanzania's Exclusive Economic Zone (EEZ) is approximately 223,000 km² (Sobo, 2012:1).

The coastal and marine environments in Tanzania include rivers, estuaries, mangrove forests, sandy beaches, seagrass beds, coral reefs, cliffs and muddy tidal flats (UNEP, 2001:18); these support various types of fisheries, which play an important role in both national revenue and coastal livelihoods (Elst et al., 2005:264). These fisheries range from traditional inshore fisheries in shallow waters protected by reefs to small-scale artisanal fisheries (Jiddawi and Öhman, 2002; Muhando and Rumisha, 2008). Generally, the most ecologically and economically important coastal ecosystems include coral reefs, mangroves and seagrass beds (ASCLME, 2012:23–26).

Under the current administrative set-up, there are five regions (*mikoa*) situated along the mainland coast of Tanzania: Tanga, Pwani (Coast), Dar es salaam, Lindi and Mtwara. These regions extend from 4°49' S at the border with Kenya to 10°28' S at the border with Mozambique. They occupy nearly 15% of the total area of Tanzania (ASCLME, 2012:42). By the end of 2012, there were sixteen coastal districts within these regions. A rapid population increase in coastal regions has been documented since at least 1967 (Masalu, 2000). For instance, the total population in coastal regions was less than three million in 1967, but increased significantly reaching more than 13 million by 2012 (NBS, 2013). Most rural coastal communities are very poor, with a GDP of less than US\$ 100 (at the current price in 2011). Rates of illiteracy, low schooling and low health status are relatively high compared to other regions of the country (MEPL, 2012).

1.2.2 Coral reefs

Coral reefs are extensive in Tanzania and raised coral platforms are common along the Tanzanian shoreline, often with lagoons, creeks and offshore islands (UNEP, 2001:34). Spalding et al. (2001) report that much of the coast of mainland Tanzania and offshore islands is occupied by fringing and patch reef systems, often close to the shoreline. The coral reefs cover a total area of approximately 3500 km², which is the largest area covered by coral reefs in Eastern Africa (ASCLME, 2012:21). A report by TCMP (2001:11) asserted that about two thirds of Tanzania's continental shelf is covered by coral reefs.

The reefs are subjected to the Eastern African Coastal Current (EACC), which flows north along the coast of Tanzania and Kenya (ASCLME, 2012:15). According to Garpe and Öhman (2003:192), these currents are locally modified by prevailing monsoon and tidal patterns causing a complex and multidirectional current system. Tanzanian reefs are influenced by mixed semi-diurnal tides with mean spring amplitude of 3.5 m and mean neap tide of about 2.5 m (UNEP, 2001:19). From November to March, the northeast monsoon (*kaskazi*) blows with moderate force whereas the stronger southeast monsoon (*kusi*) prevails from May to October. Access to outer reef and potential offshore fishing grounds is very limited during the period of the *kusi* (ASCLME, 2012:7). The months of March/April and October/November are the inter-monsoon (*matlai*) periods and usually are the calmest (UNEP, 2001:9–10; UNESCO-IOC, 2009:144).

The coral reefs of Tanzania provide habitat for populations of over 500 species of commercially important fish and invertebrates (ASCLME, 2012:23; Muhando and Rumisha, 2008:20; Wagner, 2004:227–228). The local economic benefits of coral reefs cannot be overemphasized. Government reports and various studies on fisheries estimate that over 90% of artisanal fishing activities, which in 2012 employed about 50,000 full time artisanal fishers, is carried out in or around reef areas (ASCLME, 2012:23). More specifically, the largest component of the total fish production by artisanal fisheries in Tanzania is supported by coral reefs (Jacquet et al., 2010).

Although precise data on people dependent on reef fisheries is not available, information from fisheries frame surveys and field experience clearly suggests that coral reefs support major artisanal fisheries and tourism industries, potentially providing a food source and

livelihoods for tens of thousands of coastal people in Tanzania (ASCLME, 2012:47). Additionally, overlying fish communities in coral reefs of Tanzania form an important resource base for the development of pelagic fisheries (Sobo, 2012:7). On the other hand, most small-scale artisanal fishers in Tanzania are also active outside the reefs, particularly around near shore rocky bottoms, submerged reefs, ridges and troughs (Jiddawi and Öhman, 2002:519). A recent report by Cochrane and Japp (2012:40) suggested that there is frequently heavy fishing pressure on the demersal species in these fishing grounds, particularly to the west of Pemba, Unguja and Mafia and just outside the reefs along the entire coast.

Despite their high economic, social, ecological, educational and cultural value, coral reefs in Tanzania are increasingly under various threats (Muthiga et al., 2008). A number of studies have highlighted that most pressures facing coral reefs in Tanzania emanate from a complex combination of anthropogenic forces and natural stressors (Horrill et al., 2000; Lindahl et al., 2001; Mbije et al., 2010; Nzali et al., 1998). There have also been reports of a reduction, if not complete halt, of human-induced threats, especially destructive fishing practices and extraction of live coral in some Marine Protected Areas (MPAs) and managed areas (Samoilys and Kayange, 2008; Sesabo, 2007; Wells et al., 2010). However, destructive practices still persist in most areas where management and enforcement are virtually absent, especially dynamiting, beach seining and the use of poison and spears (Silva, 2006; Wells, 2009). Additionally, other human activities such as gleaning and shell collecting in the intertidal areas, which often result in trampling on corals and other fragile intertidal organisms (Newton et al., 1993), is still a problem that degrades coral reefs in Tanzania (Masalu, 2009:8).

1.2.3 Human-induced destructive practices on coral reefs in Tanzania

Well (2009) reports emphatically that destructive fishing activities in inshore reef fisheries, especially dynamiting that was rare for a few years between 1997 and 2003, has returned with increasing vengeance. This has apparently resulted into negative fish catch trend:

Explosives are sourced from quarries and enterprises involved in mining, demolition, and road construction, but are also increasingly made from ammonium fertilizers and diesel. More sophisticated bombs, reportedly

sourced from the army, are also used. In 2006, dynamite for a single blast cost Tsh 6000–7000 (US\$ 5–6) and could lead to a catch of 150–400 kg of fish. With fish prices of Tsh 3000–4000 (US\$ 2–3)/kg, dynamiters may be making Tsh 500,000–2,000,000 (US\$ 400–1800) per blast. A group of fishermen can undertake ten blasts a day, and so this form of fishing has become a lucrative business (Wells, 2009:21).

More specifically, in southern coastal areas of Tanzania there is a long history of destructive fishing activities such as the use of dynamite¹ blasts, small size fishing nets and extraction of live coral to burn and produce *chokaa* (white lime) (Guard and Masaiganah, 1997:760). Besides that, in many coastal areas of Tanzania, including areas in Mtwara rural district, it is believed that these practices have reached unsustainable levels and are considered to be one of the main contributors to reef (and mangrove) degradation (Darwall and Guard, 2000).

Dulvy et al. (1995) even point out that some reefs have been completely removed, either inadvertently or by intentional activity such as *chokaa* production. Additionally, numerous studies have documented the enormous increase in pressure on the reefs in populous areas (Mbije et al., 2013; Wagner, 2004). More generally, studies of degraded reef systems have reveal that destructive fishing activities, such as the use of dynamite, can directly and indirectly affect the presence of fish species in and around reefs (Fox et al., 2003; Fox and Caldwell, 2006).

Based on field experience and enquires in Mtwara district, it is apparent that knowledge and understanding of coral reefs, their natural functions and threats is either misinformed or lacking. For instance, all of the groups interviewed by Guard (2004:21) referred to the live coral collected (for lime) simply as '*jiwe*' (rock); no individuals used the word '*matumbawe*', which is the literal Swahili translation for coral. It is unclear if there is a Makonde (the main ethnic group in Mtwara district) word for coral, which could also explain why the 'living' nature of coral is not embedded in the culture. Additionally,

¹ Fishers construct bombs by using a glass bottle with layers of artificial fertiliser such as powdered potassium nitrate and pebbles or an ammonium nitrate and kerosene mixture, lighting it with a small fuse and tossing it overboard. The underwater shock waves produced by the explosion stun the fish, rupturing their swim bladders and causing some fish to float to the surface, being scooped up by waiting nets. Many others simply sink to the ocean floor. The damage to the coral reef structures is devastating and in many cases permanent (Samoilys and Kayange, 2008:11).

interviewees believed the main areas from which coral boulders are collected are not part of the coral reef system, and thus they do not damage coral reefs, but are instead an area of natural rock boulders called the *'fulungu'* (Guard, 2004:21–22).

Among natural resources officials in Mtwara district, with the exception of marine biologists, there is no consensus on the main cause of reef degradation (Author, Personal observation). Some associate degradation of reefs with agriculture malpractices while others directly link it to anthropogenic destructive fishing activities, and natural dynamic processes, especially coral bleaching and the population growth of crown-of-thorn starfish² (*Acanthaster planci*). A paradox exists in the views of local officials; whilst they maintain that most of the marine ecosystems are 'healthy' (e.g. reefs in inaccessible areas; although it could be argued that all reefs are now accessible), there is also concern over the rapid deterioration of some of the more 'accessible' areas of reef, mangroves and seagrasses. This official discourse is often misleading and is likely guided by a less precise understanding of the degradation problem without consideration of the poor success of several management initiatives in the most accessible ecosystems.

Whichever point of view prevails, rapid degradation of the reef system has continued along the Tanzania's coast because of increasingly enormous pressure and threats from human activities (Wagner, 2004:230; Muhando and Rumisha, 2008:21). Coastal communities' dependence on natural resources for livelihood is a challenge that has not well addressed since the 1960s. Both fisheries and agriculture suffer from a decline in productivity and profitability due to interconnected problems including climate change. Villagers are eventually put at risk for even greater poverty and food insecurity in the near and long term.

While the continuation of destructive fishing practices is often justified by a desire for a lucrative short term profit, a more balanced cost-benefit analysis highlights the need to halt the ongoing destruction of reefs (Well, 2009). The root causes such as growing human population and lack of alternatives underlying the direct human threats to marine resources, as explained by Norse (1993), are yet to be causes of concern for the

² It is a coral predator which cause great damage to coral reefs when in outbreak condition (Muhando and Lanshammar, 2008)

Tanzanian government. Failure to address these causes has simply delayed the management and mitigation of marine fisheries destruction (Francis et al., 2001). Additionally, the important issue of climate change and its associated effects on coral reefs has not been taken into account by the government in terms of ensuring long-term sustainability in future fisheries policies.

1.3 Research problem

Human-induced degradation of coral reefs, which alters and disrupts the functioning of reef fisheries, is a continuing problem in Tanzania, specifically in coastal villages of Mtwara district (Guard and Masaiganah, 1997). A successful halt of dynamite fishing in Mtwara district was witnessed only when the navy was enlisted to assist with enforcement during the nation-wide campaign known as operation ‘*pono*’; this was a joint operation between the navy, police, fisheries officials and local community members in the mid of 1997. The operation aimed at cracking down dynamite fishing along the entire coast from Tanga to Mtwara.

Despite various initiatives by local stakeholders and government to ban and halt degradation of reef fisheries in coastal areas including Mtwara rural district, in recent years it has continued, and in some villages intensified, due to the combination of poor enforcement, lack of alternative livelihood sources and the need for increased cash requirement to satisfy the day to day survival, and the fact that communities view the sea as their only source of life gifted by *Allah* (the Almighty God) (Samoilys and Kayange, 2008: 13–15; Wells, 2009).

The considerably high number of reported and unreported incidences of dynamite fishing and fishers caught while fishing using dynamite in Mtwara rural district (Author, Personal observation), suggests that significantly more reefs are being destroyed in a limited area. For example, over two-thirds of the cases related to enforcement of fisheries and marine environment brought to courts in Mtwara district from 2008 to 2011 were related to dynamite fishing (Monitoring Control and Surveillance³, 2012). In fact, a monitoring and research report by MBREMP in 2011 estimated that around 8% of the fish catch value

³ Unpublished document for raising awareness among law enforcers in Mtwara district on destructive fishing activities

from the protected area is thought to arise from illegal gear including dynamite. This trend also suggests that degradation of reefs has persisted at a high enough rate to cause a decline in the productivity and catches of artisanal fisheries. The indiscriminate catch of fish of varying size and species while the remaining reefs are reduced to rubble by dynamiting (Fox et al. 2003) suggests a negative impact on the livelihoods: income, food security and social status of fishing households.

While the devastating effects of dynamite fishing in Tanzania are increasingly well-documented (Muhando and Rumisha, 2008; Samoilys and Kayange, 2008; Guard and Masaiganah, 1997; Muhando and Rumisha, 2008; ASCLME, 2012), there is still a substantial lack of knowledge concerning the impacts on local livelihoods and how these changes could adversely affect those livelihoods at the household level. Degradation of reefs will result in loss of ecosystem services and its effect on ecological dynamics, reef dependent organisms and ultimately on local households (Muthiga et al. 2008). In addition to the short-term health effects and the burden of anxiety created by food shortages, these conditions perpetuate poverty and reduce opportunities and adaptive capacity for those affected, generally the poorest (Lars and Johannson, 1998).

For many coastal communities, attempts to transform their livelihoods (which have historically been viewed through a fishing lens) have so far yielded only modest results. As a result, often only several livelihood strategies are used at the same time. The uses of destructive methods for harvesting natural resources including fisheries often come along with this. Similarly, the implications of such intensive degradation are likely to increase as communities cope through responses that exacerbate the fragility of the system as they see their main source of nutrition and income disappear. Consequently, this may restrict the chances of poor households improving their livelihoods and increase vulnerability to stress and shock, for example impacts of climate change and market failures.

Although a considerable number of studies have dealt with coastal livelihoods and coping strategies in Tanzania (e.g. Cinner et al. 2009; 2012; Slatter et al. 2013; Torell et al. 2012), more information concerning the responses to a reduction in ecosystem services, such as the case of degraded reefs, including micro analysis at a household level is

required. Such information is relevant for developing appropriately informed governance of fisheries and for maximizing benefits from common pool resources.

1.4 Research objectives and questions

The main objective of this study was to explore how households are able to sustain their livelihoods in increasingly changing socio-ecological conditions. Specific objectives were to:

1. Assess how the perceived ecological status of reef fisheries and related processes of change have influenced existing livelihood strategies;
2. Examine in what ways households prone to recurrent destructive fishing activities have adapted over time to enhance their livelihood strategies;
3. Explore and explain the livelihood trajectories taken by households since the 1970s; and,
4. Develop scenario storylines for the future of livelihoods in the Mtwara district and use these to identify key issues and possible intervention towards enhancing sustainable livelihoods.

The study was based on the assumption that since the late 1980s, and on both abrupt and sporadic occasions, processes of change in reef fisheries aggravated by destructive fishing activities have, cumulatively fostered livelihood change among households in coastal villages of Mtwara rural district. Another assumption of the study is that unequal use of fisheries in coastal communities has increasingly lead to constant struggle for livelihood where some households adopt destructive methods to maximise returns from dwindling resource base. This has eventually resulted into emerging risks and vulnerabilities, which could further derail coping mechanism and achievement of sustainable development.

This too reflects the general tendency of some households to utilise knowledge capacity from past stressing events on their livelihoods (e.g. drought coping mechanisms) and extend their social networks to access certain resources such as financial support or job opportunities. Several studies (Allison et al., 2009; Badjeck, Allison, et al., 2010; Brander, 2010; McIlgorm et al., 2010; Quentin Grafton, 2010) have suggested that environmental change such as global climate change are likely have severe negative impacts on fisheries, and consequently food security, in developing countries. Appropriate responses at different levels and scales are needed; but in many areas already

experiencing livelihood instability there is insufficient capacity to facilitate the processes of adaptation.

This study was structured by asking the following research questions:

1. How are household livelihood strategies influenced by rampant degradation of reef fisheries?
2. How do coastal households adjust their livelihood strategies in response to livelihood stresses?
3. How can the livelihood trajectories of contemporary households in coastal villages of the Mtwara district be conceptualized and interpreted?
4. What lessons can be drawn from households' experiences to achieve livelihood security under changing socio-economic and environmental conditions?

These objectives and questions are addressed according to the methodological framework discussed in chapter four. Overall, this study explores phenomena in a natural setting; it is inductive in nature (Glaser, 1978), and therefore no hypotheses were tested. It is consistent with the grounded theory methodology (Strauss and Corbin, 1998).

1.5 Significance of the study

Livelihoods in coastal villages of Mtwara rural district are intertwined in fisheries and small-scale crop farming, thus they are inherently exposed to many uncertainties and risks. For example, the frequency and intensity of fishing activities is reduced by most fishers during the *kusi* period because of strong winds and rough seas, whereas some fishers respond to the scarcity of fish by using destructive practices that have long-term impacts on ecosystems and livelihoods (Payet and Obura, 2004; Samoily, 2011). Accordingly, as in other coastal areas (Clark, 2006), fishing households deploy different livelihood strategies to respond to these uncertainties. This is of particular concern in terms of food security and livelihood stability of the households, especially the poorest.

This thesis provides a case study to support a micro analysis that would enable households to understand the potential impacts of their particular actions, thought to be suitable livelihood strategies, and to understand the benefits of intervention strategies. The researcher rigorously performed this by combining perceptions of households that

incorporate their socio-cultural beliefs and knowledge of their environment. Such a combination may be useful for both marine ecologists and fisheries managers in the development of tools to accurately assess the status and vulnerability of fisheries resources to human-induced activities as well as their sustainable exploitation levels, even for unforeseen impacts of environmental change such as those caused by effects of climate change. Thus, there is potential for such an assessment to contribute to the empirical and theoretical understanding of the response of Mtwara's coastal households to the degradation of reef fisheries. This could act as a global representation of mechanisms followed by households dependent on fisheries under similar circumstances.

Insights into different livelihood transitions and pathways, especially those exhibited and employed by households within the study site, make participatory planning possible for sustainable livelihood activities that incorporate the way individuals themselves view their livelihood constraints and opportunities. A better understanding of livelihood trajectories of households in the study site can also shed light on the adaptive capacity of coastal communities. Additionally, it could contribute to the understanding of the influence of various threshold factors such as initial asset endowments, skills, and reforms in government policies on the improvement or impoverishment of household livelihoods in coastal villages of Tanzania. Furthermore, the trajectories expound how these threshold factors influence decision making processes of individuals and households and by extension government and NGOs in negotiating livelihood in space and time.

In the scholarly realm, this study contributes new perspectives to the sustainable livelihoods debate by focusing on resilience building in an integrated perspective of society and nature at a local level. The practical outputs of this study are expected to be of use in programmes for human prosperity and sustainable utilisation of natural resources, particularly in the fisheries sector where approaches to protect resources from degradation have often failed due to disregard for the livelihoods of small-scale artisanal fishers and the wider economy (Allison and Ellis, 2001; Allison and Horemans, 2006; Béné, 2003).

1.6 The research setting

Mtwara rural district, situated in Mtwara region⁴ in southeast Tanzania, is the focus of this thesis and provides a particularly interesting context to explore the specific implications that occur when households dependent on fisheries negotiate their livelihoods under rapidly changing socio-economic, cultural, political and environmental conditions. Mtwara rural and southeast⁵ areas of Tanzania, commonly referred to as ‘southern (*kusini*) Tanzania’, are historically known for their extended physical, economic and cultural isolation (Liebenow, 1971; Wembah-Rashid, 1998). More specifically, until recently the ‘southern’ regions of Tanzania were widely viewed as remote and underdeveloped. However, from December 2012, southern regions of Tanzania, Mtwara in particular, came into the local and international media spotlight when residents protested to oppose government plans to lay a natural gas pipeline from Mtwara to Dar es Salaam.

Koponen (1998:309) highlighted that southern⁶ Tanzania, especially Mtwara region and its rural parts may be a peripheral place which is not well-known in the rest of world. Conversely, when giving a summary of the report by the Mtwara Reconnaissance Project conducted from April–August 2005 to gather field data and indigenous knowledge about the biodiversity of coastal forests in the area, Giulia Wegner provides a different picture about Mtwara:

⁴ The total area of this region is 16,740 km². Out of this body mass, three quarters is unutilized arable land with low fertility. The fertile area around the Ruvuma River forms 5% of the total land area. In general, the basic facts about this region are provided by Koda (1998: 202–205). Administratively, the number of districts in Mtwara region has increased from four (Mtwara, Newala, Masasi and Tandahimba) in 1995 to six in 2012. The other district is Nanyumbu created in 2007. Mtwara district is usually divided into two separate local government administrative entities: Mtwara municipal and Mtwara district council. This therefore, makes the district to be regarded as an entity formed by two districts.

⁵ Southeastern Tanzania covers Mtwara and Lindi administrative regions. The regions are inhabited by the *Makonde*, *Makua*, *Matabwe*, *Matumbi*, *Mwera*, *Yao*, and *Ngindo* tribes among others. Historically, the majority of the ethnic groups (tribes) in these regions were matrilineal — all individuals were affiliated to the descent units following their mother’s line even in relation to the household composition, domestic authority, inheritance of property, residence, and succession to political positions. Increasingly however, several historical forces such as contacts with development agents (e.g. Muslim and Christian missionaries) who emphasized patrilineal social orientation; introduction of new cultural practices by both German and British colonial administrations; as well as the favour of patrilineal social system by the post-independence government policies caused a transformation from matrilineal to patrilineal (Wembah-Rashid, 1998: 43–44).

⁶ After the introduction chapter, the term southern Tanzania will exclusively be used to refer to Mtwara rural district

The Mtwara Region ... is renowned to business men as an export channel for cashews and sisal, to divers for the presence of the Mnazi Bay-Ruvuma Estuary Marine Park, to Hemingway's fans⁷ as the place where Latham Leslie-Moore conducted his eccentric life, and to art collectors for being home to the Makonde carvers. Few people know that the Mtwara region is also where the most southern of the Tanzanian Coastal Forests are found (Wegner⁸).

Similarly, history shows that as far as the 11th century, Arab traders were already engaged in trade with many coastal cities of East Africa including Mikindani (old town in Mtwara) in southern coastal Tanzania (Pawlowicz, 2012:489). For example, records of ivory export and import of iron goods through Mikindani-Mtwara are comprehensively presented in literature (see e.g. LaViolette, 2008; Middleton, 2004; Pawlowicz, 2012). It is also well known that apart from early contact with the Arab traders, colonialism exposed these areas to German and later British colonial masters. They established plantations and introduced new crops to farmers (Koponen, 1988), but there are no records on similar treatment to fisheries. Indeed, Koponen (1988) asserts that apart from a doomed groundnut scheme, Makonde water development schemes, and few sisal estates, very little⁹ was done to develop southern areas of Tanzania.

Despite the fact that the extended 'isolation' has left the population of 'southern' Tanzania far behind the rest of the country in terms of most indicators of development and quality of life (e.g. social services and road networks), it has also provided an environment in which local cultural practices such as *unyago* and *jando* (adolescent initiation rituals), largely abandoned in other regions of Tanzania, continue to thrive (Halley, 2012:18). It is perhaps through this isolation that, until recently, communities in

⁷ In his book entitled "No man's land: The last of White Africa", Hemingway (1983:4–16) begins with the story of Latham Leslie-Moore, an elderly Englishman, who after more than 40 years in Africa, bought an island of 640 acres off the coast of Tanganyika (now Tanzania) and declared it a 'sultanate', maintaining that he had seceded from the mainland. This area (M'Simbati) he purported to be his 'sultanate' is now in Msimbati village, which form part of the study site.

⁸ <http://cepf.tfcg.org/downloads/Frontier%20Tanzania%20Mtwara%20news%20FINAL.pdf> [Accessed 22.03.2013]

⁹ In his explanations on why the colonialists did very little to develop the southeast, Wembah-Rashid (1988:47) argued that this was a strategy that came as a result of the stiff local resistance to colonial occupation demonstrated through the Maji Maji rebellion of 1905–1907. He further argued that, developing southern Tanzania was seen as 'dangerous' to German rule as it would have allowed the people in the area to organize themselves into effective. Like the Germans, the British took over the German policies with regards to the southern Tanzania.

southern Tanzania have been lagging behind in the overall economic development of Tanzania.

Conversely, this isolation has not protected the natural resources in these areas from overexploitation and degradation. For example, large-scale logging of East African Blackwood (*Dalbergia melanoxylon*; or *mpingo* in Swahili) is thought to have commenced in the early 20th century and continued under British rule after World War II. This species supplies western and local demand for musical instruments and is used to make *vinyago* (Makonde tribal carvings). It has been recorded as rare due to extensive exploitation, and Mtwara was cited amongst the areas under major *mpingo* harvesting pressure (Opulukwa et al., 2002:2). Further, a study on biodiversity of coastal forests in Mtwara reveals a high level of forests disturbance and relatively low biodiversity and endemism values in these forests (Wegner et al., 2009).

Similarly, there are reports of illegal logging and fires in coastal forests, including those of Mtwara, thereby threatening avian biodiversity contained in these areas (see e.g. Burgess and Clarke, 2000; Kaale, 2004; Mugo, 2006). More generally, the wide extent of illegal activities and governance shortfalls within various sectors of natural resources in southern Tanzania have affected communities in these areas, jeopardizing livelihoods of future generations and posing long-lasting negative threats to ecosystem services (Milledge et al., 2007:22).

Importantly, while the Tanzanian government has long neglected southeast regions of the country, so too have scholars and researchers. Since the 1960s, a significant number of studies have been conducted along the wider Swahili¹⁰ coast of East Africa (see e.g. Pollard, 2008; Shepherd, 1982; Wilson, 1982). However, thus far the majority have traditionally focused on archaeological research on stone towns (e.g. Chittick, 1984, 1974). In the recent past, several studies (e.g. Pawlowicz, 2012; Pollard, 2008) explain

¹⁰ Chami (1998) in his review work of Swahili archeology provides an overview of the dimension of the Swahili territory and the identity of Swahili people. The history of Swahili coast and its people is however, not the scope of this study. Important, is to highlight that the Swahili people, who are generalized as coastal dwellers, often in stone towns or country towns, and who have lived there for a long time (Caplain, 2009) were involved in transoceanic trade from the early centuries AD and contributed to the prosperity of the coastal communities of East Africa as evidenced by coastal monuments (Middleton, 2004). For the reasons that will not be explained in this thesis, the major ethnic group in the study site (*Wamakonde*) is generally viewed as not completely Swahili. To avoid ambiguity of terms, Swahili coast in this thesis will be referred to as East African coast and the southeast coast of Tanzania will be used exclusively for Mtwara coast.

that the emphasis of more recent archaeological work has extended the geographical coverage into the rural hinterland with Tanzanian located studies. Even with such extension, most scholars discuss much on sea-based activities in the context of seafaring compared to the exploitation of natural resources particular to the sea surrounding these areas.

Despite a plethora of recent research and archaeological records and sites of coastal Tanzania (e.g. Fleisher, 2010; Fleisher and Wynne-Jones, 2011; Jeffery and Parthesius, 2013; Killick, 2009; Pawlowicz, 2009), environmental research on the coastal society, specifically for Mtwara, is limited. This has resulted in a lack of empirical research documenting the interaction between humans and nature. However, the Finnish project called Rural Integrated Programme Support (RIPS) produced short reports and research on land tenure, population structure and natural resources (Seppälä and Koda, 1998). Furthermore, numerous but restricted physical, biological and resource-use surveys were carried out in the 1990s by The Society for Environmental Exploration (Frontier Tanzania) prior to the establishment of the MBREMP in 2000. Besides these, biophysical and socio-economic surveys were commissioned by MBREMP between 2003 and 2005 for development of its knowledge base (Tortell and Ngatunga, 2007).

Tanzania Petroleum Development Corporation (TPDC) — a national oil company and has a monopoly in terms of petroleum exploration and development in Tanzania—has been engaging in petroleum prospecting operations in Mtwara. This entails assessment of the environmental and social impacts of exploitation of natural gas and oil (ESRF, 2009:64). Additionally, REPOA and Chronic Hunger Research based at Manchester University investigated poverty alleviation, albeit with less focus on the direct link to natural resources, especially coastal and marine ecosystems. When compared with other coastal districts such as Mafia Island, Bagamoyo and Tanga, only a few scholarly works analysing the aspects of environment and socio-cultural are found, and so far, no large authoritative account could be given. For example, the work of the anthropologist Christine Walley on socio-cultural and environmental conservation in Mafia Island have highlighted dynamics between government, NGOs and local communities, and provided extensive socio-economic information (Walley, 2004). There is a wide information gap on such information in Mtwara district.

1.6.1 Study area

Mtwara rural district (Fig 1.1) is one of the six districts of Mtwara region. It is located in the southernmost part of Tanzania and lies between longitudes 39° 0' and 40° 27' east of Greenwich. It is also situated between latitudes 10° 0' and 10° 07' south of the Equator (Mtwara District Council, 2012:1). The district has an area of 3,579 km² of which 72% is arable. The district is bounded administratively to the west by Tandahimba district, to the north by Lindi region, and on the east separated by Indian Ocean. The Mtwara coastline stretches from the Ruvuma River in the south to the Lindi region border, a distance of about 125 km. For government administrative¹¹ purposes, the district is divided into 6 divisions (*tarafa*), 28 wards (*kata*), 157 villages (*vijiji*) and 638 hamlets (*vitongoji*).

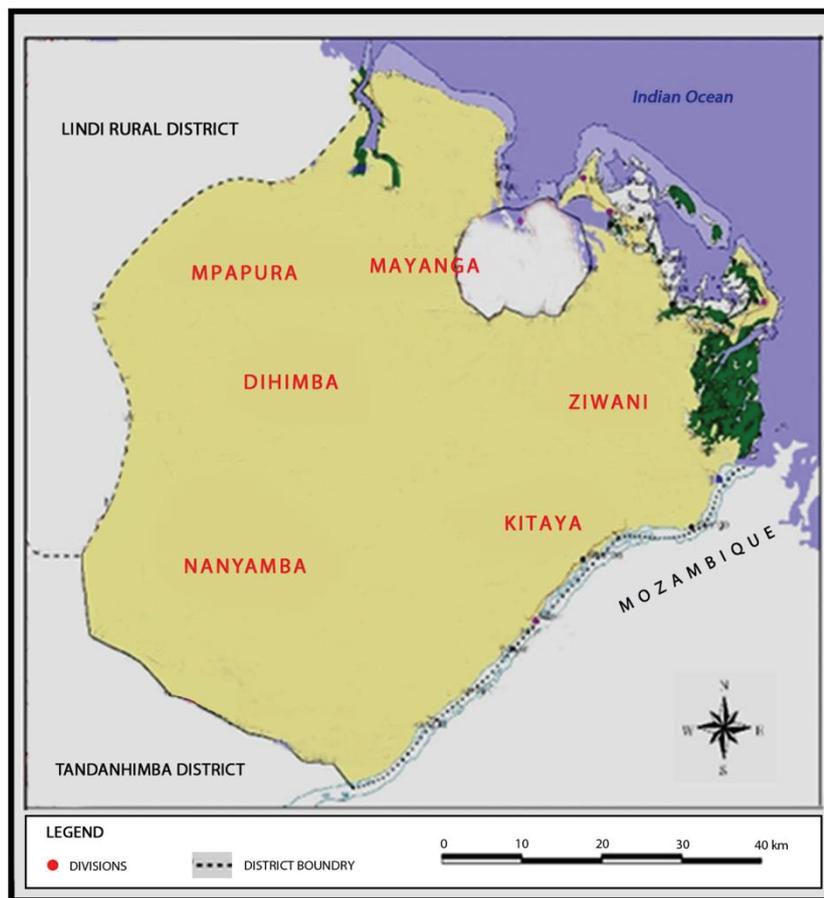


Figure 1.1 Map of Mtwara rural district (Source: Reproduced from Mtwara District Council profile map of 2012)

¹¹ Local government administrative units from the smallest include village, ward, division, district and region. The *kitongoji* (hamlet) is not a local government authority but is a part of a village.

The 2012 national census shows that the total population of the district is 228,003 of which over 75% is engaged in subsistence agriculture, although in coastal villages fishing is the main economic activity (Rwenyagira et al., 2014). Overall, the report on the District Council Socio-Economic Profile released in 2012 indicated that a big portion of population of the district is poor. Over 80% of the households have main houses built using thatches (*makuti*) as main roofing material, while only 15% used iron sheets (*mabati*). Besides, over 90% of all households had poles and mud as wall material for their main houses. Other social services such as toilets facilities, clean and safe drinking water and schools are also poor. Only 2% of the district population has access to electricity; this, however, could rise, given the ambitious project of rural electrification whereby the government, through the Rural Energy Agency (REA), has increased subsidies for electric power installation for villages in Mtwara rural district. This programme started in 2012, especially in villages near the proposed gas pipeline from gas wells in Mnazi Bay (Msimbati village) to Dar es Salaam.

This district is an important area in which to conduct research related to fisheries supported livelihoods, considering that the majority of households in coastal villages still rely heavily on subsistence farming and fishing to meet their basic energy needs. As is typical in other coastal areas in Tanzania, many households in the study area use destructive fishing methods for harvesting marine resources, which are somewhat easy to access but unfriendly to the environment. Also, in many cases, marine invertebrates are collected through tramping over reef areas without appropriate fishing gears. This probably makes it difficult for alternative livelihood activities to compete, because any alternative will be regarded as expensive. Indeed, shifting to other economic activities besides fishing in these areas can be very problematic, even if only small amounts of money are involved, since communities get very little financial returns from their economic occupations and are known to live in abject poverty. There has been little inductive research on human and natural interactions to derive implication on the sustainability of livelihoods. On the other hand, little is known on the effects of greater resources depletion in the overall local economy.

Field work was conducted on five coastal villages: Msimbati, Mngoji, Mkubiru, Mnete and Nalingu, extending from the Msangamkuu peninsula on the shore of the Indian Ocean (Fig 1.2).

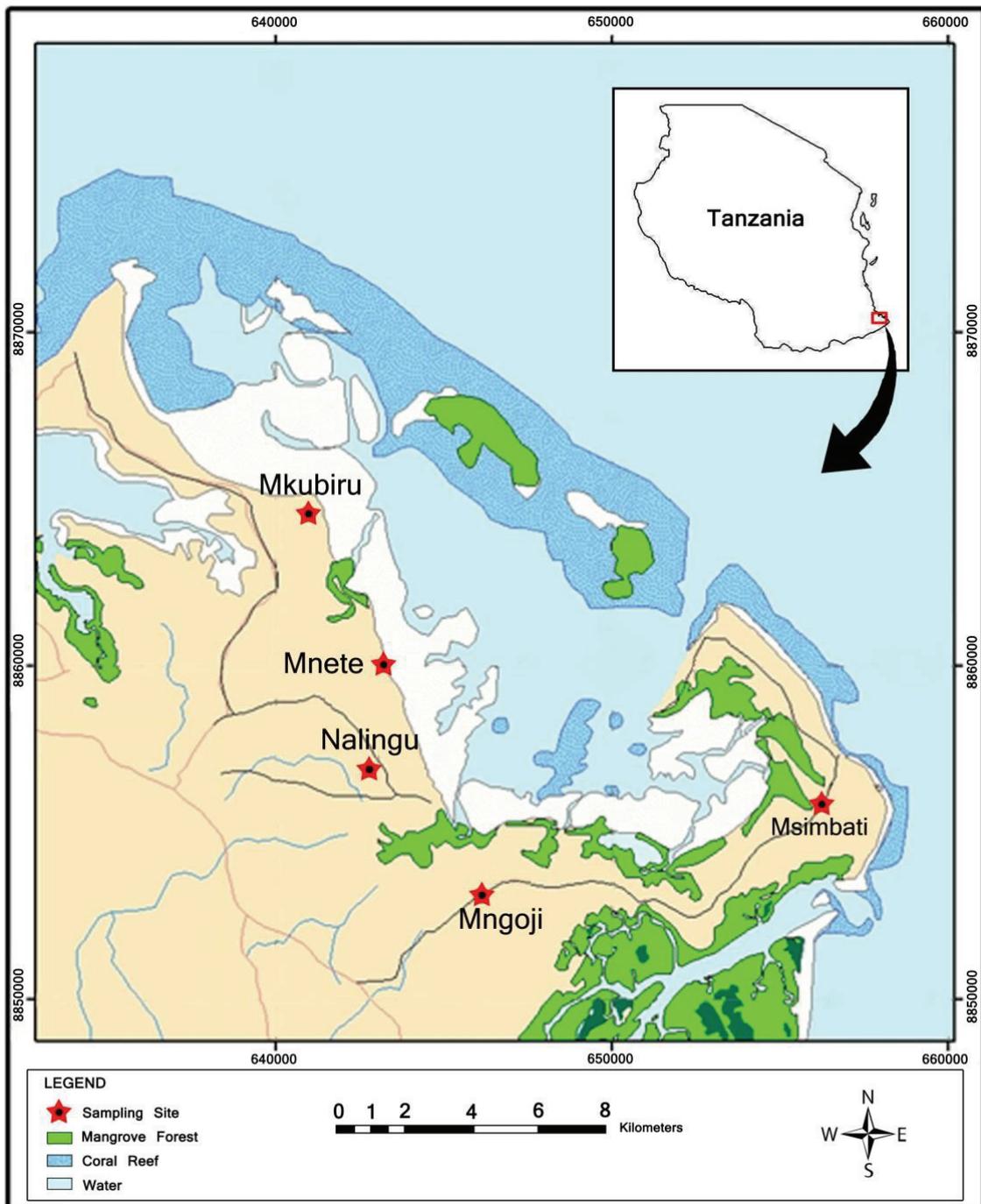


Figure 1.2 Map of the study area (Source: Reproduced from MBREMP database)

1.6.2 Criteria for selection of study villages

In accordance with the objectives of this study, one of the main criteria for selecting study sites was to search for villages with communities where reefs fisheries has influence on their livelihood strategies. The other related criteria were that the site should include those villages where depletion of fisheries resources has occurred, and destructive fishing methods, particularly dynamite fishing, are common. Furthermore, the villages should comprise a significant number of households practising fishing in or around reef areas irrespective of whether it is supplemented by other economic activities not related to fishing. Additionally, it was important to see if some local community members across the selected villages had developed social mechanisms and safety nets in response to the environmental uncertainties and variability of their livelihood systems.

One of the most suitable sites from Mtwara rural district for this study was the area encompassing 17 villages forming the Mnazi Bay-Ruvuma Estuary Marine Park (MBREMP). The MBREMP was set up in 2000. MBREMP is located to the southernmost tip of Tanzania and occupies 430 km² marine and 220 km² terrestrial area and includes open ocean, bay, estuary, island, coral reef, seagrass beds, intertidal areas, beach, mangrove forest, secondary forest and lowland and upland agricultural areas. It is bordered by Indian Ocean to the east, Mozambique to the south, Mtwara municipal to the north, and several hinterland villages of Mtwara district to the west.

1.6.3 Social and environmental settings of the study villages

Most households in coastal villages of Mtwara rural district, in particular those in the study villages, are involved to a great extent in fishing (Malleret, 2004:19). However, a considerable number of households in these villages are involved in agriculture, despite the fact that soils in the area have low fertility. Fishing has been carried out entirely at the subsistence level along near shore reefs and mangrove areas of this coast, since these areas are accessible to fishers with *mitumbwi* (dug-out canoes) and relatively simple fishing gears. There is less exploitation of the deeper areas beyond the reefs (Obura, 2004); however, few fishers with boats and gears capable of fishing this area report good fish catches.

While there is much less documented information on the history of fishing and fisheries resources ecology in Mtwara rural district and the study villages in specific, diaries (an online version) of a Game Ranger who worked over a period of ten years (1928–1938) in the south-eastern provinces of Tanganyika territory (Harvey, no date¹²) contain some interesting observation on fishing experiences especially along the Msimbati channel and Ruvuma River. His accounts highlight the availability of big fish such as mackerel:

The biggest horse mackerel (*karambisi*) that ever came my way and scaled 57 pounds, very deep and wide with strong rasp like keels near the caudal fin. These fish are not only heavy but very strong swimmers and in my opinion put up a better fight, weight for weight, than Barracuda, Albacore or the "Kingfish" of East Africa (*nguru*) (Harvey, no date).

His diaries contain not only evidence of availability of large species of fish and marine environment such as coral reefs, but also amount of fish as summarized in the text below:

Our dhow with its ample sail was making four or five knots: sometimes a few flying fish broke water and terns were busy after sardines, diving headlong into the water with a splash. ... Dolphin-fish (*fulusi*) were on migration and soon we were amongst them. In a short time I had seven or eight in the dhow, ranging from 5 to 15 lbs (Harvey, no date).

Like fish, other marine organisms were also abundant as contended below:

Crustaceans and many other forms of marine life were feeding voraciously in the abundant waters. Small fish were feeding eagerly on crustaceans, weeds and seagrass and the big predatory fish were hunting the shoals of smaller fish and octopus and squid (Harvey, no date).

Walking along a sandy road that connects Mkubiru, Mnete and Nalingu villages on the peninsula and crossing the Mnazi bay further south to Msimbati and Mngoji villages, it is common to see fishing nets spread out under big trees being mended by fishers (men in particular). Walking across sandy beaches besides these villages, one will encounter women going to or coming from intertidal areas where they collect invertebrates and shell fish. If one stops and asks people about their lives in these villages, their immediate response will highlight the decline in societal and economic services provided by reef fisheries. Their stories will highlight past days when they could easily collect octopus and lobsters by hand from reef flats at low tide or by diving.

¹² Only the online version was available to the author at <http://www.wildlife-baldus.com/download/Bill%20Harvey%20Porini%20II.pdf> [Accessed 27.04.2013]

They would certainly talk of the poor performance of food crops and compare it with their history of successful sea cucumber trade, without forgetting to mention the devastating effects of insect pests such as edible grasshoppers and wild animals on crops (especially wild pigs and monkeys). Certainly, you may hear vague accounts of soil infertility; soils in the area are coral remains and hence infertile, yet fertilizers are seldom used. In fact, in these villages soil acidification is a major problem (Kikula, 1997), and is associated with the dusting of cashew nut trees with large quantities of elemental sulphur in attempts to control powdery mildew disease (Ngatunga et al., 2003).

Surprisingly, one might hear a long list of names of *bomu* (dynamite) fishers who are identified by villagers as the primary culprits of reef degradation, in addition to other factors such as the rapid increase in the number of fishers and lack of alternative income sources. Thus, one will possibly hypothesize that this decline is due, by and large, to deterioration and overexploitation of near shore resources caused by the use of destructive fishing methods and rapid population increase.

Although it is not easy to establish precisely whether, or when, the indigenous people of Mtwara altered their fishing methods to incorporate destructive practices especially dynamiting, it is possible that dynamite commenced during the construction of Mtwara harbour in the early 1950s or road construction works in Dar es salaam during the 1960s or early 1970s; although, this cannot be substantiated. Anecdotal evidence clearly refutes the use of dynamite during the pre- and colonial eras in Tanzania (Author, interviews in 2012). While this study does not intend to unravel the underlying causes of dynamite fishing practices, information collected from interviews and discussions revealed that in recent years, this practice is done mostly by individuals who are used by wealthy people in the villages or outside. In the past especially early 1990s, it was a common practice by young men who seemed to be desperate because they did not own any fishing gear and got their catches by diving for reef fish (Swantz et al., 2001:392).

Further, when talking to people in these areas, they will not hesitate to mention the devastating effects of the villagerization¹³ (*ujamaa vijijini*) programme in the 1970s

¹³ Refer simply to the agglomeration of rural living units to facilitate state administration

(Hyden, 1980; Kikula, 1997). Actually, this was one of the policy measures adopted and pioneered by the government-under the leadership of Mwalimu Julius Nyerere: to put into practice the country's ideology of *ujamaa*¹⁴ *na kujitegemea* (socialism and self-reliance). In this programme, the government forcedly moved millions of people from their original homes and farms into clustered villages (Hydén, 1980a; Kikula, 1997; Shao, 1986). The intention of this programme was envisaged to improve the provision of social services such as water, education and health services. Despite these noticeable positive results of villagerization, in the long run, this policy negatively affected agricultural production, social networks and socio-economic activities in general (Kikula, 1997; Lawi, 2007; Shao, 1986). Unfortunately, the southeast regions took the large share of villagerization exercise compared to other regions (Lal, 2010:13). About 38% of all *ujamaa* villages were based in southern regions (Voipio, 1998:32).

One would also hear divergent stories of the relationship between villagers from Nalingu, Mnete and Mkubiru villages and the MBREMP, who had more opportunity to resist the implementation of marine conservation activities after MBREMP was established in 2000. They usually say that MBREMP has restricted their traditional fishing rights by demarcating *maeneo tengefu* (no take zones). Despite significant levels of management and enforcement, both regulated and illegal human activities are widespread in MBREMP; these activities are not limited to areas outside the marine park boundary (Robinson et al., 2012).

Recently, there have been changes in rural Mtwara, especially since the onset of revived activities to explore natural gas in 2003, which appear to have reshaped the lives of residents of southern Tanzania in multiple and complex ways, in terms of their livelihood strategies and coping mechanisms. Furthermore, recent changes in state macro and micro-economy policies have driven a simultaneous rise in miscellaneous income-generating activities beyond fishing. As in other areas of WIO, and sub-Saharan Africa (SSA) in general, these changes could trigger new pathways of rural development. One particular outcome could be a shifting relationship between fisheries resource bases and economic

¹⁴ *Ujamaa* meant literally family hood and legitimated itself by invoking an idealized construction of traditional African forms of kinships and extended family-one that emphasized reciprocity, collective effort, and an open version of community (Lal, 2010:2)

opportunities. These changes are undoubtedly reshaping the social, economic, cultural, political and environmental conditions of Mtwara rural district, by introducing new social structure and livelihood options and challenging existing cultural norms and institutions surrounding traditional livelihoods.

1.7 Structure of the thesis

This thesis comprises nine chapters. Chapter one, which forms the introduction to this work, focuses on: the pertinent background information about the research topic; the context within which the research is based; and the broad context within which the purpose, objectives, questions and rationale of the research have been formulated. An overview of the research setting and study area is also provided. In chapter two, a detailed review of marine fisheries and salient issues related to fishing industry is provided.

Chapter three presents the conceptual and theoretical framework. Specifically, it commences with a review of relevant concepts and terms used in the current thesis and the contemporary discussion on the sustainable livelihood approach, used as an analytical approach in this study. Due to the limitations of the livelihood approach and the daunting challenges in the quest for environmental sustainability, the theory of political ecology, with a focus on political economy, is explored to provide a thorough understanding of the relationship between humans and degraded reef fisheries. Finally, a review of pertinent issues related to coping strategies, adaptation and scenario planning approach are discussed.

The methodology used to conduct the research is detailed in chapter four. The research approach and design are laid out at the outset of the chapter. This is followed by a comprehensive explanation of selection of sample, data collection techniques and sources, and data analysis techniques. The chapter concludes with some of the quality issues pertaining to reliability, validity and authenticity, as well as the challenges faced in the field and the various mitigation strategies used.

Ecological and socio-economic information gathered from the household surveys, qualitative interviews and secondary sources is analysed and discussed in chapter five. The discussions pertain to socio-economic demographic characteristics, asset

endowments, political and social organisation, local institutions and household livelihoods. Discussions on household livelihoods strategies are in explicit recognition of the importance and strategic role of fisheries within village economies and livelihood systems.

In chapter six, coping strategies undertaken by households to maintain their livelihoods are assessed, with the aim of broadening the impact of local adaptive capacity within the research site. In doing this, the chapter highlights both coping and distractive actions, the consequences of negotiating livelihoods, and more importantly, how these responses are transforming fisheries-dependent livelihoods and social structure in coastal communities.

Livelihood trajectories are presented in chapter seven. Using the life-course analysis approach to reconstruct livelihood trajectories, this chapter conducts an explorative analysis of how the various episodes, interventions and support, and ecological change have influenced different livelihood strategies and shaped social and institutional changes in villages.

Chapter eight focuses on scenarios for future of livelihoods based on narratives developed by stakeholders interviewed for this study.

The final chapter presents a summary of the thesis, with the various conclusions that can be drawn from the results and policy implications of the study. This concluding chapter also offers some suggestions for future research.

Chapter 2 Marine fisheries of Tanzania and within the study area

2.1 Chapter overview

The purpose of this chapter is to provide an overview of the fishery within the study area through a brief historical and contemporary description of Tanzania's marine and coastal fisheries. Many features of the fishing industry covered in this thesis are introduced and elaborated upon here. The chapter begins with a broad picture of the marine fishery and its importance to the national economy, while showing differences for the type of fishing industry and fisheries resources in the country. It ends with an overview of the fishery, and management practices in the Mnazi Bay-Ruvuma Estuary Marine Park (MBREMP)—where study villages are located. Although most of the information presented here is from published and unpublished materials, some information comes from interviews and the author's experience in working with coastal fishing communities in Tanzania.

2.2 General characteristics of coastal and marine fisheries in Tanzania

The fisheries sector in Tanzania includes both marine and inland fisheries (FAO, 2007:2). The coastal and marine fishery sector in Tanzania, as is the case in many developing countries, can be broadly grouped into capture fisheries and aquaculture (Jiddawi and Öhman, 2002). Marine capture fishing activities in Tanzania take place in all five coastal regions and has long been regarded as one of the most profitable activities in those areas (Francis and Bryceson, 2001:82).

The prospects for aquaculture in Tanzania are considered significant but yet untapped (Rice et al., 2006). Aquaculture¹⁵, in both marine and freshwater bodies, is dominated by small farmers practising both extensive and semi-intensive fish farming and cultivation of seaweed (Shoko et al., 2011). Generally, aquaculture in Tanzania is characterised by the cultivation of different species. These include tilapia (*Oreochromis niloticus*, *O. mossambicus*), shrimp (*Penaeus monodon*), red seaweed (*Eucheuma*, *Kappaphycus*), marine and brackish finfish (*Siganus*, *Chanos*, *Mugil*), molluscs (*Saccostrea*, *Anadara*,

¹⁵ Brief information on aquaculture in Tanzania was available at: http://teacher.bmc.uu.se/SLUGLOBALAQUA/SLUGLOBALAQUA/Welcome_files/Overview%20of%20the%20fisheries%20and%20aquaculture%20in%20Tanzania%20-%20Osewe.pdf [Accessed 14.9.2013]

Pinctada), and integrated systems (e.g. tilapia-ducks integration) [Tanzania Coastal Management Partnership (TCMP, 2009:21–26)]. There is little commercial aquaculture in coastal areas of Tanzania, with few operations for seaweed (Bryceson, 2002; Mallya, 2007:9). Nonetheless, reports show that much of seaweed production in the Western Indian Ocean region (WIO) comes from Tanzania, with annual production of around 15,000 tonnes involving nearly 20,000 farmers (Msuya et al., 2014:701). This, in fact, could suggest low productivity when compared to other regions of the world, such as Southeast Asia and the Pacific (see Ahmed and Lorica, 2002; Campbell and Pauly, 2013; Hishamunda et al., 2009). Nevertheless, in recent years, new cultivation trials for various species of red seaweed in Tanzania have been carried out, and efforts to initiate cultivation at a commercial scale are underway (Msuya et al., 2014:699).

Unlike aquaculture, the maximum potential yield in the territorial marine waters of Tanzania was estimated at 45,000–70,000 tonnes during the period 1975–1980 (Iversen et al., 1984:42). However, several fish stock assessments (Table 2.1), though limited in spatial-temporal coverage have also been undertaken under various initiatives. Nonetheless, since the onset of collecting fisheries records in Tanzania, the annual fish production has not reached the presumed maximum potential value for fish stock (ESRF, 2009:41). The potential for EEZ remains unknown (Jiddawi and Öhman, 2002) although recent efforts to monitor EEZ fisheries under the Tanzanian Deep Sea Fishing Authority (TDSFA) is a promising stride towards close examination of resources found there.

Scholarly works show that marine fishery production lags behind freshwater fishery. Recent records reveal that production from marine fisheries has contributed only about 10–12% of the total annual fishery production in the country for the past two decades (Division of Fisheries, 2013). For instance, the average annual marine fish catch (see Fig 2.1 for example of fish catch) from 1980–2012 was approximately 45,000 metric tonnes. During the same period, the production averaged 280,000 tonnes for inland fisheries (Division of Fisheries, 2013). The major portion of the catch was contributed by small-scale artisanal fisheries (Division of Fisheries, 2013). Although these data are not sufficient to make any authoritative conclusions, it could be argued that the trend in the performance of marine fisheries (Figure 2.2) is not satisfactory. However, critics argue

that the amount of catch in Tanzanian fisheries is underestimated due to the absence of a well-structured system of data collection and recording.

Table 2.1 Fish stock surveys carried out in inshore marine waters of Tanzania in various periods

Cruise/researcher(s) name and date	Method used	Depth range covered	Information recorded	Estimated biomass (tonnes)
R/V Dr. Fridtjof Nansen (1982-1983)	Acoustic and swept area methods	10 m–500 m	Fish resources and the main hydrographic regimes	100,000–175,00 tonnes
Tarbit (1984)	Acoustic	>50 m but <200 m	Artisanal fishery	25,000 – 45,000 tonnes
Sanders (1989)	Catch and effort data of 1988	Not specified	Shallow water shrimp trawl	740 tonnes
TAFIRI using commercial trawler A.G. Spyridon (1992)	Acoustic	500 m	Biological and stock size of crustaceans in Rufiji- Mafia channel	544 tonnes
TAFIRI using stern trawler R/V Kiboko (2001)	Bottom trawling	200 m	Abundance of prawns in Rufiji and Bagamoyo	828 tonnes

Source: Published and unpublished materials



Figure 2.1 A typical fish catch from marine waters (Source: Author, field work)

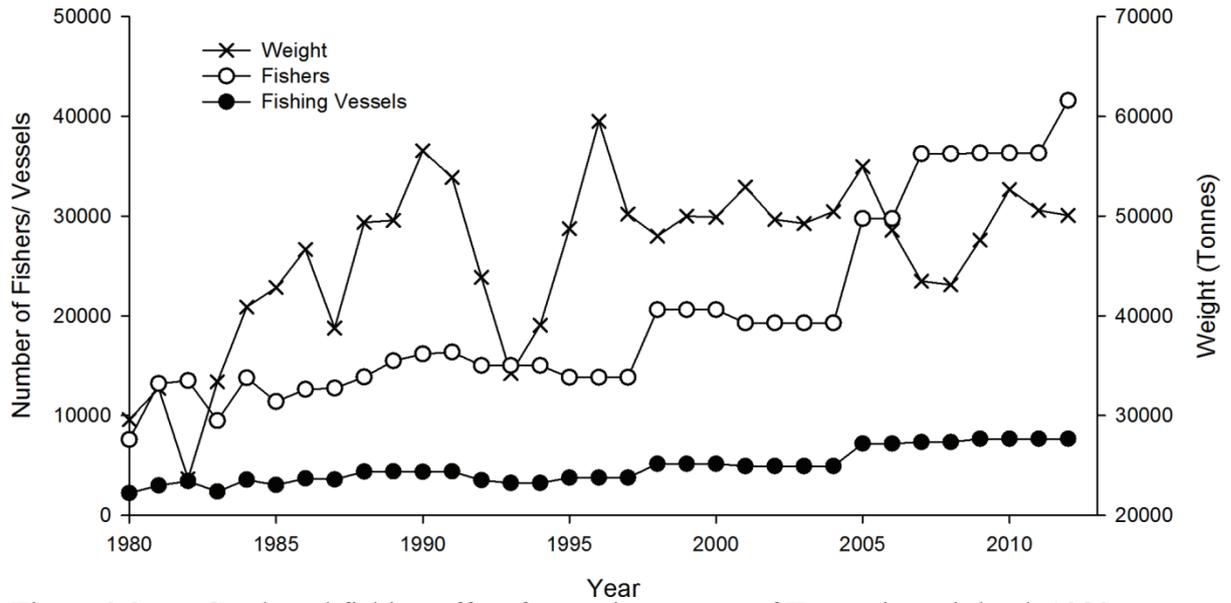


Figure 2.2 Catch and fishing effort for marine waters of Tanzania mainland, 1980–2011 (Source: Division of Fisheries)

It is worth to mention that Tanzania is predominantly an agricultural¹⁶ economy, with over 70% of its workforce employed in the agricultural sector (MLFD, 2010). By sub-components, the agricultural sector comprises of crop farming, livestock, forestry and hunting, and fishing (Mashindano et al., 2011:5).

The agricultural sector is a key driver of social and economic development generates 25% of GDP and 24% of foreign exports (URT, 2011a:23). However the sector has persistently registered a lower growth rate compared to other sectors—services and industry—so that its share of GDP fell from 29% in 2000 to 25% in 2009. For example in the recent past, the agricultural sector has been growing at the rate of about 4%, while services and industry have been growing by more than 6% (Mashindano et al. 2011:5–6).

¹⁶ Tanzania’s agriculture is dominated by small-scale subsistence farmers who operate on average of 0.2 to 2 ha as well as traditional pastoralists and fishers. Over 80% of the arable land is used by smallholders and only about 1.5 million ha is under medium and large scale farming (TIFSP, 2011:23).

Although the agricultural¹⁷ sector as a whole grew rapidly during 2000–2007, the source of this growth has been concentrated among a few export crops (Pauw and Thurlow, 2010:3). However, 1% growth of the agricultural sector has more positive multiplier effect than the same growth in any other sector in Tanzania (Pauw and Thurlow, 2010). Low performance of the agriculture sector has impeded efforts to reduce the high rural poverty levels and points towards an urgent need to boost agricultural productivity growth and investments (Amani, 2005:3).

Reports show that although fisheries kept pace with overall agricultural production during 1998–2007, it grew at an average of 5.1% per year (URT, 2011b:11). More recent economic survey report indicates that in 2011, fishing activities (both marine and inland) grew by 1.2% (URT, 2011b: 153). This was relatively low compared to 1.5% in 2010. This slowdown was attributed to the use of poor fishing gears, destruction of fish habitats and low demand of fish in the world market (URT, 2011b:153). The share of fishing activities to the GDP for various years is presented in Table 2.2 while Figure 2.3 presents the growth rate for the fisheries sector (both inland and marine) from 2002–2011.

Table 2.2 Share of GDP by kind of economic activity of agriculture sector at constant 2001 prices

Year	Fishing	Hunting and forestry	Livestock	Crops
2002	1.7	2.4	4.8	21.1
2003	1.7	2.4	4.6	20.4
2004	1.7	2.2	4.5	20.1
2005	1.6	2.2	4.4	19.6
2006	1.6	2.1	4.2	19.1
2007	1.6	2.0	4.0	18.6
2008	1.5	2.0	3.8	18.2
2009	1.5	1.9	3.7	17.8
2010	1.4	1.9	3.6	17.3
2011	1.3	1.8	3.5	16.8

Source: Author's compilation from various reports produced by the National Bureau of Statistics

¹⁷ For the government administration purposes, fisheries and agriculture are served in two different ministries, each having its own values and focus. Since 2008, the Ministry of Livestock and Fisheries Development (MLFD)—through Division of Fisheries (DoF)—has been the main body in charge of the fishery sector in Tanzania. Until then, the fishery sector had been under the ambit of the Ministry of Natural Resources and Tourism (MNRT). The MLFD works in collaboration with other Ministries, Departments and Agencies to enforce existing fishery laws and regulations.

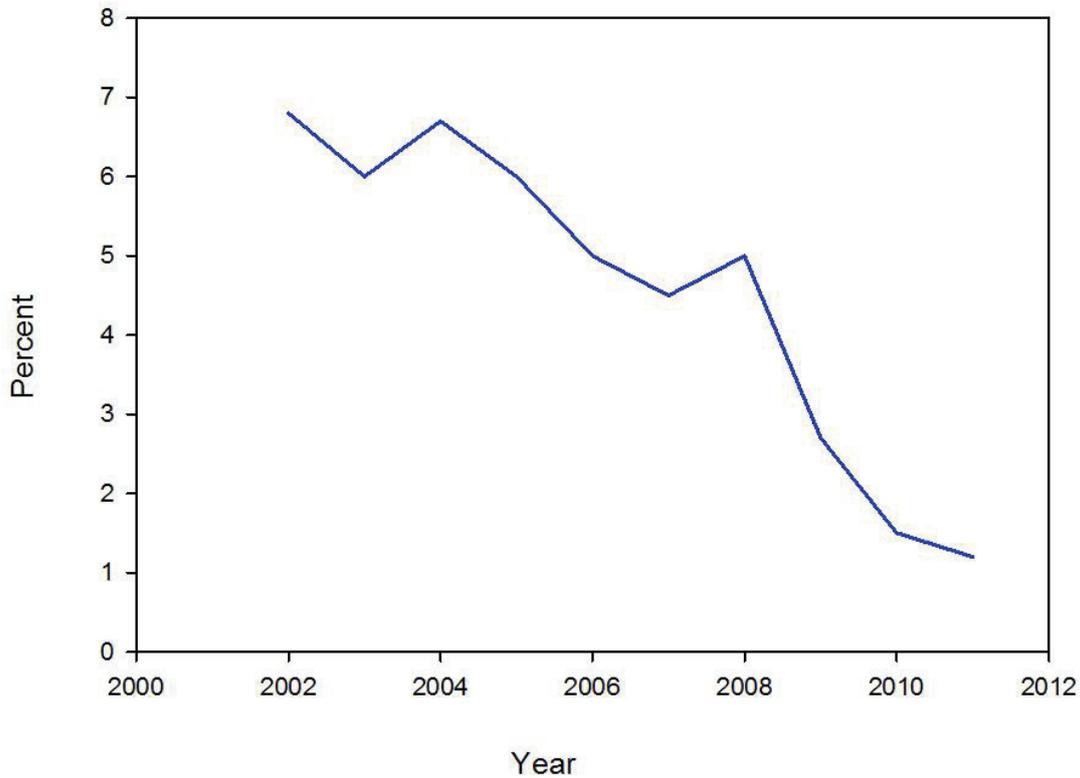


Figure 2.3 GDP growth rate for fisheries sector at constant 2001 prices (Source: Author's compilation from various reports produced by the National Bureau of Statistics)

Fish caught in Tanzania is primarily consumed on the domestic market. The per capita animal protein from fish has shown a declining trend to 7.6 kg/capita in 2012 (Division of Fisheries, 2013:28). In the past decade, the per capital fish consumption was around 15–20 kg/capital per year (Chauvin et al., 2012:37). Nonetheless, fish provided around 55% of the animal protein consumption in Tanzania in 2011 (Division of Fisheries, 2013:28).

The fisheries sector in general employs about 400, 000 fishers and more than 4 million people depend on fisheries and its related activities—thus making a significant contribution to livelihoods along the coast and in riparian areas (MLFD, 2010:1–2; Sobo, 2012:1).

The state of marine fisheries is generally considered to show sign of degradation from overexploitation, destructive fishing practices and pollution from land based sources (Francis and Bryceson, 2002). The status of some resources remains unknown. Although

there has been no recent assessment on the biological status of fish stocks, reports for several projects (e.g. ASCLME, 2012; Van der Knaap, 2014) suggest that marine resources are currently in poor state attributed to destructive fishing activities and influences of natural changes.

2.3 Types of marine fisheries

The Fisheries Act of 2003 recognises three types of fisheries in marine waters of Tanzania: artisanal, semi-industrial and industrial fishery. Of these three, artisanal fishery is the most important and common among the majority of fishing communities as it employs a great number of fisher-folks and contributes over 90% of the total annual fish production in both marine and inland fisheries (URT, 2011b:153). But more broadly, Tanzanian fisheries are categorised as small-scale artisanal and commercial, a difference due to modern mechanised fishing vessels for the former and gears for the latter (Sobo, 2012:1). Artisanal fisheries could be for subsistence or commercial purposes but the likely difference between them is rather arbitrary¹⁸.

Although it is not well documented, some authors report that commercial fisheries started to operate in the territorial waters only from 1988 by making use of trawlers aimed at prawns and shrimp (Abdallah, 2004). However, this fishery has been closed since 2007 due to a decline in prawn resources (MLFD, 2012). But illegal fishing activities in marine waters of Tanzania have often been reported, indicating prevalence of unregulated commercial fishing activities in the country's jurisdiction.

2.3.1 The artisanal fisheries

Artisanal fishery is primarily inshore fishery involving local (and migrant) fishers using small craft of up to 10 m, most of which are non-motorised and built of wood. Such vessels include *mitumbwi* (dugout canoes), planked canoes, outrigger canoes, and dhows (Shao et al., 2003:17–19). Most of the fishing vessels especially those used by local fishers are propelled either by *tanga* (sails) or *kasia* (paddles). However, some few

¹⁸ It is important to note that in Tanzania, artisanal can be subsistence or commercial fisheries although for convenience, artisanal, tradition and subsistence fisheries are pooled together to refer to small-scale fisheries

migrants fishers operate their vessels with outboard engines of up to 60 HP. Artisanal fishers target reef, demersal and small-pelagic fish in shallow waters of less than 30 m and sheltered bays; the size of their fishing vessels restrict movement far beyond shallow waters (Jiddawi and Öhman, 2002). Most artisanal fishing activities take place year-round (van der Elst et al., 2012).

The main types of fishing gear used in artisanal fishery include traps, gill nets, shark nets, scoop nets, hand lines, long lines, ring nets and cast nets (Masalu et al., 2010:32). Artisanal fishery accounted for over 90% of marine fish landings in 2012 (Division of Fisheries, 2013). The productive areas commonly visited by artisanal fishers are coral reefs, reef flats, seagrass beds and estuaries (Jiddawi and Öhman, 2002). In recent days, these areas are said to be subjected to heavy fishing pressure from increasingly number of artisanal fishers. A frame survey conducted in 2011 revealed an increase in number of artisanal fishers as well as vessels (Division of Fisheries, 2013).

2.3.2 The semi-industrial fishery

Fishing vessels with lengths 11 m to 24 m, together with sophisticated technology such as use of ice cooling boxes and Global Positioning System (GPS) characterise semi-industry fisheries in Tanzania (Mndeme and Haji, 2006:62). Fishing activities for semi-industrial fishery takes place in territorial sea and in inshore waters (Mndeme and Haji, 2005). The fishing fleet is composed mostly of trawlers, purse seiners and long liners. But generally speaking, this type of fishery in marine waters of Tanzania involves prawn trawler fishing (Abdallah, 2004:6–7) although other pelagic fish species are also a target. Prawn (shrimp) fishery industry forms one of the most important marine fisheries products in terms of income and export value (Mndeme and Haji, 2005). From the mid-1990s, semi-industrial fishery is reported to have increased fishing pressure on inshore prawn fishery (Fig. 2.4), increased resource user conflicts between industrialist and artisanal fishers and drastic decline in abundance of targeted stocks (MLFD, 2012).

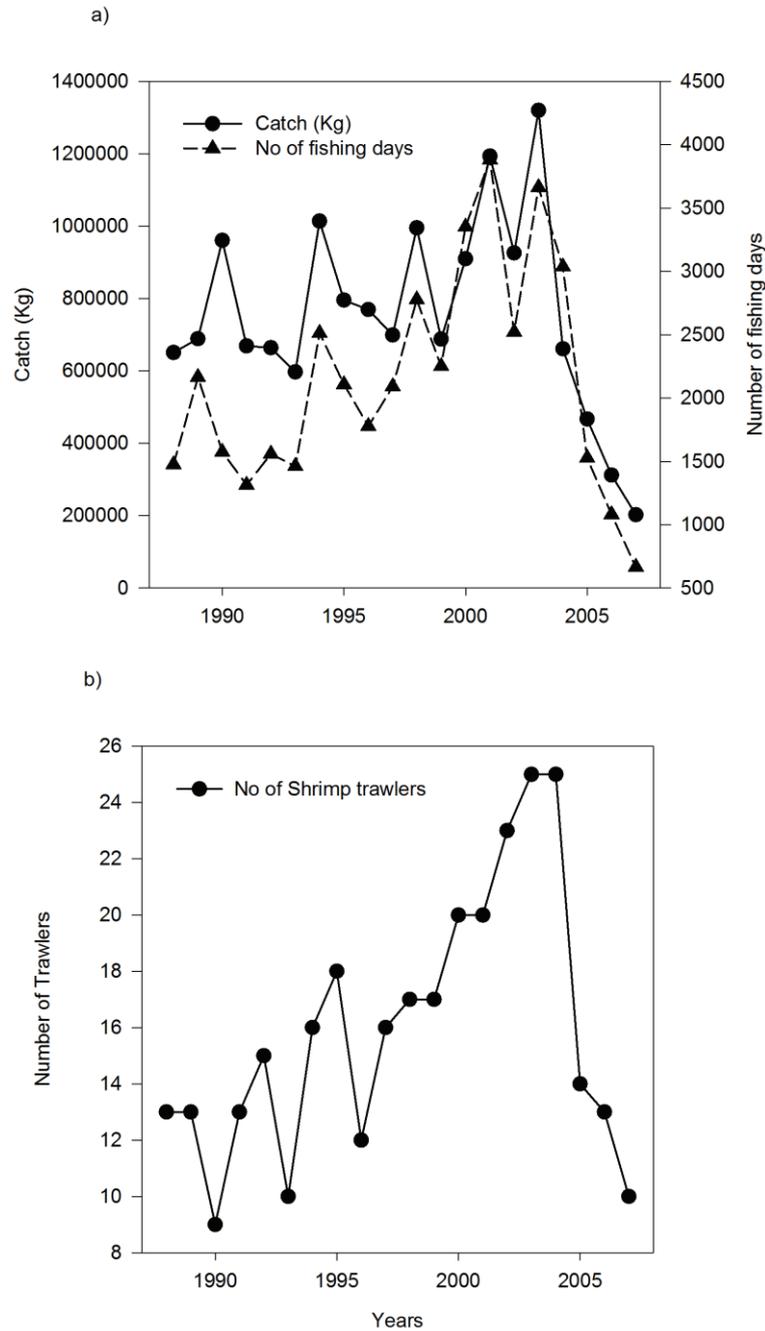


Figure 2.4 Trends in catch and effort for shrimp fishery until 2007 where a) weight in kilogrammes and number of fishing days and, b) total number of trawlers registered (Source: Division of Fisheries)

According to (Ngoile, 2012:7), the prawn fishery in Tanzania has indicated a serious unsustainable exploitation levels for the past decade. Consequently, the government in 2007 imposed a moratorium on prawn trawling to safeguard the fishery from collapsing. Since then the inshore prawn industry has remained the domain of small-scale artisanal fishers. The most recent prawn stock assessment carried out in 2010–11 by TAFIRI

suggests that the stocks are yet to recover to allow for the lifting of the moratorium (MLFD, 2012).

2.3.3 The industrial fishery

Industrial fishery is dominated by foreign-owned purse seiners and long liners. The main target species are tuna and tuna-like species (FAO, 2007:2). Majority of vessels in industrial fishery are from Japan and the European Union.

During the past decade, van der Elst et al. (2005) estimated that only 55 of active fishers in Tanzania were involved in industrial fishery. This is in line with many other studies that show that most of the fishing activities in Tanzania are for subsistence and semi-commercial. Nevertheless, there is no recent data on the number of Tanzanian fishers involved in industrial fishing.

In 2012, a total of 36 vessels were licensed to fish in EEZ (Division of Fisheries, 2013:82). Unfortunately the exact figure for catches in Tanzanian EEZ are unknown as foreign vessels do not land in Tanzania and hardly share data with the local authorities. This is partly attributed to conditions attached to the fishing licences of distant water fishing nations (DWFN) that do not include the obligation to land or tranship (part of) catches from the Tanzania EEZ. Often times, the catches for tuna and tuna like species are commonly presented, although with anomalies as shown in Fig 2.5. This however, tends to underestimate the value of catch that is reported from EEZ and to provide an estimate of the total share of catch in Tanzania EEZ that is landed in the country.

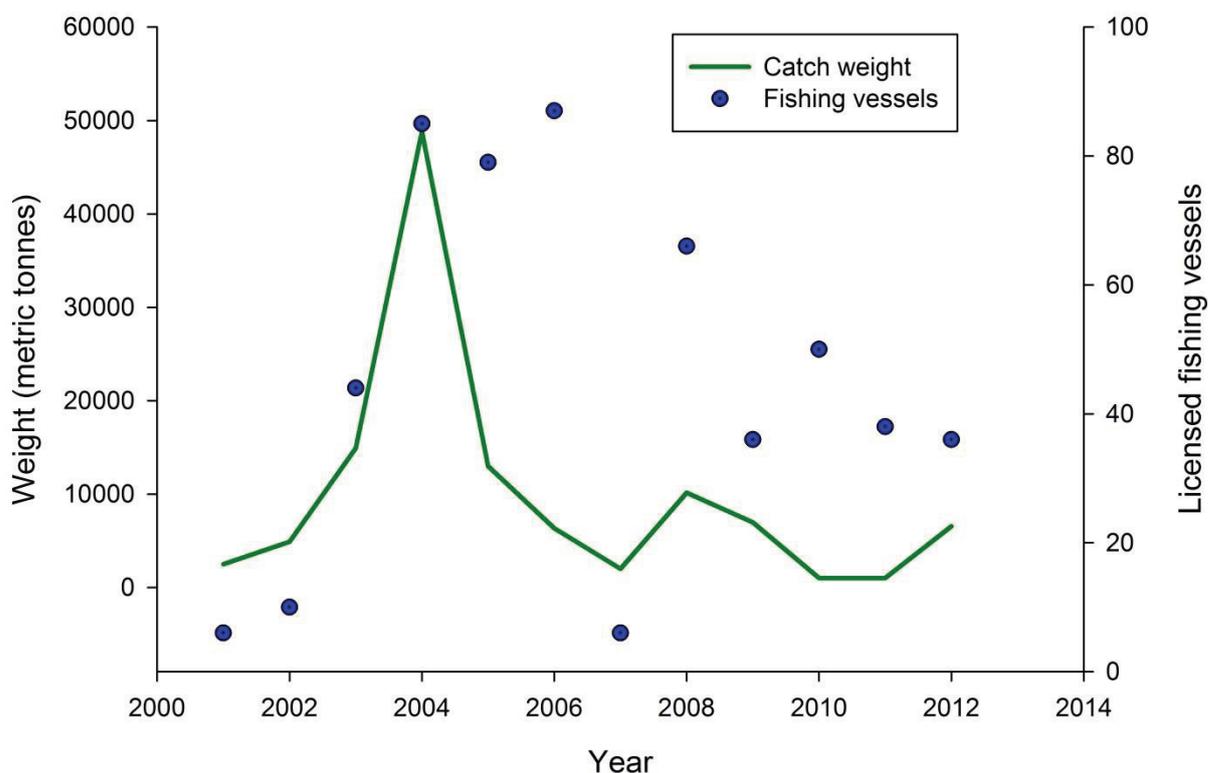


Figure 2.5 Catch trend and number of licensed fishing vessels for tuna and tuna like species for commercial fishery in the EEZ from 2001–2012 (Source: Records from the Division of Fisheries)

2.4 Main fishing resources

The multi-species coastal fishery of Tanzania comprises of living marine and brackish-water resources with greater species diversity (Jiddawi and Öhman, 2002). With exception of assessment by the Nansen project on fish stocks and the most recent on status of pelagic fishery, specific studies on fisheries resources in marine waters are lacking. However, comprehensive reviews on marine habitats and resources in Tanzania (e.g. Jiddawi and Öhman, 2002; Muhando and Rumisha, 2008; ASCLME, 2012) highlight that marine fisheries are characterised by many species; the most dominant being reef, demersal, pelagic, oceanic and deep water species.

Previous scholarly works on fisheries in Tanzania (Francis et al. 2001; Jiddawi and Öhman, 2002) indicate that most of the fish caught in inshore waters by artisanal fishers

are mostly demersal species (*Lethrinidae*, *Serranidae*, *Mullidae*) followed by large and small pelagic species (*Carangidae*, *Scombridae*, *Cluupidae*, *Engraulidae*). Accordingly, others include sharks, rays, crustacean, octopus and squid (Jiddawi and Öhman, 2002). Other important groups include the lobsters, shrimps, cephalopods and gastropods (Muhando and Rumisha, 2008:51).

Virtually, fisheries legislation in the country bar fishing of holothurians, marine turtles and marine mammals. However, there are reports of incremental catches of these groups as by-catch (e.g. turtles and whales in gill nets—Fig.2.6) or by dedicated poachers for commercial purposes (Amir et al., 2002, 2005). For example, the 2011 annual report of Sea Sense—NGO targeting the conservation and promotion of flagship species—revealed that 166 dead turtles were recorded (either slaughtered or caught in nets) along the coast (West, 2011:4). Similarly, in 2012, Sea Sense reported that direct take of sea turtles is commonplace in many coastal communities in Tanzania and that several sea turtle butchery sites were observed in numerous villages in Pangani, Mafia and Kilwa district (Sea Sense, 2012:12).



Figure 2.6 Local community members watching the dead whale that was captured in gills nets near Msangamkuu village (Source: MBREMP's Research and Monitoring Department)

The most recent frame survey carried out by the DoF reveals dominance of reef fish in the overall catches and landings. Similarly, most species of commercial importance caught in marine waters and recorded by DoF (some of which are illustrated in Table 2.3), are reef fish.

Table 2.3 List of some of the common variety of marine species caught in mainland Tanzania

Common name	Local name	Representative species	Habitat
Anchovy	Uono	<i>Stolephorus commersonii</i>	Pelagic
Catfish	Hongwe	<i>Arius serratus</i>	Estuaries, mangroves
Cobia	Songoro	<i>Rachycentron canadum</i>	Pelagic
Crabs	Kaa	<i>Scylla serrata</i>	Estuaries, mangroves
Emperor	Changu	<i>Lethrinidae</i>	Reef
Goat fish	Mkundaji	<i>Mullidae</i>	Reef
Grouper	Chewa	<i>Cephalopholis argus</i>	Reef
Lobster	Kambakoche	<i>Panulirus ornatus</i>	Reef
King fish	Nguru	<i>Scomberomorus plurilineatus</i>	Pelagic
Mackerel	Vibua	<i>Scombridae</i>	Pelagic
Mojarra	Chaa	<i>Gerres spp</i>	Sandy-bottom
Mullet	Mkizi	<i>Mugil cephalus</i>	Pelagic
Octopus	Pweza	<i>Octopus chromatus</i>	Reef
Parrot fish	Pono	<i>Carrotomus spinidens</i>	Reef
Rabbit fish	Tasi	<i>Siganidae</i>	Reef
Pompano	Kolekole	<i>Carangidae</i>	Pelagic
Ray	Taa	<i>Hypolophus sephen</i>	Reef
Sardine	Dagaa	<i>Clupeidae</i>	Pelagic
Sea cucumber	Jongoo	<i>Holothuria scabra</i>	Reef
Shark	Papa	<i>Carcharhinus sp.</i>	Open ocean
Shell, Oyster	Chaza	<i>Ostrea amasa, Pinctada sp.,</i>	Mangroves, estuaries
Shell	Kome	<i>Cypraea tigris, Cypraeacassi rufa</i>	Beach
Snapper	Fimbo	<i>Aprion virescens</i>	Reef
Squid	Ngisi		Reef
Sweetlips	Komba	<i>Diagrama pictum, plectorhinchus chubbi</i>	Reef
Tuna	Jodari	<i>Euthynnus sp., Thunnus sp.</i>	Pelagic
Unicorn fish	Puju	<i>Naso unicornis, N.hexacanthus</i>	Reef

Source: (Division of Fisheries, 2012;2013; Labrosse et al., 2005; Muhando and Rumisha, 2008; Muhando, 2011; Silva, 2006)

Undoubtedly, the realism of this list is a question that goes far beyond the scope of this thesis and will be left for the time being. Overall, however this list of fish species does not appear to capture every common species caught and seems to reflect data collection framework followed by DoF in their records and not the actual landings by fishers, suggesting that there exists need to empirically examine obstacles in recording fisheries statistics to get something that is almost scientifically feasible.

2.5 Fishing methods

Literature on marine fisheries in Tanzania though scarce and limited, has highlighted the range of fishing vessels and gears used by small-scale artisanal fishers in Tanzania. Unfortunately, unlike inland fisheries especially for Lake Victoria in the north east part of the country (see e.g. Fryer, 1973:305; Geheb et al., 2008:85–87; Kateregga and Sterner, 2007:363–367; Pitcher et al., 1996:135), there is paucity of documented information and studies on historical fishing resources, methods and practices in marine waters. Consequently, most studies tend to describe fishing methods and fishing communities from the 1960s onwards. Obviously, a lack of continuation and depth information that could go to colonial and pre-colonial periods deters a clear picture of what was going on in the past as far as the current status and development of fishery is concerned.

Recent reports such as Masalu et al. (2010:32), have shown that the most common fishing gear and methods range from seining, gill netting, ring netting, trap, trolling and to some extent simple collection by hands (for less mobile gastropods and bivalves) and scooping *dagaa* (small fish) using piece of clothes or mosquito nets. This concurs with Bryceson (Bryceson, 1985) and therefore suggests little improvement in fishing gear and methods over the years. However, other reports (e.g. ASCLME, 2012) state that significant changes in fishing practices have taken place during the past four decades. For example, considerably change in fishing technology is illustrated in increase in modern fishing nets and outboard engines in several areas along the coast.

Similarly, technological improvements are also reported to dominate fishing activities in productive fishing grounds such as those in areas of Kilwa and Mafia with spectacular rise in the use of ice cooling devices, mobile phones and GPS during fishing operations.

Whether technological developments observed have led to substantial increase in the total size of fish catches and landings is an issue that remains under-investigated.

An overview of gear used in marine fishery provided by Sobo (2012a:3) suggests that common gears found along the coast can be passive or active. Traditional gears such as *madema*, traps and spears are mainly made from local materials found in villages. Other gears such as fishing nets are constructed from synthetic fibres in industries and fishers get them through purchases from local dealers. Up to the late 1980s, most modern fishing materials were imported thus, rendering to scarcity of these materials in the fishing industry and high operational costs to fishing crews.

Although there is lack of documented evidence on the variety and forms of fishing gears used during before colonialism, there is common agreement among many fishing communities that gears were made to a standard that they had mesh sizes that are big enough for juvenile fish to escape. In other words, fishing gears involved almost basic form of modern fisheries conservation measures.

The Fisheries Development Division (DoF) under the MLFD is responsible for providing periodic information on the composition, magnitude and distribution of fishing effort as well as facilities and services at fish landing sites. Such information is released as output of fisheries frame survey, which is carried out on biennial basis. A comprehensive summary of the fishing gear by types and numbers over the coastal districts as recorded in the more recently marine fisheries frame survey is presented in Table 2.4, which among others, highlight statistics for the artisanal fisheries in the marine water of Tanzania mainland in 2012.

Following inconsistencies and lack of systematic methodology in collecting information during frame surveys, it is hard to discern any causal relationship between the rise in these gears and development of fisheries sector in the country. As far as socio-economic situation of most fishing households is concerned, the spectacular rise in some gears, some of which are associated with high performance could be attributed to investment by few people who use fishers as their crew. Nevertheless, there has been little investment by

both public and private sector in fishing activities as compared to other sectors of economy.

Table 2.4 Artisanal fisheries statistics for marine water of Tanzania mainland, 2012

Item	Coast	DSM	Lindi	Mtwara	Tanga	Totals
Total number of Landing sites	100	23	47	28	59	257
Total number of Fishermen	12417	7430	5272	5792	5410	36,321
Total number of Fishing vessels	3130	1184	1047	1111	1192	7,664
Total weight of fish in metric tons	9,692.75	19,454.53	4,481.45	3,660.96	12,789.58	50,079.27
Total value of fish in 000's TShs.	33,924,640	68,090,859	15,685,077	12,813,346	44,763,527	175,277,449
Number of Fishing gears by type and size						
Number of Gill nets	16740	431	524	1084	1161	19,940
Number of Shark nets	1294	247	588	714	890	3,733
Number of Traps	1060	634	456	1196	1328	4,674
Number of hand lines	2508	2462	1311	2963	4826	13,955
Number of Long lines	9020	3	167	2	245	9,437
Number of Beach seines	42	50	21	498	168	768
Number of Ring nets	417	235	70	154	83	1,241
Number of Purse seine	0	0	0	0	0	-
Number of cast nets	111	43	18	0	57	229
Number of Scoop nets	0	27	0	0	13	40
Number of Spears	648	44	117	420	86	1,315
Number of Trawl nets	3	0	0	0	0	3
Number of Fences	0	0	0	0	0	-
TOTAL						55,335
Engines						
Number of Outboard engines	156	316	94	41	130	737
Number of Inboard engines	14	64	2	0	14	94

Source: Division of Fisheries (2013:40)

2.6 Coastal fishing communities

2.6.1 Historical context

The community which forms the basis for this study is a small-scale fishing community. Arguably, the definition of small-scale fisheries is of course problematic, since as explained in literature (Andrew et al., 2007; Berkes et al., 2001; Chuenpagdee, 2011; FAO and World Fish Center, 2008; Teh and Sumaila, 2013), different countries have their own ways for categorising fishing activities. According to Teh and Sumaila (2013:80), small-scale fishers should be those communities whose fishing activities are: 1) primarily geared towards household consumption or sale at the local level; 2) at low level of

economic activity; 3) for fulfilling cultural or ceremonial purposes; 4) non-mechanized, or involve low technology and low capital investment; 5) undertaken by the fisher and/or family members only; 6) conducted within inshore areas; and 7) minimally managed. For the purpose of this study, small-scale fishing refers to using small craft and simple gear (though not necessarily simple techniques) of relatively low capital intensity.

Few published materials exist on specific studies surrounding coastal fishing communities in Tanzania. What has been published is largely anthropological in nature, with the focus on cultural material in fishing communities, resource management, indigenous knowledge, religion and belief, language, pottery and crafting, traditional architecture of towns, seafaring and trade, and socio-political processes concerning marine conservation (e.g. Christie et al., 2013; Garlake, 1966; Horton and Mudida, 1993; Larsen, 2009; Walley, 2004 etc.). In the context of the overall Tanzania's coastal fishing communities, these studies appear as a pittance. They are site-specific, especially for areas around Mafia, Kilwa, Rufiji, Bagamoyo and Tanga, leaving a gap for southeast communities, especially in the Mtwara region. More specifically, fishing households in Mtwara are among the most poorly described of the communities of Tanzania, even though they are among those with the earliest and longest contact with alien, literate societies.

While fishing is broadly considered an important part of the economy, the knowledge gap about key aspects of fishing communities, such as gender, power and economic relations, have resulted in marginalisation and underestimations of the potential contribution of fisheries to poverty reduction and to overall national development. On the other hand, the paucity of studies presents an opportunity and a challenge for researchers to contextualise and to more broadly understand the dynamics of life in Tanzanian coastal fishing communities.

Historically, people, living by the sea in Tanzania, formed fishing communities that were comprised of families or kin-groups. It is reported that these communities engaged primarily in fishing to satisfy their basic material and social needs rather than to accumulate capital. Nevertheless, some scholars, such as Chami (2009), argue that livelihoods in coastal societies (Swahili people) were traditionally agricultural-based, although people were gradually engaged in various economic activities, which formed

wider livelihood systems. For instance, Beidelman (1967:xii) states that people in coastal areas, especially *Zaramo* and *Kwere* (who in recent days dwell in areas around Dar es Salaam and Bagamoyo) practiced iron-working, pottery making, fine basketry and a considerable amount of woodcarving of tools and decorative pieces. Arguably, coastal communities were practising both agriculture and fishing, although fishing seems to be a subset of agriculture and a low-scale activity, as expressed below:

Swahili people would have been farmers but they would also have kept chickens, cattle and ovicaprids. (...) Fishing must have dominated the activities of those living near the shore and on the islands settlements and fish would secure the most reliable means of obtaining protein. The Swahili are the descendants of the people who must have conquered the ocean from ancient times through fishing and trading (Chami, 2009:48).

Several historians indicate that before the 1900s, numerous explorers visited the East African coast (Swahili coast) at various points in time and reported about people and their economies (e.g., Caplan, 2009; Chami, 1994; Freeman-Grenville, 1962; Middleton, 2004). However, in their writings, virtually none explained clearly about these fishing communities. In spite of a lack of detailed reflections on fishing communities, Chami (2009:48) indicates that people in coastal areas fished in both deep and shallow waters, and that there were periods where the population consumed great quantities of shellfish and land snails. This certainly suggests periods of hardship and could also be taken as an indicator of the overexploitation of fish species.

Early accounts of visitors to East Africa abound with vivid descriptions of agro-pastoralist communities, with only a cursory detail on fisheries. For coastal areas, most East African historians have, in particular, described agricultural systems, such as shifting cultivation and large-scale plantations (Kjekshus, 1977:26–46). Coastal cultivation systems involved a long-fallow practice of three to four years, with successive harvests of maize, rice, sorghum and cassava, inter-grown with various legumes (Kjekshus, 1977:29). Additionally, these forms of agricultural systems were also associated with technological innovation as highlighted in the excerpt below:

German travellers were struck by the very advanced irrigation techniques and by scale of the operations, where water from the main rivers was for several miles directed towards the cultivated fields in the valley bottoms.

Dams of stone and timber were built high in the valleys from which the irrigation furrows branched out. The peasants in this region were also quite familiar with animal dung as fertiliser, and their system was extremely productive (Kjekshus, 1977:33).

Conversely, one may argue that early travellers were not as fascinated by fisheries and, thus, did not have much interest in reporting on them. Nonetheless, maritime studies indicate that the transshipping trade between coastal areas, Arabia, and the Far East already used canoes to sail to the sea, and that sailing was probably the most prestigious activity of the Swahili man (Chami, 2009:48), and, therefore, would have drawn the attention of explorers. Several authors (Chami, 2009; Pollard, 2012, 2008) report that the Romans found the people of the Swahili coast already making sewn boats and also importing boats from abroad. Similarly, other coastal people, such as the *Zaramo*, built fishing boats. These boats, according to Beidelman (1967:16), underwent considerable modification through centuries of Arab contact. Although it would be difficult to prove, an overly optimistic argument would be that these boats also could have been used to fish, because shellfish and fish were among the products traded during that time. Recent archaeological excavations have also provided evidence of a seafood trade between the Arabs and Africans, where the Africans prepared marine products to sell to the Arabs (Pollard, 2012).

There are few built structures along the shores that could be linked directly to the importance of seafood trade. Built structures related to urbanisation and non-seafood trade are evident elsewhere along the shore (Fleisher, 2014:4-6; Pollard, 2008:271; Wynne-Jones, 2013:761-763). The most notable ones include old buildings dated back to the 11th century in Kilwa Kisiwani, and stone towns like Bagamoyo and Zanzibar (Chami, 1998:202–207).

People along the coast used to build large spectacular tombs, using stones and lime, with most of them concentrated around the mosques (Chami, 2009:45). It is interesting to note that alongside the tombs—the walls of some of these tombs being more than two metres high—architecture structures along the Swahili coast were reinforced by mangrove wood and coral rubble, suggesting the traditional use of marine resources. On describing architecture of Swahili town, Chami (2009) says:

Four storey houses' floor slabs were made by arranging mangroves or other hard wood across each other. Lime mortar, sometimes mixed with coral rubbles, was spread on top (Chami, 2009:47).

Historians have observed that agricultural areas near the coast reverberated as a result of city formation that created a considerable demand for foodstuffs, which, in turn, stimulated their specialisation as grain and vegetable producers and suppliers for the urban centres. For instance, the export of large quantities of foodstuffs (beans, maize, rice and sesame seeds) from the Rufiji villages (that could be considered fishing villages) to Zanzibar are recorded in the literature (Kjekshus, 1977). Because of the important rice exports, Rufiji was referred to as *Calcutta Mdogo* (Little Calcutta) (Maghimbi, 2007; Mwami and Kamata, 2011:12; Ochieng, 2002). Furthermore, it seems likely that part of the flat and enormously fertile river valleys in the south (Ruvuma River and Makonde plateau) were particularly affected by these developments. The greater urban concentration on the north half of the Tanzanian coast also caused a deep penetration of agricultural demands. In none of these developments are there accounts for any growing demand for fisheries products.

While the history of Tanzania does not explicitly address economic conditions in fishing communities, close examination of the coastal trade suggests a role for fisheries products in the local economy. Concerning the well-known trade that existed between the hinterland and the coast, Kjekshus (1977:34), citing Baumann (1891), indicates that large quantities of maize, sorghum and rice, originating in *Bondei*, were delivered to the coast, and that fish were usually brought back to form part of the standard diet. His accounts, however, show that *Wadigo* did not seem to have been part of this pattern. Baumann described these people as recent converts from cattle-keeping to agriculture due to *Maasai* raids (Kjekshus, 1977:34). In recent years, *Wadigo* have become active fishers in northeast coastal areas of Tanzania, and they have been frequently reported to be migrating further north to Kenyan fishing grounds.

In recent years, large quantities of fish bone have been recovered from archaeological excavations (Biginagwa, 2012:159), although accounts by early explorers did not detail

fish in coastal areas. These new finds reveal the type of fish caught, as well as fishing methods—indicating the existence of fishing activities in coastal areas of Tanzania.

Improvement in transport and communication such as opening of railways¹⁹ however was not accompanied with establishment of infrastructure such as ice plant that could have escalated fishing industry. The coastal people involved in fishing were not able to transport fish to the hinterland markets. Even to present, fishing communities reside in peripheral communities with weak market access and are forced to compete with much more technologically sophisticated craft for dwindling resources.

With the lack of scholarly studies on fishing communities, many concerns regarding them have not been comprehensively addressed in recent times even with the development of a robust literature on fisheries science in many academic disciplines in Tanzania. For instance, a number of academic and research institutes have come out, like the Institute of Marine Sciences (IMS); the Department of Fisheries and Aquatic Sciences of the University of Dar es Salaam; the Animal Science Department at Sokoine University of Agriculture; the Tanzania Fisheries Research Institute; and the newly established Fisheries Education and Training Agency (FETA²⁰). This has, on one hand, remedied studies on fishing (e.g., creating more biological information on fish species in certain sites), whereas gleaning information on populations using fisheries resources and their livelihood dynamics continues to suffer neglect.

Although there is less detailed information on earlier coastal fishing communities in extant scholarly works in Tanzania, this does not, however, imply that these communities never existed. What is not well elaborated on in the literature, needing further research, is a clear demarcation of fishing activities from other activities that formed the local economies, in sea-based areas, and delineation of precisely what populations took part in each endeavour. But more broadly, it is quite convincing that earlier fishing communities participated in an inshore fishery with simple fishing gears.

¹⁹ The first railway in Tanganyika was built inland from Tanga on the coast after 1891 by the German rulers. They also built central railway with about 1200 km from Dar es Salaam (coast) to hinterland regions.

²⁰ Established by merging two fisheries institutes—Mbegani Fisheries Development Centre (MFDC) and Nyegezi Freshwater Fisheries Institute (NFFI). MFDC was established by the Government in 1966 as an artisanal fisheries development centre while NFFI was established in 1967 as an experimental centre with responsibility for conducting fishing, processing and aquaculture trials.

2.6.2 Transformation in fishing communities

Similar to small-scale fishing communities around the globe, fishing communities on the coast of Tanzania have undergone drastic changes in response to environmental, socio-economic, cultural and political change. More specifically, subtle reconfigurations have occurred leading to changes in socio-cultural structure, social organisation and customary rules. Specific management measures, such as gear restrictions and bans on beach seines, as well as delineation of marine protected areas, have resulted in a number of conflicts among resource users. Threats to fishing have been increasing due to poor management, incompetent fisheries officials, the greed of some fishers for quick riches, and a shirk of responsible fishing as a way to increase production from declining resources.

The increase in human population, most marked since the 1990s, has brought with it a striking increase in social diversity in coastal areas of Tanzania. At one time, the major social division was between fishing (*wavuvi*) and non-fishing families (*wakulima*). Today, many other groups (of blurred distinctions) are involved. Also, once it was uncommon for coastal villagers to belong to more than two social groups, now the major social groups centre on numerous relatively new institutions. Among many others, these include religious groups (Muslims, Christians, traditional believers), political affiliations (ruling and opponent parties), pro-conservation (*wahifadhi/mazingira*), seaweed farmers, women groups for saving and rotating schemes (e.g. Village Community Bank—VICOBA), entertainers/artistes (*wasanii*), cashew nut traders, coconut traders and petty business groups.

The increased demands for fish have led to an increased number of people involved in fishing and related activities. Most of these new people in the fishing industry come from an “egalitarian” culture, because their community members have traditionally had different backgrounds, such as petty traders, hunters, pastoralists, waged labourers, and others. While not equal to inland fish, like the Nile perch in Lake Victoria (Bwathondi et al., 2001; Mgaya, 2005), critics argue that the dominance of medium-scale operators in fish trading, processing and marketing has opened up access to markets beyond coastal villages. This has brought with it opportunities to trade fish products outside coastal

areas. Nonetheless, whether or not the observed changes have improved the quality of life in these fishing communities, is an issue that needs addressing.

More generally, there have been remarkable changes in social organisation within the coastal communities over the past few decades. Traditionally, men used to fish, while women processed catches and managed households. In recent years, some women have become active in fishing although their number is relatively low, and they focus largely on inshore waters without fishing vessels. Power was traditionally held by men in relation to decisions that matter in the household, including fishing activities. Conversely, women have more recently taken some control, as evidenced by their holding positions in some institutions, such as beach management unit (BMU) and fish landings sites.

Transformations occurring in the fishery have, in turn, made it more difficult to define a coastal fishing community in contemporary Tanzania. This undoubtedly contributed to problems encountered when selecting respondents based on their livelihood categories for this study (see section 4.3.1. Some key interviewees for this study remarked that prior to the 1990s; one would consider a fishing community as a small coastal fishing village with a “fishy” smell that was remote from urban areas. This definition is vague and lacks a clear, systematic boundary, because some scholars, such as LaViolette (2008:27), state that archaeological evidence supports the concept that the first Swahili (presumably coastal) communities were groups of mixed descent consisting of farmers, fishermen, cattle keepers and traders.

Even now, such conceptualisation is no more appropriate in describing the fishing communities in Tanzania. For example, while it may be culturally acceptable to say that some villages, such as Moa and Kwale (Mkinga district) and Msimbati and Msangamkuu (Mtwara district), are fishing villages, they are, however, currently struggling in peri-urban economies, where fishing is somewhat submerged in other activities, including smuggling and unofficial points of exit to third countries by migrants from Ethiopia and Somalia (Ministry of Home Affairs, 2008:12). Some people in these villages are acting as local contact points and manage routes of transit as part of their livelihood strategies.

While an outsider would immediately realise that they are in a fishing community, from seeing fishing nets and boats anchored along shores, other resource users like tourists may also find several boats to take them to dive sites, as in northern coastal villages off the city of Dar es Salaam. This may make one wonder whether the conscience of independence of fishers is compromised as they take part in tourism and the ferry business to earn extra cash income.

There is little doubt that a number of key transformative trends like a cash-based economy, coastal tourism, social-political changes, and the growth of mariculture activities (especially seaweed farming) have brought remarkable changes in the social structure of fishing communities. Evidently, a growing gap in income between boat and gear owners (*matajiri*), and fish workers (*wavuvi*) and middlemen, who buy catch or provide capital, has created power hierarchies that are socially apparent and recognised. These transformations have apparently led to an increasing concentration of production capacity in the hands of a relatively small number of individuals with capital. Most of these individuals reside outside fishing villages. Anecdotal evidence suggests that this was uncommon in the past. However, historians, such as Maxon (1986:41–44), indicate that between 1200 CE and 1500 CE, several city-states like Mogadishu, Mombasa and Kilwa prospered, and these communities were socially stratified.

Even though most villages in coastal Tanzania retain a distinctive “fishy” flavour, and might at first glance appear to justify the stereotypical description, it is clear that enormous changes have taken place here, affecting everything from social organisation around fishing activities, power, and economic to gender relations. These transformative processes have ultimately affected the sustainability of livelihoods and the creation of wealth and poverty. As a result, the usual view of fishing communities in Tanzania as remote and tradition-oriented, without profound changes, is an unfounded stereotype, with little basis in reality in recent years.

2.7 Historical background on the management of marine fisheries in Tanzania

There is a general consensus in scholarly debates that management of natural resources in Tanzania passed through three²¹ era namely pre-colonial, colonial and post-colonial (Zahabu et al., 2009). Management approaches emerged during these eras are discussed in literature (see e.g. Vihemäki, 2007). These include clan based in post-colonial period, and centralised in colonial and early years of post-colonial (*Ujamaa* policy). Following trade liberalisation, the major approach became market based. This is continuing concurrent with participatory approaches that emerged since the 1990s.

2.7.1 Pre-colonial period

Little concrete information is available about the local economy, politics and social organisation in coastal fishing communities in the present-day territorial area known as Tanzania, prior to the beginning of colonialism in the 19th century. On one hand, some of the earlier assessments on politics and economics are not representative of a fishing society as is agriculture, particularly food cropping, and the ivory and slave trade, which were exchanged for items such as beads and textiles (Kjekshus, 1977:117–121) and were a matter of concern. Specific studies on natural resources, especially forests, indicate that the pre-colonial period was characterised by management through traditional institutions (including taboos, beliefs and customs), low populations and minimal exploitation of forest resources (Zahabu et al. 2009:8).

2.7.2 Colonial period

The period between the years 1884 and 1960, during which the lands that came to form Tanzania were governed by European states, is described as the colonial era (Mihanjo, 2011). This era can be further divided into periods of German rule (1886–1918) and British rule (1919–1961) (Torell, 2002:276). The relationship between some of the current patterns in natural resource management and the colonial era is a frequently discussed topic in Tanzanian natural resource governance literature. Many natural resource experts agree that colonialism shaped the use of resources, such as land and

²¹ Highlights of the evolution of local government in Tanzania were available at <http://www.pmoralg.go.tz/menu-data/about-us/history/History%20of%20Local%20Government%20In%20Tanzania.pdf> [Accessed 13.08.2013]

forests, and formulated the general legislative structures for their governance. Consequently, even after independence in 1961, many of the colonial structures continued to shape natural resource management (Bode and Wu, 2011:19).

Many scholars argue that in governance terms, the colonial period represented formation and imposition of centralised management institutions for nearly all key resources found in Tanzania, even though they never had full control over the territory (Bode and Wu, 2011:7 –9). They created a colonial order that severely weakened the political, economic and military structures of pre-colonial societies by a mixture of indirect rule and direct rule (Iliffe, 1979:118; Temu, 1979:88–93). Typical were wildlife, land and forest laws that were all based on the process of alienation, where local people began to be moved out of newly protected areas, proscribed the use of particular products (Chachage, 1998; Shivji, 1998; Ylhäisi, 2003).

Non-availability of documented materials on management of the marine fishery in the colonial period was commonplace. The literature shows, however, various attempts to manage Lake Victoria's fisheries, which date from 1927, when the first fishery survey was conducted along with the enactment of regulations, by 1933, for a minimum mesh size of five inches (Bwathondi et al., 2001:2). Although the literature lacks comprehensive historical coverage of the management and governance of marine fisheries in the country, the mere fact that coastal communities have relied on marine resources for their livelihoods since time immemorial implies a major gap in the literature, which needs to be addressed urgently with micro socio-economic studies. To this end, exploring the colonial period is crucial to the understanding of current fisheries management in Tanzania.

2.7.2.1 German colonialism (1886–1918)

The mainland area that is today called Tanzania and the land areas that nowadays are the states of Rwanda and Burundi became under the German colonialism in the 1880s and was named German East Africa (Iliffe, 1969:32). Typically, German rule started a process that changed the society from an agro-pastoralist society to a capitalistic market-

oriented economy and in 1895 declared all “ownerless” land areas as Crown Land (Vihemäki, 2009:70).

Hydén (1980:41) argues that German colonisation, combined with the devastating impact of several epidemic diseases, transformed earlier patterns of indigenous economies. In large part, they opted for a mixture of settler and plantation agriculture, on the one hand, and cash-crop oriented peasant agriculture on the other hand. According to Coulson (1982:40), the German administrative policy generally sought to establish a settler and plantation agriculture, where African labour was used to extract revenue from cash crops, such as sisal, rubber, cotton and coffee. Thus, it could be argued that they did not value fisheries resources as of equal importance as a cash crop. The German rule introduced a hut²² tax in 1897, only to force people in the colonial economy, delivering surpluses to the market and forcing native peoples into wage employment (Iliffe, 1979:133).

It is not clear whether German rule made any effort to transform Tanzania into fisheries-based economy. However, there is a broad consensus that the Germans thought that forests could cover the operational costs of administration. Consequently, the first forestry policies for German East Africa were to secure the exploitation of natural resources that were seen as valuable in Europe (Koponen,1994:529–533). Furthermore, German rule made comprehensive wildlife regulations, including the requirement to purchase licenses for all hunting carried out in the territory, and they banned customary hunting practices, such as the use of nets, pits and snares (Nelson et al., 2007:236). Lack of information in the literature on fisheries, compared to forests and wildlife, may fundamentally indicate little interest by the German rule towards fisheries and fish. This ultimately leaves the question open for further research.

A broad review of literature on German rule in East Africa showed that their system of administration, until their departure, was indirect rule (the *akida* system) (Iliffe, 1969). Indirect rule involved the use of chiefs (clan or tribal rulers) but stripped off much of their traditional powers, even changing their traditional names (Coulson, 1982:41). The *akida*, connoting the African term for headman, was a minor African administrator dealing only

²² A type of tax introduced on per hut or household basis and benefited the colonial authorities in four related ways: it raised money; it supported the currency; it broadened the cash economy, aiding further development; and it forced Africans to labour in the colonial economy

with Africans. They were charged with a prescribed area for collecting taxes for the central colonial government, while ensuring that the orders of their German masters were obeyed (Coulson, 1982:41).

It is not well known whether German rule—through the *akida* system—regulated all fishing rights in coastal areas, due to lack of information for arriving at an authoritative conclusion. However, the *akida* system was also common in coastal areas and, therefore, could suggest some sort of autonomy over fisheries, as it was with other administrative tasks. This could also be underscored by the fact that traditional rule, such as through chiefs and council, may have been regulating natural resources, including fisheries, but were stamped out by the Germans after the Maji Maji rebellion of 1905–1907 (Iliffe, 1969:9–26; Maxon, 1986).

A common theme in German East Africa that most scholars point out is the restriction of human activities in reserved areas (Sunseri, 2009:52–54), most of which were forests and game areas. Neumann (1997:50) states clearly that there were a total of 231 nature reserves established by the Germans between 1906 and 1914, where all human activities were banned. Although there is no explicit link to fisheries, studies have shown that conservation policies imposed led to the emergence of new boundaries that changed peoples' livelihood strategies and eroded the role of local people as independent resource users (Vihemäki, 2009:73).

Although it could be argued that fish are a form of wildlife, and for this reason fish and game have to be managed jointly, there is no evidence to show that game or forest laws, introduced by German rule, were also applicable to fisheries. In other countries, such as Zambia and Zimbabwe, hunting restrictions that are a common feature of wildlife (game) legislation were also applied to fisheries. This included regulations, such as closed seasons, protection of young game, and licensing that was meant to avoid over-hunting. However, it is believed that a strong ecological interest during German rule was shown through their establishment of the first forest reserves at the beginning of the 19th century (Koponen, 1994:529–533), where priority was given to water-catchment forests and forests with valuable timber species. Unfortunately, there is no written fisheries

legislation or policy left by German rule that could suggest their commitment to and interest in fisheries.

2.7.2.2 British colonialism (1919–1961)

The mainland area that nowadays is known as Tanzania was given to Britain by the League of Nations, following the end of the First World War (WWI) of 1914–1918 (Nelson et al. 2007:236). The area was then renamed Tanganyika. Most organisational structures of natural resource management that existed during German rule also endured under British rule (Bode and Wu, 2011). Like the Germans, British rulers maintained exclusive policies on forests and wildlife established by the Germans. For example, the British built upon the Germans' framework of centralising control over wildlife by regulating utilisation and establishing protected areas (Nelson et al. 2007:236). Vihemäki (2009:74–77) reports that the British extended areas of nature reserves, where local people were seen as a “threats” to the environment and needed to be controlled.

Although local people were allowed to use natural resources (presumably including fish) for household needs, British rulers embarked on more control of certain valuable resources. They re-gazetted game reserves established by the Germans, which now included “complete” game reserves, where no hunting was allowed, and the “Governor” could prohibit or restrict entry, settlement, and cultivation of the land (Nelson et al. 2007: 236). For example, Neumann (1997:55) states that in 1928 the use of certain valuable commercial timber species was restricted, and the state monopolised their harvesting.

There is a dearth of information on whether or not similar measures were implemented to control commercial fish species. However, the British system of rule—the indirect rule—where tribal chiefs and their councils were given legal control over administration by the Native Authority Ordinance (Reed, 1979:5; Crowder, 1964:198), could suggest jurisdictional power over fisheries.

With the rapid rise in timber prices and export during the Second World War (WWII), a number of actions were taken by the British rulers towards meeting the growing demand of these products. Several new sawmills were opened, government subsidized machinery

and hiring of African labour, and exploitation was intensified in both forest reserves and non-reserved land (Sunseri, 2009:119–122).

After WWII, it was realised that Tanganyika could not meet the growing demand for timber. As a response, the British rulers increased funding to the Forest Department and expanded forest reserves (Sunseri 2009:125). There is no record on whether a similar department existed for fisheries or for any establishment of marine reserves, as a way to conserve fish stocks.

The British rule considered the fishery to be for natives (Graham, 1929). It might be assumed that the British took longer to recognise the importance of fisheries than they had acknowledged for the value of forests, wildlife, and game. As with the Germans, they left without any policy or legislation on fisheries in place. Archives of colonial reports indicate that the Natural Resource Ordinance, passed in 1948, came into operation in 1949. This, however, was belated, as the British rule had already promulgated other ordinances, such as the 1923 Land Ordinance (Shivji, 2002:7). Admittedly, the failure to put much effort into recognising the value of fisheries during colonial times has been merely a reflection of other, almost innumerable, acts of marginalisation meted out to the coastal people in present-day Tanzania.

Unlike terrestrial areas, where cash crop farming was introduced into the peasant mode of production (Tibazarwa, 1994:64–70), in coastal areas there are no reports of such major social and economic transformations related to fisheries. This would suggest that perhaps fishing was largely practised on a subsistence basis. Even though food shortages were evident during British rule (Maddox, 1986:17–22), there are no reports that might have prompted rulers to impose strict regulations dealing with fish production. While every able African over the age of sixteen was obliged to pay taxes, it has been established that people were forced to grow cash crops to raise income for such taxes (Eckert, 1999:216). This, on the other hand, could have a profound impact on traditional fishing practices and management. However, lack of clear information paints a potentially dismal picture of exactly what took place.

2.7.2.3 Post-independence (1961–to date)

This is a period beginning with the year of independence (1961) to the present day. During this period, the national response to fisheries management has been manifold and varied. After independence, Tanzania adopted a socialism model, commonly referred to as *Ujamaa* (African socialism). Under *Ujamaa*, numerous companies were nationalised, and the state took control over imports and wholesale trade (Cornelli, 2012:201–203). More generally, the socialistic era entrenched and reinforced centralised natural resource management as was also the case during the colonial period.

In the early years after independence, fisheries (and aquaculture) issues were a part of agriculture governance. Fisheries were, however, not managed in the sense of being regulated for conservation or utilisation. The government intervened in the form of constructing physical infrastructures at landing sites and developed a provision for extension services. It is hard to discern whether this intervention also included a provision for granting credit for fishing equipment, as little data exists to confirm this. The most conspicuous involvement of the government was through the establishment of fishing companies as an attempt to increase revenues from the fisheries sector. Consequently, Tanzania Fishing Corporation (TAFICO) was established specifically to fish prawns in marine waters. For the reasons linked to the country's economic problems and the socialist politics, TAFICO was incompetent and collapsed. Another fishing company, the Bagamoyo Fishing Company (BAFICO), was formed in the coast. This was a small company formed with the aim of harvesting several fish species from the sea. BAFICO survived for a short period before its collapse in the 1980s; for the same reasons as TAFICO.

In the 1970s, the Fisheries Division was founded and became responsible for the Tanzania mainland fisheries. Concurrently, the nation's first fisheries legislation—the Fisheries Act of 1970—was enacted and placed authority and responsibility for fisheries resources in the hands of the government. Virtually, however, this legislation lacked provisions for community participation. More broadly, the Fisheries Act of 1970 gave more power to the Minister responsible for fisheries, including the power to create orders and regulate through licensing. The 1970s also saw the establishment of marine reserves,

where seven small areas of reef around Mafia Island-Chole Bay and Tutia Reef were declared marine reserves (Greg, 1998:267). Similarly, the Dar es Salaam Marine Reserves System (DMRS) was gazetted as a marine protected area (MPA) in June 1975 under the Fisheries Act No. 6 of 1970 (Roxburgh et al., 2002).

In the 1980s, Principal Fisheries Regulations were created. These regulations and their subsequent amendments aimed to provide many of the detailed requirements in accordance with the Fisheries Act legislation. Other important legislation, related to management and governance of marine fisheries in the 1980s, included the Territorial Sea and Exclusive Economic Zone Act (EEZ) (1989), which among others, declared the territorial sea and the EEZ of Tanzania. Unfortunately, implementation of this act was stalled, due to reservations from the Zanzibar Government. Consequently, an important vehicle for the management of the EEZ went missing until 2007, when it was agreed by both parties and came into force. Since then, implementation and enforcement of policies on deep sea fishing vessels, including distant water fishing nations (DWFN) in the EEZ, started to take place.

The process of policy reformations in the 1990s resulted into enactment of the Marine Parks and Reserves Act of 1994 and the development of National Fisheries Policy of 1997. There are also several other policies and guidelines that are relevant for fisheries management in Tanzania formulated during the 1990s. There are also several policies and guidelines that are relevant for fisheries management in Tanzania formulated during the 1990s. The policies include the National Forestry Policy (1998), Wildlife Policy of Tanzania(1998), National Tourism Policy (1999), National Integrated Coastal Management Strategy (1999) and Agricultural and Livestock Policy (1997). A number of guidelines with some bearing on fisheries resource management, as mentioned by Sobo (2012:3) include the Mariculture Guidelines (2001), Tanzania Investment Guidelines, Guidelines for Coastal Tourism Development in Tanzania (2003), Guidelines for establishment of BMU of the marine side 2009 and a draft Guidelines for Collaborative Fisheries Management Areas 2012.

The Fisheries Act of 2003 repealed the Fisheries Act of 1970 with the aim of assuring the promotion of sustainable fisheries, ensuring adherence to regulations and conservation of

resources. Though not mentioned explicitly, the Fisheries Act of 2003, to some degree, embraces provisions of community participation through establishment of beach management units and co-management regimes. Nonetheless, as the Fisheries Act of 2003 is currently under review, it is anticipated that Tanzania might have new fisheries legislation in the near future that will try to address major changes observed in its fisheries through community-based management approaches and others, as stipulated by the Food and Agricultural Organization (FAO) code of conduct of responsible fisheries.

Tanzania has also ratified international conventions relevant to fisheries governance. In 1982, Tanzania authorities signed the United Nations Convention on the Law of the Sea (UNCLOS) and the related Fish Stock Agreements (ratified it in 1985), committing the country to specific conservation and management standards for living aquatic resources (Daffa, 2011). The country signed the Convention on Biological Diversity (CBD) in 1992 and ratified it in 1996. Tanzania is also involved in at least ten international and regional agreements directly or indirectly related to the management of fishery resources. Some of these agreements do not have legal power to deal with national issues, because there is no legislation to enforce them, while others are felt to be obsolete due to the lack of political will.

2.7.3 Salient issues in fisheries management

Fisheries in Tanzania are virtually managed by the central government through the Division of Fisheries (DoF). Institutionally, the DoF is operating within severe operational constraints with inadequate human, technical and financial capacity. These conditions, in turn, have negative effects on the implementation of duties such as collection of basic data required for managing Tanzania's fishery. There is a lack of continuity in the collection of catch and effort data. More importantly, there has been a failure to register fishers and fishing vessels. Van den Knaap (2014:11) reports that the results of the latest fisheries frame survey along the Tanzanian coast demonstrated that only 27% of the vessels and fishermen are registered. This large impact on the economy includes the failure to collect revenues from the sector and proper allocation of resources for developing fishing communities. Detailed information related to licensing and registration is provided in Van den Knaap (2014:11–15).

The jurisdiction of the DoF is exclusively the fishing industry. As a result, it has difficulties to deal with, technically, and in coordinating indirect services, such as credit and insurance that are important to the sustainability of the fishery. Government structural reforms that started in the 1990s have also affected the institutional capacity for managing fisheries. For example, the DoF has no mandate on marketing of fisheries products and not restricting importation of some materials that could obstruct the aquatic environment.

Other critical issues facing fisheries management in Tanzania include high levels of poverty among communities living in coastal areas. This causes fishers to reduce their dependence on fisheries. Indeed, there is no enabling policy environment to support typical methods deployed to block or adjust the incentive to overfish, like gear restrictions and no-take areas. As a result, such measures are, in some instances, being contested by certain groups of beneficiaries, leading to plans to rescind those measures such as bans on certain gears to fulfil political expediency. On the other hand, there are reports of fishers migrating to remote areas to circumvent enforcement and apparently practising destructive fishing methods.

While co-management schemes have gained popularity in Tanzania (see e.g., Cinner et al., 2012; Fisheries Division and WWF, 2009; Sobo, 2012), recent experiences in Mafia, Kilwa and Bagamoyo show that authorities responsible for managing fisheries and NGOs are often incapable of initiating and implementing sound management. Resources are adequate, although the government has recently released guidelines on implementation of co-management—beach management units in particular. One clear challenge seen in BMUs is power imbalances. Kajembe and Marageri (2009:30) argue that the private sector is the key player in making such local institutions become real business entities. The unequal power it creates in the process of establishing the BMU puts communities at the risk of benefiting from such measures. Similarly, other measures, which seem to have developed on an ad hoc basis, such as closing seasons for certain fisheries, have not always had the impact intended. Introduction of price adjusting mechanisms, such as tax removal for fishing gear and vessels, could encourage fishers to use modern fishing equipment. However, this remains a new idea. The use of co-management methods are likely to play an important role in curbing resource depletion as evidenced in Bangladesh (Khan et al., 2012) and Brazil (Kalikoski and Satterfield, 2004). It is clear that current

fisheries management methods in Tanzania need to be refined or re-oriented towards new approaches, such as ecosystem-based fisheries management and right-based fisheries, if sustainability of resources is to be realised.

2.8 Overview of the MBREMP's fishery industry

The fisheries of MBREMP were selected as a case study for this thesis. This part of Mtwara rural district is of importance to Tanzanian marine fisheries because its waters contain some of Tanzania's most significant biodiversity of high national and international importance (MNRT, 2005). This area is also a major source of food and nutrients to adjacent waters (Obura, 2004). Besides being an important area for dugong, humpback whales, turtle, dolphins, birds and pelagic fish (WWF, 2004), the MBREMP area supports over 48 genera of scleractinian coral, 15 species of soft coral, 137 species of macro algae and 400 species of fish (Obura, 2004). Its coral reef, which extends south from neighbouring region Lindi to the Mozambican border, connects with the Mozambican Quirimbas reef system. A report by WWF (2004) indicated that together these reef systems are of critical importance as sources of marine larvae and spores which disperse out to northern and southern marine ecosystems. Divergence of the Southern Equatorial Currents in the MBREMP has made it to be an area of high replenishment capability (Shao et al. 2003).

Labrosse et al. (2005:6) provide a number of important features that have determined the nature and extent of fisheries in the MBREMP. These include a relatively narrow continental shelf (1–3 km) with extensive fisheries—rich coral reefs and seagrass beds, and the Ruvuma River and estuary—a highly productive environment.

The fishery in Mtwara district, including the MBREMP, is almost exclusively shallow-water based (Oga²³, pers. comm.). It is dominated by artisanal fishers utilising a wide variety of gear types, including hand lines, traps, nets, beach seines, spears and sticks, long lines, *juya*, *tandilo* (Malleret, 2004:29–32), and, most recently, ring nets (Oga, pers. comm.). Artisanal fisheries are also dominated by the collection of shellfish and other invertebrates on reef flats and intertidal areas, primarily by women and children

²³ District Fisheries Officer, key informant interview held on 13.04.2012

(Malleret, 2004). A large proportion of the fishers, although probably with a tradition of fishing in the area, are, in fact, commercially oriented, even if that is partly opportunistic in the sense that if fish suitable for marketing are caught then they are sold. Otherwise, the catch is eaten (Labrosse et al., 2005).

Catch composition is multi-species and reef fish account for the majority of this catch (Labrosse et al. 2005; Obura, 2004). Most commonly species caught are demersal fish, followed by some large and small pelagics; crustacean, octopus and squid are also common (Labrosse et al., 2005).

Fishing vessels are mainly dugout canoes and some dhows, as is common in other coastal areas of Tanzania (Masalu et al., 2010). Majority of fishing vessels operating in the MBREMP are not motorised (Author, Personal observation). Other boats are found in the MBREMP area but are used as ferries, and are not used for fishing purposes. These boats commonly transport people and goods to Mtwara urban, Kilwa, Mafia, and some cross the border to various areas in Mozambique (Mwaisaka²⁴, pers.com).

2.8.1 Fish diversity and populations

The MBREMP is internationally recognised for its richness in marine biodiversity. At least 400 species of fish are found in the waters of MBREMP, an estimate based on reports from numerous studies using landed catches, underwater visible identification and examination of underwater images (MNRT, 2005:14). Critics have however, argued that a more realistic number of fish species available in the MBREMP is likely to be around 1,000 if detailed fish studies will be conducted (MNRT, 2005:14).

The species richness of fish in the MBREMP is one of the most abundant in Tanzania. It is higher than the number of species in Mafia Island Marine Park—the first marine park in the country, established in 1995, but not higher than numbers reported from other parts of East Africa, where detailed investigations have taken place (MNRT, 2005:14).

Fish populations in MBREMP are, however, being lost at an unprecedented rate caused by human population growth, unsustainable fishing techniques, changing land use and

²⁴ Key informant interview, held on 22.05.2012

climate change. A study on fish fauna by Obura (2004) found the absence of top carnivorous species, such as groupers, emperors, snappers, and barracuda. Herbivorous fish, such as parrotfish, surgeonfish and rabbit fish, were also nearly totally lacking from the reefs. Fish that form schools were also absent (Obura, 2004:13–14; MNRT, 2005:15). These are all indicators of heavy fishing. Destructive fishing techniques—dynamite, in particular—now constitute a major threat to fish populations in the MBREMP (Darwall and Guard, 2000; Guard et al., 1998). Other threats, such as the impacts of climate change, are expected to exacerbate loss of fish species if insufficient measures are taken.

2.8.2 Production trends

No current data exist from the official statistics of the district for the total number of fishers, fishing vessels (by type), and fish catch for the MBREMP. This is particularly complicated by the way fisheries records are kept, that is, the district collects data from the official landing sites only. For the MBREMP, these data are taken from Msimbati. Yet, on a broader scale, the prevailing trend is that data is generalised to reflect the situation for the whole district. Moreover, in recent years, a number of local community members volunteer to record fisheries data, although there is no clear mechanism by which how the records are processed and utilised. Nonetheless, the current production in Mtwara district is approximately 6000 tonnes per annum (Oga, pers. comm.).

The fisheries frame survey of marine waters in Tanzania indicates that in 2009, there were 3099 fishers in Mtwara district as a whole (urban and rural) (Division of Fisheries, 2012:49). Of these 2278 were from Mtwara rural district. The most recent report by Van den Knaap (2014:18) indicates 5461 fishers in Mtwara district, of which 4819 are from Mtwara rural district. Accordingly, the total number of fishers has increased by 2362 (76%). At this point in time, it is hard to link the relatively strong increment in fishers reported in Mtwara district due to absence of detailed studies on fishing communities. However, this could presumably be attributed to growing population in coastal areas.

2.8.3 Socio-economics and marketing

Malleret (2004) estimated that fishing was the sole source of income for 70% of households in seafront villages of the MBREMP. Since then however, there have been no survey on income of socio-economic groups in the MBREMP. Seemingly, current detailed socio-economic survey could reveal striking changes in socio-economic characteristics.

Men engage in many different types of fishing, women generally only partake in *tandilo* (piece of cloths or mosquito nets) fishing, fish mongering and gleaning activities (Malleret, 2004). Although data on post-harvest sector are scant and considered unreliable, anecdotal evidence indicates a markedly rise in the number of women involved in fish trade and processing in recent years.

Fish caught in the MBREMP are primarily consumed through the domestic market. There is no recent data on per-capita fish consumption in the MBREMP; although there is a clear indication that Mtwara town consumes the largest portion of fish from the MBREMP. Fish are either sold fresh, dried, frozen (to a small extent only) or fried at the landing sites. Market location is dependent on the landing site and the proximity to urban centres. Around villages in MBREMP, most fish are sold whole and fresh.

Invertebrates particularly octopus, lobster and prawns are always sold fresh, although prawns are sometimes boiled or dried at the markets by middlemen (Author, Personal observation). Octopus is bought and frozen by Tanpesca, although many other intermediate dealers buy octopus from fishers and sell directly to Tanpesca (Chiwinga²⁵, pers.com).

The main transport to fish loading areas used to be bicycles, although, in recent years, there has been an increase in use of motorcycles (*boda boda*²⁶), three-wheeled carts

²⁵ Key informant interview, held on 15.04.2012

²⁶ The term itself is a corruption of English 'border border'. *Boda boda* mainly provide a passenger taxi service, although they can sometimes be hired to move goods. They operate in areas where more conventional services are physically impossible because of poor road conditions or uneconomic. In rural areas, such as the study site, they act primarily as a service between villages, to Mtwara town or major public transport routes. In recent days, they are increased used by fish traders for moving fish to markets.

(*bajaji*) and pick-up vehicles. Independent buyers purchase fish directly from fishers or boat owners at the landing sites, and process them (Chiwinga, pers. comm.). The use of trucks to transport frozen fishery products and dried fish has increased markedly in the MBREMP, in recent years, and is probably one of the greatest threats to the long-term viability of fish populations. A broad range of actors, including women, have emerged over the past decade, often giving food and fuel to fishers and taking the entire catch.

2.8.4 Threats and challenges to MBREMP's fishery

The coral-bleaching event that occurred throughout the East African coast and the WIO region, in 1998, had an impact on shallow reef areas in MBREMP, which are known to support its rich fishery (Obura, 2004; TCMP, 2001). Other threats, also common along the entire Tanzania coast, are insufficient skills, knowledge, and institutional capacity for sustainable use and management of coastal and off-shore fisheries; unregulated coastal development; and poor scientific understanding of coastal and marine biodiversity and fisheries. Similarly, marine fisheries resources are threatened by inadequate management of fishing methods and efforts, leading to over-exploitation of key commercial and vulnerable species (e.g., tuna), and destruction of habitats that provide critical spawning and nursery grounds for marine biodiversity (Francis et al. 2001).

Threats to the marine fishery arise, in part, due to the heavy dependence of local communities on resources for their livelihoods and to the poor socio-economic condition of the Mtwara rural district. In addition, the lack of clear access rights in inshore waters is exacerbating ongoing poverty in coastal communities and thwarting the potential for government revenue from the fishing industry. It is notable that fishery products are a major source of protein, and fishing is a major source of cash income for many people living in the MBREMP. These facts, however, should be treated cautiously considering the inexplicit relationship between the main occupations of people in the MBREMP and changing socio-economic conditions.

As highlighted earlier, dynamite fishing (which has been practiced in Tanzania since the 1960s) was once fairly prevalent along the coast of the Mtwara district, where, in a single day, hundreds of blasts could be recorded (Francis et al. 2001:7). More explicitly, Francis et al. (2001:7) indicate that over 441 blasts were recorded from October to November

1996 in Mtwara, while in the Songo Songo Archipelago, 30 blasts were heard every three hours. Likewise, 100 blasts were recorded during one six-hour period at Mpori Reef (near Kilwa Kivinje) in the same year (Wagner, 2004:230). Dynamite fishing was effectively controlled in the late 1990s (Darwall and Guard, 2000). In recent years, however, there has been a resurgence of this fishing technique, and it has spread to areas around the Msimbati channel, close to Membelwa and Namponda islets and surroundings north to Msangamkuu (Oga, pers. comm.).

Systematic data on incidences of dynamite fishing in the MBREMP, and even within the whole Mtwara District, are absent. This is partly due to the fact that surveillance and the compliance system in the MBREMP and the district do not entail organised schemes that monitor dynamite fishing. Monitoring—especially data recording about dynamite—is mainly carried out by volunteers and a civil society organisation called the Tanzania Dynamite Fishing Monitoring Network (TDFMN). Data recorded by the TDFMN is, however, not representative and up-to-date because of the areas covered and is being done on an ad hoc basis. Notwithstanding, information generated by the TDFMN and several volunteers suggests that until quite recently, there has been no major success in the campaign to reduce the extent of dynamite use. This, in turn, has reinvigorated the call to deploy the Navy, as was carried out in the late 1990s. This eventually resulted in almost phasing out dynamite fishing.

Although there were several successful initiatives in the late 1990s and early 2000s, led by an NGO called SHIRIKISHO (Southern Zone Confederation for the Conservation of the Marine Environment), to mobilise local fishers and the community in Mtwara to fight dynamite use, such efforts are currently inactive. This could be attributed to little support from government agencies, lack of funding, and social and political conflicts. Excerpts below, taken from some of the focus group meetings held for this study, reveal why dynamite has continued to persist despite ongoing efforts taken by various stakeholders:

There are no plans to achieve villagers' cooperation in patrolling the sea and seriousness in funding these patrols. Sometimes villagers are more than ready to participate in fighting dynamite incidents but tend to have reservations on the honesty of some fisheries officials. Some police and even court officials sometimes collude with dynamite perpetrators after

being given bribes. (Participants Mnete village focus group, 23 March 2012)

[...] there is lack of cooperation between and amongst the organs involved in controlling dynamite and other destructive fishing activities. We do not get support from strong activists groups and sponsors as is with other issues that need public attention and support such as campaigning against female genital mutilation, barbaric killings of albino and elderly women killings as well as conflicts between farmers and cattle keepers. (Participants Nalingu village focus group, 17 March 2012)

The war against destructive fishing and dynamite, in specific, seems to be impeded by lack of awareness by the court system about its deleterious effects. Consequently, there have been numerous court rulings acquitting suspects of dynamite use or those found in possession of dynamited fish, due to an ignorance of the law by the perpetrators themselves. A key informant describes dismay over such rulings:

[...] magistrate said that the accused had never received any training or attended a seminar on dynamite, so they cannot understand if using dynamite is an offense. The worse thing is that once offenders are released return to intimidate the campaigners of anti-dynamite. In some villages if a dynamiter is taken to court, an informal network of dynamiters go to bail them out and pays the fines for them. How can we stop them...people can get dynamite explosive very easily... (Key informant interview KII17, 29 March 2012)

Increasingly dynamite incidents in the MBREMP, as in the entire Tanzania's coast, is allegedly due to the poor participation of politicians in the anti-dynamiting campaigning process. While commenting on the main impediment towards a long-term solution to an upsurge of dynamite fishing, one key informant for this study said that:

The army deployed in 1998 managed to reduce the scale of the dynamite fishing along the coast. There were no more dynamite blasts. [...] Some politicians in coastal areas became uncomfortable on the way the campaign to fight dynamite succeeded and they interfered. You know politicians here have major role and are source of many problems we face, including poverty. They [politicians] claimed for the army discontinue with the patrolling exercises in marine areas. The results are now obvious; explosives are being heard in inshore areas ten times a day and in some remote pockets more than that on daily basis. (Key informant interview KII26, 20 May 2012)

Village liaison committees (VLCs), which were initiated to improve community participation in surveillance and management of resources in the MBREMP, have not been successful in stopping the use of dynamite and other destructive fishing activities. Despite being chosen from amongst local community members, VLCs seem to have no impact on fishers' decisions to violate these regulations. There are also complaints among local communities that VLCs have been part of the problem, due to allegedly being involved in assisting perpetrators, including in-migrant fishers, to circumvent enforcement of fisheries regulations.

At the same time, while both fishers and VLCs agree that dynamite fishing has a profound negative impact, including the likelihood to harm fishers themselves, their perception of the fish stock deterioration mechanism remains too vague. Besides that, with the current trend toward dynamite fishing, one could argue that the situation is increasingly deteriorating, calling for urgent collective efforts from all key players, including the government, NGOs, the private sector, and other key stakeholders.

While there are considerable community-driven initiatives within MBREMP's villages to combat destructive fishing activities, implementation has proved extremely difficult. Further complicating the situation is the coinciding of anti-dynamite campaigns with strong socio-cultural structure and norms within MBREMP villages. Cohesive social relationships, such as family or kin networks, have been posing a considerable challenge for community groups and VLCs, which significantly reduce their commitment against dynamite use and eventually cause them to work in favour of dynamiting. It is important to note that some community members, who take part in these peer-groups, have a low level of understanding of the serious impacts caused by destructive fishing, which, in turn, leads to unequal levels of commitment and ambiguous decision-making against such activities. The situation is often cited (though not documented) to show where dynamite perpetrators have family or neighbourhood relations with people involved in tackling the use of dynamite. In such circumstances, community pressure makes it difficult to deal with offenders, and, as a result, the ultimate decision is always to exonerate the perpetrators captured to avoid disbanding social relations. This phenomenon was specifically captured in the words of one key informant:

Those involved [dynamiters] are sometimes closer relatives of those who patrol or village leaders who eventually protect them. When a patrol is planned, dynamiters are warned in advance by their relatives. [...] As a result, the patrols spend the whole day at sea and fail to apprehend anybody. Even if a dynamiter is caught by patrols, rarely is the case taken to court ... and even if taken fines [about US\$ 10] are insignificant compared to the cost of patrolling. (Key informant interview KII35, 13 June 2012)

Other common, but less practiced, destructive fishing methods in the MBREMP include beating and smashing corals to frighten fish into nets, use of poisons from plant materials (commonly an extract from the Euphoria plant), and chemicals (*thiodine*), as well as the use of spears and sticks to catch more sedentary species, such as the octopus. Such practices often result in the trampling of reef flats. In most cases, reasons attributed to catch declines indicate a widespread acknowledgement amongst the MBREMP's communities that destructive fishing techniques are in use, that fishing effort levels are excessive, and that regulations are generally ignored.

Reports produced by the MBREMP authority frequently and negatively describe the presence of in-migrant fishers. They are blamed for causing a depletion of mangroves trees, used for poles to build their encampments. This, in turn, has exacerbated the extremely high water storm surges that occur during days of extreme weather events. Anecdotal evidence reveals a ripping trough of storms surges in Namponda and Membelwa islets that have destroyed fishing camps.

The gendered fishing method (*tandilo*), which uses small meshing to catch sardines locally known as *dagaa* (small fish) is known to result in both the trampling of reef beds and a high juvenile catch. Jiddawi and Öhman (2002) asserted that nearly 61% of the catch in the *tandilo* fishing consist of fish below half the maximum adult size. Local communities in the MBREMP however, do not perceive *tandilo* as damaging due to the belief that fish caught by *tandilo* are already mature and will not grow any further as argued by scientists. It could also be attributed to the fact that *tandilo* represent as the only source of income for women undertaking this activity (Malleret, 2004).

Despite some efforts by the MBREMP authority to control the presence of in-migrant fishers by issuing identity cards for fishers living within its jurisdiction area, it is admitted

that little significant progress was being made in eradicating in-migrants. An increased number of in-migrant fishers is problematic to the sustainability of fisheries resources.

2.8.5 Management and regulations of fisheries in the MBREMP

While regulations for marine fisheries in Tanzania are clearly defined, there is widespread evidence showing that they are not strictly enforced. More broadly, marine fisheries in Tanzania are continually managed as open access, and the Mtwara district where MBREMP is located, is no exception.

Regulations of fisheries within the MBREMP—oriented towards the reduction of fishing efforts—are essentially the same as those outside, although they are enforced more frequently (Adam, pers. comm.). For example, as in other coastal areas in Tanzania, legal access to fishing is through the purchase of a fisher's licence. However, many people engage in fishing without a fishing license, leading to an underestimate of the number of fishers at specific locations (Libwala²⁷, pers. comm.). A license is valid for one year within the jurisdiction where it was purchased. In case a fisher engages in fishing outside the area specified on their license, they need to report to local authorities, usually a fisheries officer to get a permit to continue fishing in that new area. Unfortunately, management of fisher's licenses are not facilitated by a database, with warning flags as individual licences approach their deadline for validity.

Fishing vessels also need to be registered and to obtain licenses. Verification of a licence for both fishers and fishing vessels has remained a formidable task by district fisheries authorities. It is reported that vessels change their names relatively frequently, and fishers do transfer licences they own to their colleagues. This has further constrained the capacity of fisheries authorities to control fishing pressure and illegal fishing activities (Oga, pers. comm.). Other common legal governance factors include gear restrictions, where certain gears are prohibited because they are believed to degrade marine habitats and to catch juvenile fish. The implementation of these regulations has continued to be ineffective because of the inability to enforce regulations, change socio-cultural attitudes, a lack of political will, and the high dependence of communities on marine fisheries for livelihoods. Closed seasons operate only for prawns, although such fishing is not

²⁷ Key informant interview, held on 8 May 2012

commonly practised within the MBREMP or in many areas of the Mtwara district. Generally, there is no unrestricted access to demersal species and other species in the open sea during the year (Libwala, pers. comm.).

While fishing within the MBREMP boundaries is restricted to fishers residing in villages located within it, restricting fishers from outside the MBREMP has proven hard to enforce. Consequently, fisheries resources in the MBREMP continue to suffer disproportionately from growing human pressure as in other coastal areas of the country. This is particularly true for the sea front villages of the MBREMP where limited enforcement reduce effectiveness in the protection of fisheries resources, and dynamite is continually going on.

In recent years, the Marine Control and Surveillance (MCS) unit of the Fisheries Division has been established in many regions, including Mtwara. However, the presence of MCS has not proven effective, thus far. The high mobility of fishers among landing sites, and the rise in demand of fish for food and trade, have contributed to difficulties in surveillance of fishers and the quest against destructive fishing activities. The other limitation to effective regulation of the fishery in the MBREMP, and in Tanzania as a whole, is a lack of attention to the knowledge of factors that influence the variation of individual catch rates and fishers' strategies for operating within different areas. In fact, almost all fisheries enforcement activities in Tanzania are based exclusively on limiting the fishing effort by controlling the number of fishing vessels or fishers' licenses.

2.8.6 Institutions and fisheries organisations in the MBREMP

The MBREMP authority, comprised of a warden-in-charge, wardens and rangers, with supervision of an advisory committee²⁸ (AC), has an overall mandate in the sphere of management and conservation of fisheries resources in villages found within its jurisdiction. This, however, does not exclude the district fisheries office, which is

²⁸ The Marine Parks and Reserves Act of 1994 provides for formation of Advisory Committee (AC) for marine parks. These committees constitute the representative of marine Park stakeholders including the local community, local government, academia, private sector and conservation NGOs. Its role is to advise the Board of Trustees (BoT) in consultation with the Warden in Charge on regulations, technical, scientific, and operational matters related to day-to-day running of the particular marine park (EcoAfrica Environmental Consultants, 2012:46)

accorded a mandate to deal with the enforcement of fisheries in the district. The two institutions are mutually dependent on each other, but lack of harmonisation of legislation governing them has resulted in conflicts and the overlapping of duties.

A report by EcoAfrica Environmental Consultants (2012:23) highlights that the lack of direct linkages among sector institutions (Marine Parks and Reserves authority, on one hand, and the Division of Fisheries and District Council authority, on the other hand) has created a communication breakdown and problems of overlapping roles and activities between relevant stakeholders—at the district and ministerial levels—in the implementation of policies.

Prior to the early 2000s, village environment management committees (VEMCs) were responsible for enforcement and compliance of fisheries in present-day MBREMP villages. The Marine Parks and Reserves Act provides for formation of VLCs, which are a structure to involve village governments (commonly referred to as village councils) representing communities in the vicinities of MPAs (MNRT, 2005). Each village has its own VLC, made up of not more than 12 members selected for an official tenure of three years in a village assembly.

There was no clear separation of roles between the newly formulated VLCs and the VEMCs. However, with the support of the MBREMP authority, VLCs became active and VEMCs remained virtually dormant. This, created conflicts between these two local institutions in management of fisheries resources. However, the VLCs modus operandi is not necessarily one of many possible forms of co-management for better management and protection of fisheries resources in Tanzania.

It is also not clear if people are selected to become VLCs members based on their commitment and higher level consciousness on environmental issues or not. Although no efforts have been taken to assess the role of VLCs in the overall management of fisheries in the MBREMP, the impression gleaned from this study is that many members of the VLCs are less motivated to fulfil their duties, and that the realities behind family ties and social organisation in villages render obstacles for the unbiased and proper functioning of VLCs. Key informant interviews for this study revealed that VLCs have not taken a crucial role in special task forces formed to deter increasingly deleterious fishing

activities. Arguably, empowering of VLCs through training and incentives, as well as linking them with NGOs with a strong focus on marine conservation, can increase their efficiency and minimise problems caused by socio-cultural ties found within the villages.

There are also other organisations operating in the Mtwara Rural District that could be treated as synonymous with everything that seems functional and desirable in the management of natural resources within villages of the MBREMP. The Tanzania Social Action Fund (TASAF)—a World Bank supported and government managed social action fund—has been addressing socio-economic challenges of communities, like food insecurity and vulnerable groups, in order to minimize the negative effects of the global financial and food crisis, droughts, and flash floods. CARE International in Tanzania has a gender and economic empowerment programme in southeast regions of Tanzania, including the Mtwara rural district, using a community-based group savings and loans methodology to mobilize group members to address a wide range of constraints to the social and economic empowerment of marginalised women and girls. Nonetheless, contributions of these organisations toward changing behaviour to promote the sustainable utilisation of fisheries resources remain unclear.

While many NGOs and CBOs are reported to exist in the Mtwara district (Table 2.5), few are active in dealing with fisheries management. A vast majority of these organisations have been engaged in the MBREMP on an ad hoc basis. They are also known to lack a clear identifiable theme on the environment that can be observed among the core area of their non-commercial activities and goals that focus on the Mtwara region.

Similarly, the role of community-based organisations on fisheries management remains quite contentious and, admittedly, has not helped to build collective actions against destructive fishing activities. For example, some organisations, whose names are reserved here, have been against nurturing institutional arrangements for better fisheries management heralded by MBREMP authorities. This could partly be attributed to the fact that many CBOs tend to be under the patronage of a few individuals, who actually do not want to lose their stakes in natural resource issues. The government has, in recent years, attempted to reverse this pattern through participatory planning and awareness campaigns, although this has not yet necessarily been translated into tangible actions. For example, beach management units are supposed to be established within villages,

although there is the risk of continued domination by influential people. So far MBREMP has offered grants in form of hand-outs to several groups of fishers (see e.g., Fig 2.7) and villagers (see e.g., Fig 2.8) as a way to empower local communities.



Figure 2.7 One of the big fishing boats offered to a group of fishers from Mnete village by the MBREMP authority (Source: Author, field work)



Figure 2.8 Improved technology of fish smoking to reduce fuel wood consumption in Msimbati village

Table 2.5 A list of selected non-governmental organisations in Mtwara district with working domains related to environment

Name of NGO	Category	Organization mission	District based	Activities engaged in the MBREMP
United Peasants of Tanzania (UPT)	Agriculture	Combating income poverty and food insecurity in the households	Mtwara rural	Public empowerment on modern agri-farming notably in vegetable and rice production projects
AMREMF Water and Sanitation Mtwara	Water and poverty alleviation	To improve health and quality of life of vulnerable people in Mtwara Rural District by increasing access to sustainable water sources and sanitation	Mtwara rural	Water and sanitation projects
Mtwara People's Umbrella Organization (KIMWAM)	Multi-sectors	To help poor communities in Mtwara Region become empowered and improve their wellbeing	Mtwara urban and rural	Microfinance projects, fishing gear, mariculture and restoration of mangrove trees
SHIRIKISHO (SOZOCOMAE)	Environment	—	Mtwara/Lindi region	Active in environmental education and awareness to communities on sustainable use of marine resources; enforcement of fisheries regulations
Forum for Conservation of Nature (FOCONA)	Environment	—	Mtwara region	Environmental education, restoration of ecosystems, community empowerment, poverty reduction
Mtwara Convert Foundation (MCF)	Multi-sectors	To improve living standard of the people of Mtwara by using natural resources and other efforts of their respective areas	Mtwara urban	—
People and Development Foundation	Multi-sectors	To improve the living standard of people by reducing the rate of poverty	Mtwara urban	—

Source: Tanzania National NGO Coordination [Accessed 28.09.2013 from <http://www.tnnc.go.tz/ngoresults.php?category=Environment>

2.9 Chapter summary

In this chapter, the coastal fishery of Tanzania was described by presenting explicit information about resource types, landings, and associated threats and management regimes. This was followed by a succinct description of the fishery in the MBREMP and its associated threats. The overview provided, however, clearly shows that there are many gaps in information that makes the exercise of discerning past and current trends in the fishery and in fishing communities non-feasible. These gaps are largely attributed to a lack of systematic biophysical and socio-economic assessments and published peer reviewed materials on the coastal fishery. Nonetheless, in light of information presented here, it could be stated that fisheries continue to remain a crucial resource in supporting livelihoods and contributing to the wellbeing of coastal communities. This desperately needs a local comprehensive analysis of fisheries exploitation to assure vital and appropriate management measures.

Most importantly, this chapter has highlighted that there is clear evidence of transformation in fishing communities in coastal villages. Perceptions of community members on fisheries have changed from having subsistence to a monetary value, leading to a substantial number of people who have traditionally never engaged in fishing. The fishery is currently operating under a new socio-cultural environment from that of historical fishing communities—with a shift from a kin-based mode of production to a cash orientation.

Evidently, a number of factors in fisheries and other economic sectors have given rise to this impetus in the country in general, and in the MBREMP in specific. The liberalization policies, which started in the late 1980s, have opened access to export markets for high-priced fish, although this has not been curtailed following a government ban on the export of finfish. New fishing techniques are being used and migrant fishers are common in many villages. The sector has also grown due to population growth. However, existing organisations and institutions lack a shared vision and common goals connected to sustainable fisheries management. At the same time, degradation of fisheries resources—dynamite fishing in particular—seems to impact directly fishers livelihoods through income and profit reduction, increasing competition and conflicts over fishing grounds, fishery resources and markets.

Chapter 3 Theoretical considerations and key concepts

3.1 Chapter overview

The focus of this chapter is on the central theoretical concepts used in the current thesis. Theories, concepts and terms discussed here aim to provide a theoretical framework for the analysis of this study. Firstly, the chapter briefly outlines the origins of the livelihoods approach (LA), and subsequently discusses the sustainable livelihoods approach (SLA). Additionally, the key elements that form the basis of livelihood analysis are presented along with a critique of the approach. Livelihood concepts are particularly important in this study and are discussed in more detail, for example assets, vulnerability and resilience.

Secondly, the chapter advances the understanding of livelihoods as dynamic, flexible, diverse and adaptive in both time and space by considering the notions of livelihood pathways and trajectories. Based on life-course analysis, the idea suggested here is that individuals/households have inherent abilities, knowledge and creativity to construct and shape their livelihoods. Thirdly, the broader theory of political ecology (PE) and its application in the context of this study is presented. The analysis of PE focused in particular on the political and economic processes in society, in order to identify and understand the existing power dynamics and networks that prevail among households in the study site whose livelihoods are associated with reef fisheries, and on issues such as local knowledge and history in the construction and interpretation of their livelihoods.

Next, adaptation concepts enmeshed in scenario planning approach were incorporated to enrich the theoretical framework for this study; they highlight several variables which are critical to understanding the adaptive capacity and mechanisms by which households in Mtwara coastal villages cope with the cumulative impacts of their activities on reef fisheries. Finally, an analytical approach is suggested using insights from the conceptual lenses of livelihood strategies and vulnerability, life-course, and climate change adaptation.

3.2 The Sustainable Livelihoods Approach

3.2.1 The emergence and influences of the Sustainable Livelihoods Approach

The early cross-disciplinary research efforts that focused on household studies, village studies, and farming systems are said to have later informed and influenced development studies and livelihood thinking (e.g Farmer, 1977; Lipton and Moore, 1972; Moock, 1986). However, it was not until the 1990s that the term Sustainable Livelihoods Approaches (SLA) and the Sustainable Livelihood Framework (SLF) entered the development discourse. Its rise was a reaction to wider changes in general thoughts about development and the perceived shortcomings of top-down, bureaucratic, market-oriented approaches that dominated the development discourse during the 1950s–1970s (Ellis and Biggs, 2001:439).

Scoones (2009) argues that increased attention to poverty reduction, people-centred approaches, sustainability in the political arena, development theory and practice resulted in the widespread adoption and adaptation of livelihood definitions, models, and frameworks during the subsequent two decades. Solesbury (2003:14) states that “the emergence of SLA was characterized by a shift from an idea of development based on economic growth and top-down processes to an idea more centred on human well-being and participation of local communities in development efforts”.

As illustrated by Chambers (1986:5), SLA is attractive because it combines the different strands of thinking, namely environment, development and livelihood thinking, that dominated the various fields related to development issues. In other words, this implies a focus on sustainability, productivity and poor people’s livelihoods respectively (Scoones, 1998).

Several events and documents were particularly relevant in shaping the political milieu into which livelihood approaches emerged. For instance, Arce (2003:202) argues that the SLA originated in a period when policy-makers perceived nation states to be less politically important than regional markets or the economic global interdependence of national governments. The Brundtland Report, titled *Our Common Future*, emerged in

1987 from the Commission of Environment and Development of the United Nations (UNCED). It emphasised the importance of the link between poverty and environment, and this signified the entrance of the term ‘sustainability’ into development discourse and policy discussions (Ellis, 2000a). Schafer (2002:14) states that the concept of livelihoods was incorporated into Agenda 21 at the UNCED in Rio in 1992. Furthermore, as poverty reduction became the rationale and primary focus of most international development work in the 1990s and 2000s (Cahn, 2006:12–14), the livelihoods approach emerged.

Scholarly works (e.g. Niehof, 2004; Whitehead, 2002) link the explosion of livelihood research and subsequent formulation of the SLF to a working paper from the IDS by Robert Chambers and Gordon Conway in 1992. According to Bennet (2010:7), this seminal work sought to “theoretically locate sustainable livelihoods within the actor-oriented approaches to development, the framework of environmental and social sustainability, and the rhetoric of poverty reduction”.

Being deeply rooted in the broad context of poverty and rural development research, Chambers and Conway (1992) sought to move away from the conventional conceptualisation of poverty (i.e. production, employment, and poverty line thinking) (Ellis, 2000:45–47), to incorporate the fundamental ideas of capabilities (Sen, 1984), assets (Swift, 1989), equity, and sustainability (WCED, 1987). Based on the observations of Ashley and Carney (1999:7–8), the SLA aims to promote development that is environmentally, socially, institutionally and economically sustainable in order to provide positive livelihood outcomes.

Although the concept of sustainable livelihoods has been widely accepted in development literature and rhetoric, the meanings attributed to the term vary widely and this may impede practice (Scoones and Wolmer, 2003). However, since its emergence in the late 1980s, SLA has been refined in response to the need for more effective ways of approaching poverty reduction. A key feature of the SLA is the recognition that the root of all human development and economic growth is livelihoods. In this context, livelihoods are not jobs per se, but the wide, infinitely diverse range of activities and assets people engage in to make a living (Scoones, 1998).

3.2.2 Defining sustainable livelihoods

A livelihood is a more complex and holistic concept than a profession or an occupation. An occupation (which corresponds to what DFID refers to as a ‘livelihood strategy’) is the economic activity that contributes to household income and is only one component of a ‘livelihood system’. While a livelihood, in its simplest definition, could be described as a ‘means of living’, the commonly quoted definition is from the seminal work of Chambers and Conway (1992). In their work they define sustainable livelihoods as follows:

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conway, 1992:7–8).

According to Scoones (2009:175), a modified version of the above definition has been generally adopted, with a few minor differences between authors and organisations. A few typical examples are presented below:

A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household (Ellis, 2000:10).

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets...’both now and in future’ (Carney, 1998:4) or ‘while not undermining the natural base’ (Scoones, 1998:5) or including both these last statements (Farrington et al., 1999:1).

In relation to this study, the word “livelihood” holds diverse meanings for fishing households of different wealth categories, ranging from simply a source for a meal and income to a status in the community. Nonetheless, livelihood standards might not necessarily be reflective of wealth status. As example, in one of the study villages, wealthy fishing households, identified by owning boats with engines, owned ‘normal

houses' of a low standard in terms of basic amenities in order to avoid being looted and killed by witchcraft or sorcery.

The two main ideas of SL are adaptive strategies, and participation and empowerment (Tao and Wall, 2009:91). This understanding is however contested by some authors. Helmore and Singh (2001:3) state that adaptive strategies are the changes and adjustments people make in their livelihood systems in order to cope under difficult circumstances. They are based on local knowledge, combining traditional knowledge with appropriate elements from contemporary or external knowledge, assimilated into the community over time, which individuals utilize as coping mechanisms in difficult and unforeseen circumstances (Bebbington, 1999:2025). Helmore and Singh (2001:3) contribute that livelihoods also depend on entitlements such as support from family or clan members in an emergency. Therefore, understanding the current livelihood activities, assets and entitlements of a community or individual naturally provides the best guide to understanding how their livelihoods can be made more productive and sustainable (Helmore and Singh, 2001).

3.3 The Sustainable Livelihoods Frameworks

Promotion of the value of SLA by Chambers and Conway resulted in the development of a wide range of conceptual 'frameworks' by a number of major development agencies with the aim of clearly identifying factors involved in attaining sustainable livelihoods, and relationships between these factors (Knutsson, 2006:91). Being influenced by the fact that the concept of sustainable livelihoods could be an alternative to the largely macro-level based sustainable development approach, SLA may be a more tangible organising framework, particularly for work with impoverished or marginalized communities (Cahn, 2006).

Previously, various authors convincingly showed that by employing a people-centred approach to development that focused on livelihood assets, it was evident to the development agencies that the poor draw on a wide range of livelihood assets, to incorporate a variety of livelihood strategies, in pursuit of a vast array of livelihood outcomes (Ashley, 2000:15). Nonetheless, Carney (2002:15) argues that despite

illustrating the livelihoods approach, these frameworks do not aspire to include all aspects of the SLA, and are just one of a number of analytical tools that can be employed when implementing the approach. In other words, the SLF should not be considered as an accurate copy of reality but a guidance to understand and assess livelihoods.

A SLF provides the structure for integration of household and community-level data for collection and analysis of economic, cultural and environmental assets (Simpson, 2009:188). There are a plethora of SLFs in livelihood literature that has evolved over time and space. The most well-known, which is also adopted in this study, is the DFID SLF illustrated in Figure 2.1, with box indicate fishing practices. The essence is to emphasize that in the current study fishing practices are among livelihood strategies responsible for promoting sustainable livelihoods and may impact a specific household's livelihood assets, means and outcomes.

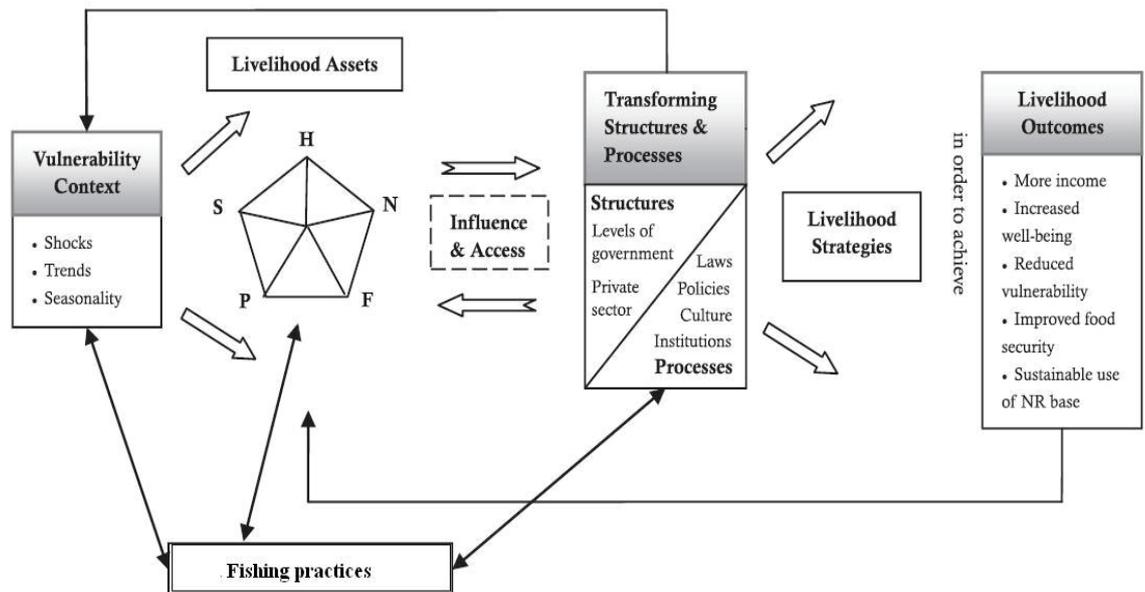


Figure 3.1 The sustainable livelihoods conceptual framework with fishing practices (adapted from DFID, 1999)

Carney (1998) highlights that the DFID framework draws heavily on the work of the IDS, although it has been adapted to accommodate DFID's objectives and concerns. Other frameworks, which are not covered in this thesis, are the IDS framework developed by Scoones (1998:4) and CARE (Cahn, 2006:33). UNDP has no formal framework albeit

documenting the SLA (Krantz, 2001:12). Being people-centred, holistic, and intending to maximize local strengths, Ashley and Hussein (2000:52) state that the SLF provides a common structure for comparing unquantifiable impacts, allowing the investigator to get closer to the development impact as perceived by the local population. This framework permits merging of different approaches to understand various issues such as tourism, land tenure and pastoralism (Ashley, 2000), and how these issues shape the livelihoods of the poor. Based on this, the SLF is put forth as an effective means of evaluating livelihood sustainability based on the five key features summarised in Table 3.1 above and discussed further in the following sub-sections.

Table 3.1 The key features of the Sustainable Livelihoods Framework (Adapted from DFID, 1999; Scoones, 1998:4 –5)

Key feature	Component	Succinct description
Vulnerability context	Trends Stress Shock Seasonality	Vulnerability frames the external environment over which people have limited or no control. People’s livelihoods, choices, and assets are affected by shocks, trends, and seasonality
Livelihood assets	Natural Physical Financial Human Social	Central to the sustainable livelihoods frameworks are a number of capitals or assets that are the platform for livelihood strategies.
Transforming structures and processes	Structures Processes	Structures involve the private and public sectors, whereas processes consist of policy, laws, institutions and culture. They transform and mediate access to assets and have impacts on livelihood strategies or portfolios and the resultant socio-economic and environmental outcomes
Livelihood strategies	Diversification Clustering Sequencing	Are the range and combination of activities and choices that people make in order to achieve their livelihood goals. Also be understood as the means to cope with external disturbance and maintain livelihood capabilities.
Livelihood outcomes	More income Improved food security Increased well-being Reduced vulnerability Sustainable resource management	Are the achievements or outputs of livelihood strategies

3.3.1 Livelihood assets

Sustainable livelihood frameworks usually identify five categories of assets or capital that can be utilised to achieve self-determined outcomes of livelihood strategies in order to reduce the vulnerability of households and communities to shocks, trends and seasonality (Bennet, 2010). The commonly mentioned forms of assets or capital include natural, physical, financial, social, and human capital (Ellis, 2000b) —definitions of each is provided in Table 3.2. In recent times, critics have proposed the inclusion of other capitals such as information (Odero, 2003:11–14), cultural (Cahn, 2006:20), economic and institutional (Shen et al. 2008:26), and political (Dorward et al., 2003:323), which are absent in the standard SLFs. Although not covered by the current study, these missing assets are considered significant in determining ones' rights and capabilities, and shaping the world view associated with fishing activities.

Table 3.2 Definitions of the capital assets (Adapted from Carney, 1998:7; Scoones, 1998: 7–8; Morse et al. 2009:5)

Capital assets	Definition
Human capital	The skills, knowledge, ability to labour and good health and physical capability important for the successful pursuit of different livelihood strategies
Social capital	The social resources (networks, membership of groups, relationships of trust, norms,) upon which people draw in pursuit of livelihoods
Financial capital	The financial resources which are available to people (whether savings, supplies of credit or regular remittances or pensions, economic assets) and which provide them with different livelihood options
Natural capital	The natural resource stocks from which resources flows useful for livelihoods are derived (e.g. water, land, wildlife, environmental resources, biodiversity)
Physical capital	The infrastructure on which livelihoods are based on and depend on, and the equipment used to create production output (e.g. access roads, shelter, communication, production equipment, energy)

Scoones (1998:7) remarks that the ability to pursue different livelihood strategies is dependent on the basic material and social, tangible and intangible assets that people have in their possession. In other words, as noted by Ellis (2000a:31-32), the asset status of the poor is fundamental to understanding the options open to them, the strategies they adopt

to attain livelihoods, the outcomes they aspire to, and the vulnerability context to which they operate. Bebbington (1999:2022) points that “in order to build sustainable livelihoods, individuals must have access to a sufficiently wide range (and functional combinations) of assets”.

Livelihood literature suggests that an analysis of assets should be a review of what people have while recognizing what they do not have, instead of an analysis of needs (Carney, 2002). As an example, based on this study, if households adopt or do not adopt reef fisheries as one of their main livelihood strategies, examination of their livelihood assets can help to identify requirements and prerequisites of different kinds of livelihood supported by reef fisheries. Furthermore, some strategies might reflect strengths (e.g. hunting skills as human capital) while others might reflect weaknesses (e.g. lack of financial capital to purchase fishing gears and vessels). The dynamics and complexities of how households use assets in the study villages are critical as this outlines the importance of local knowledge. According to Helmore and Singh (2001), the SLA recognizes that people can experience interventions with valuable and essential assets that must be acknowledged and utilized. However, it is crucial to understand that the assets that people draw upon for their livelihoods vary between contexts and social groups (Bebbington, 1999).

3.3.2 Policies, institutions and processes

The SLA intends to encompass multiple actors and socio-economic scales, from the individual or the household to the international arena. Livelihood analysis, therefore, starts at the micro level and progresses upwards to the macro level in an attempt to contextualise local livelihoods within a broader institutional context (Carney, 1998). This context is often referred to as ‘transforming structures’ (e.g. levels of government) and ‘processes’ (policies, laws, institutions) which determine access to assets (Ellis, 2000a:37; Scoones and Wolmer, 2003:4). DFID (1999) highlights that institutional and policy mediation give meaning and value to assets and, by extension, drive individual choice for livelihood strategies. This could also be interpreted as variation in time and space of individual access to and control over assets due to socio-environmental variability. Transforming structure and processes are also perceived to be contributing factors to vulnerability of livelihoods (Bennett, 2010).

During the past decade, there was greater emphasis on structures of institutions and organizations (government, market) and processes such as laws, incentives and policies (see e.g. Helmore and Singh, 2001; Carney, 2002). In addition, there has been more discussion on how these issues relate to governance, rights and power (Carney, 2002). Within the DFID framework, the section which focused on these issues was termed ‘transforming structure and processes’ until around 1999 or 2000; currently, in literature on the SLA it is commonly referred to as ‘policies, institutions and processes’. The alteration in terminology was made in order to emphasize core issues and increase understanding of this aspect of the SLF (Bingen, 2001 cited in Berg, 2006).

3.3.3 Livelihood outcomes

Livelihood outcomes of people, as elaborated by LaFramme (2007:292), are the outcomes of their actions and can be more or less desirable. The outcomes may be improved well-being, a higher income, reduced vulnerability, improved livelihood and food security, and more sustainable use of natural resources. DFID (1999) points out that the outcomes are context specific and vary between individuals, households and communities, as do the trade-offs between outcomes. In the context of this study, desirable livelihood outcomes as expressed during interviews and group discussions include food security and development of roadways to ease transportation; however, under the negative externalities of the degradation of reef fisheries, the livelihood outcomes of the poor are becoming increasingly fragile.

3.3.4 Livelihood strategies

Livelihood strategies are composed of activities that people engage in to earn a living and can be sustainable or unsustainable (Ellis, 2000a:40). Strategy means conscious and coherently structured actions that are aimed at achieving something in the future (Niehof 2004: 323). In general, livelihood strategies are not static; they change as the external environment over which people have little control alters, as policies, institutions and processes shift and evolve, as access to and control over assets change, and as opportunities arise (Cahn, 2006). Literature highlights that sometimes unsustainable and unproductive livelihood strategies continue because of tradition and habit, while at difficult times livelihood activities are introduced as coping strategies. Scoones (1998:10)

states that the combination of strategies or activities pursued are referred to as a livelihood portfolio. Some portfolios may be highly specialised with a concentration on a single or a limited range of activities; others may be quite diverse.

Several researchers have described different types of livelihood strategies depending on the context and/or specificity of the study (e.g. Brown et al., 2006; Jansen et al., 2006). Scoones (1998:9) identified three types of livelihood strategies: agricultural intensification/extensification, diversification, and migration. Notably, according to Scoones (1998) livelihood diversification means that people develop a wide income portfolio (temporary or permanent) either to cope with adverse conditions or for accumulation and reinvestment. Ellis (2000a) unanimously pointed out that diversification of livelihoods has a range of purposes rather than simply being a coping strategy. Diversification is increasingly undertaken by both poor and rich, the poor for survival and the rich for wealth accumulation and prestige (Baird and Leslie, 2013; de Sherbinin et al., 2008) identifies livelihood strategies to be natural resource based, non-natural resource based and migration.

Ellis (2000a:38) specifies livelihood strategies as natural resource based activities and non-natural resource based activities (including remittance and other transfers). Zoomers (1999:2) distinguishes four categories of livelihood strategies: accumulation, consolidation, compensatory and security. However, this categorization should not be taken as something fixed, but flexible (Zoomers, 1999). This means that, in different times and places, the same person may pursue different strategies. These are influenced not only by the results of preceding activities, but also by personality characteristics (de Haan and Zoomers, 2005).

In the recently study of Zagros in Iran (Soltani et al., 2012:61), livelihood strategies were classified into three types: forest/livestock strategy, crop farming/livestock strategy, and non-farm strategy. Indeed, livelihood strategies have also been classified into four categories: only farm, farm and non-farm, only non-farm, and non-labour (see e.g. Fang et al., 2014).

3.3.5 Vulnerability context

People's livelihoods and the availability of assets are fundamentally affected by critical trends and events as well as by trends, shocks and seasonality, over which they have limited or no control. Trends are slow-moving, often benign, changes in the macro-environment, the trajectory of which may be tracked with relative accuracy. These might include broader population trends, natural resource trends and/or national and international economic trends. Shocks, on the other hand, are typically impacts that are sudden, unpredictable, and traumatic; unlike stresses²⁹ which are usually predictable, cumulative and seasonal (Chambers and Conway, 1992). Examples of shocks include: droughts, fires, epidemics, conflicts and/or sudden changes in the economy. Some disturbances may be seasonal in nature. More importantly, vulnerability means not to lack or want (Chambers, 1995:175) but a function of exposure, sensitivity and adaptive capacity (Birkmann et al., 2014:10).

Vulnerability context is usually divided into two contexts: the external environment in which people exist and how people adapt and cope with stresses and shocks (Reed et al., 2013:67-68). It is important to understand the vulnerability context within which each livelihood system is placed to avoid counteractive livelihood interventions that increase the vulnerability of poor people (Perez and Cahn, 2000). For example, in this study it was expected that livelihoods would be resilient as long as the fisheries resources on which fishers primarily depend for their livelihoods remain at a maximum sustainable level on a long term basis. It should also be noted that not all the factors listed in the SLF are negative or will cause vulnerability (DFID, 1999).

On the other hand, vulnerability can be thought of as the flip side of resilience. While resilience, as described by several authors (e.g. Ifejika Speranza et al., 2014; IPCC, 2012; Islam and Chuenpagdee, 2013; Obrist et al., 2010; Ungar, 2011 etc.), means the ability to deal with disturbances, stresses and shocks, vulnerability defines the limitations in the face of challenges. Conceptually, SL, well-being and resilience are interconnected and complementary concepts to our understanding of livelihoods (Ifejika Speranza et al.,

²⁹ The line between stresses and shocks is not always very clear—what can be a shock for someone may be a stress to someone else (Marschke and Berkes, 2006).

2014). Thus, when livelihood assets are depleted or institutions fail to adapt to change, livelihood strategies become risky and resilience is reduced, leading to increased vulnerability.

Folke (2006) states that loss of livelihood can lead to a rapid change from a relatively stable status of welfare to increased poverty and destitution, particularly in most vulnerable communities. Increased resilience, that could come for instance through livelihood diversification (Worku et al., 2014:54) or building capitals (Skerratt, 2013:42–44) expands the potential to cope with stress and thus can help to decrease vulnerability. In the context of this study, it is argued that local government and NGOs have not addressed the livelihood portfolio needs of households in an integrated manner, leaving households to determine their own livelihoods using local knowledge and the resources available, especially marine fish, kinship relations and local knowledge. Due to poverty, rural households seek pathways to sustain a living; thus, some employ destructive activities to harness resources. While this could be a livelihood solution for the poor, it reduces the resource base and often exacerbates the vulnerability and dynamics of poverty locally.

3.4 Uses and critiques of the Sustainable Livelihoods Framework

There is strong evidence that despite its diverse forms the sustainable livelihoods approach has been accepted by a number of organizations and authors as a basis for development research and practice in terms of overall poverty reduction (Cahn, 2006). Pertinent literature concerning rural livelihoods shows that the approach and frameworks can be useful in rural development planning, action, monitoring and evaluation (Cahn, 2006).

Bennet (2010:11), citing Ashley and Carney (1999) notes that the approach has proved to be of particularly useful for: 1) the systematic and holistic analysis of poverty; 2) providing an informed view of development opportunities, challenges and impacts; and, 3) placing people at the centre of development work. Furthermore, while citing Carney (2003) and Hussein (2002), Bennet (2010:11) stated that sustainable livelihoods approaches have also led to: 4) improving understandings of poor people's lives; the constraints facing them, and inter-group differences; 5) increasing intersectoral,

collaborative, and interdisciplinary community development research and work; and, 6) creating increased links between micro, meso, and macro level considerations in poverty and development discourse.

Although livelihood thinking has proliferated in development practices, the deeper ideological and theoretical shortcomings of the SLF (as with all theoretical approaches) have also long been recognised (Knuttsen, 2006; Carney, 1999), even by some of its earliest proponents (see e.g. Scoones, 2009). Bennet (2010), citing Ashley and Carney (1999), posits that early critiques of the SLA included: potential costliness of the process; over-emphasis of the SL framework, vocabulary and processes; the need for additional tools and skills to complement various aspects of the SLF and to support change agendas. The paragraphs below also present some of the critiques of the SLF (as synthesised from literature).

Firstly, SLA and framework proposes a rather limited theoretical and methodological basis for addressing a number of issues such as governance, power, rights, markets and economics, sustainability, and micro, meso and macro level policies, institutions and processes (Carney, 2002). For instance, the institutional analysis suggested by the approach remains too focused on formal organizations and institutions (e.g. state agencies, NGOs). Consequently, this becomes a detriment to other, possibly more significant, social units, such as family structures, communities or interpersonal networks, which engage individuals in an informal and often concealed system of power (Baumann and Singh, 2001). Cleaver (2001) points out that SLA adopts an overly simple and mechanistic model and neglects feedback processes (e.g. political struggles) through which individuals and populations reshape institutions and social structures. In other words, SLA is described to fail to take into account power and human agency, and therefore clearly lacks the conceptual tools for approaching complex socio-environmental governance.

Secondly, the SLF fails to adequately conceptualise the environment. Various authors have shown that the SLF merely integrates the environment in terms of biophysical stocks and flows (Scoones, 2009). Largely, only institutional factors are considered as the main determinants of access to, control and use of natural resources. Consequently, culture and

its role in situating environmental knowledge appear to be either absent from the approach or merely integrated as an institutional factor (Cahn, 2006). According to Scoones (2009), the approach appears to significantly underplay the social construction of nature; a bias which appears particularly critical considering that environmental sustainability represents a core issue for a number of livelihood frameworks.

Thirdly, as other items are omitted from the SLF to avoid complexity, it is obvious that by strictly following the structure of the framework some important issues may be ignored (Cahn, 2006). For example, while participation is stressed explicitly in the approach, the frameworks do not specify it. Additionally, as suggested by (Neefjes, 2000) , the weakness of the SLF is limited reference to gender and development, political ecology, social exclusion and other theoretical frameworks. While the SLF cannot include everything, it is widely argued that since the importance of some issues differ in different contexts, it is critical that the framework does not ignore these important issues (Cahn, 2006).

Finally, because the approach aims to represent the convoluted nature of the livelihood system in a simple and logical manner, the linkages between the factors are barely considered during analysis. Carney (1999) points out that the shortcomings of the approach arise due to the fact that livelihood systems are extremely complex, and that the framework is used to examine them holistically. Following this, as noted by Brocklesby and Fisher (2003), the SLF should not be viewed as a rigid template for rural development, but rather as an adaptable and dynamic framework for guiding development planning and intervention. For that purpose, SLA could greatly benefit from an increased use of comparative, multi-local perspectives aimed at exploring and theorizing broader scale dynamics (see e.g., Bebbington, 2003; Dercon, 1998).

3.5 Use of the SLF in this research

For the purpose of this research, the SLF was used to assess the role of reef fisheries in catalysing sustainable livelihood opportunities in the livelihood strategies of households in the study villages. The framework allowed reef fisheries to be placed within the local overall livelihood spectrum to identify whether any linkage exists between the reef

fisheries and other sectors of the local economy. The framework enabled an assessment of how reef fisheries can more easily be integrated within existing livelihood strategies. In the study villages it was noted that individuals and households use a variety of livelihood strategies, including but not limited to reef fisheries and agricultural production.

The framework gives particular emphasis to the components of institutions and organisations such as village government and different associations within the villages. Structures and processes mediate the complex and highly differentiated process of achieving sustainable livelihoods (Scoones, 1998). Subsequently, the framework was used to identify the links between inputs, outputs and the flow of livelihood resources, actors and trends in the social environment. Exploration of these links helps to identify whether reef fisheries, in what form, and through which institutional processes and organisational structures, could strengthen or weaken local livelihood assets, contribute to or undermine livelihood outcomes (such as improved housing quality and household incomes), and alter vulnerability context (such as reducing loss of jobs due to degradation of reef resources).

In the context of the current study, the SLF provided a wider perspective on many factors that coastal households define as contributing to their well-being or vulnerability. The SLF was therefore employed to understand households' views and responses concerning the changes induced by degradation of reef fisheries. In summary, the SLF was used to provide broader understanding of livelihoods to assess the context in which coastal households, especially those depending on reef fisheries live and make choices.

3.6 The notion of household

In conventional livelihood literature, a 'household' is usually regarded as the suitable social unit for livelihood research (Mikklesen, 2005). However, the concept of a household is a rather contested and complex term, and definitions of a household are not standardised (as stated by Gittleson and Mookherji, 1997:198). While households, as argued from anthropological perspectives, are said to contain one or usually more features such as co-residence, joint production, shared consumption and kinship links, no particular single feature or combination of these features constitutes a universal definition

of the household (Gittleston and Mookherji, 1997). Irrespective of the definition employed, the concept of household may not be applicable to all societies and cultures.

Moore (1988) asserts that defining the term 'household' is difficult because its meaning overlaps significantly with that of other terms such as 'the family' and 'the domestic sphere'. However, the term household is usually used to refer to the basic unit of society involved in production, reproduction, consumption, and socialisation (White 1980). Marshall (1994) defines a household as a group of persons sharing a home or living space, who aggregate, and share their incomes, as evidenced by the fact that they regularly take meals together. Following this, various authors have asserted that a household therefore shares a residence and meals, and makes coordinated decisions, resource allocation, and income pooling (e.g., Ellis, 2000a). However, the character of 'sharing residence and meals, and pooling income together' may not be essential because such arrangements vary throughout different communities. For instance, in most communities of Tanzania, including coastal communities, household members eat their meals from the same pot but not together; usually men and women eat separately.

In contrary to a household, a family is a social unit based on kinship, marriage, and parenthood (Moser, 1993). According to Bastidas (2001), a family is a group of people bonded by blood and kinship ties, and families can be nuclear or extended. However, cases of non-residential family members being part of a household or extended family members permanently in residence are common in many areas (Bastidas, 2001:42). It is important to distinguish between family and household and not to use them interchangeably.

Furthermore, the household is not a fixed entity but varies in space and time. In sub-Saharan Africa it often comprises the extended family, as noted by Malleret-King (2000). In the study sites and coastal areas of Tanzania in general, for example, it is also common for members of extended family to migrate seasonally for *dago* (temporary fishing camps). Usually they live in these camps for 3–6 months while some move back and forth between their houses in the villages and the *dago*. Interestingly, in a *dago* the units that live together do not correspond with those in the village; people that do not share the same house in the village can share food and share shelter in the *dago*. This concurs with

Salman and Zoomers (2002) in their assertion that households do not necessarily organize their livelihoods in one place.

For the purpose of this study, a household (*kaya*) is defined based on the local definition adopted from household surveys in Tanzania. In this context a household is an interconnected economic, decision making unit that may be spatially divided, and largely dependable on members' identification with it. A more recent definition given in 2010 Tanzania demographic and health survey is a household is a person or a group of persons, related or unrelated, who live together and share a common source of food (NBS and ICF Macro, 2010:11).

3.7 Livelihood pathways and trajectories

The concept of livelihood 'strategies' is invariably associated with predefined goals, and of rational and planned actions (De Haan and Zoomers, 2005). In addition, it can help to distinguish the different ways in which people try to sustain their livelihoods; nonetheless, it is of little use when describing the process of livelihood change over long periods of time. Bruijn and Dijk (1995) argue, this is because many people cannot plan their strategies in advance due to an insecure environment, as well as the fact that individual and family goals and priorities do not remain constant. Analysis of a single strategy would therefore reveal very little about the prospects of a household's livelihoods (Murray, 2001). Consequently, some scholars have proposed the notions of 'pathways' and 'trajectories' in livelihood literature as an appropriate approach to account for the historical perspective of livelihoods (de Haan and Zoomers, 2005).

The idea of a livelihood pathway provides a valuable contribution when considering livelihood strategies in terms of risk and livelihood threats. Scoones (1998:10) defines livelihood pathways as the result of a series of livelihood choices that emerge over time or as different combinations of livelihood strategies that are pursued sequentially. Pathways incorporate a high degree of coordination amongst actors, with historical knowledge and experiences being utilised in the decision making process.

While a 'strategy', as explained earlier, tends to attain a pre-set goal, a 'pathway' arises from a repetitive process in a step-by-step procedure in which goals, preferences,

resources and means are constantly reassessed under new unstable conditions (de Bruijn and van Dijk, 1995:1–2). For example, during poor fishing seasons fishers' decisions to temporarily or permanently reduce fishing hours to supplement household labour in crop farming or petty trade may be based on previous experience of lacking adequate food or labour in the household, while ignoring the future benefits of fisheries.

A number of scholars have highlighted the need for attention to the concept of 'livelihood trajectories', which enables one to track livelihood dynamics over time (de Haan and Zoomers, 2005). As stated by de Haan and Zoomers (2005: 43), a livelihood trajectory is an appropriate methodology for examining individual strategic behaviour embedded both in a historical repertoire and social differentiation.

The use of a pathway is proposed for the observed regularities or pattern in the livelihood of particular social groups, and trajectories for the life paths of individual actors (de Haan and Zoomers, 2005). In other words, trajectories are used as a means to conceptualise how individual strategic behaviour is conditioned by historical circumstances and through social differentiation (de Haan and Zoomers, 2005:42–44). Bagchi et al. (1998) suggest that understanding the processes and structures involved in livelihood trajectories opens up the opportunity to identify positive and negative factors and elements that can affect future livelihood development and natural resource dynamics.

3.8 Political ecology

Over the past two decades, political ecology (PE) has emerged as a field of interdisciplinary research addressing the politics of environmental change and natural resource degradation; it has proven to be a powerful tool for analysing socio-environmental interactions (Neumann, 2005). More importantly, PE has since served in examining linkages between power relations, environmental knowledge and discourses and ecological dynamics (Bryant and Bailey, 1997:3). Nonetheless, PE, as stated by Robbins (2004), is a rather young approach that has gained importance during past decades among different academic fields including geography, anthropology, development studies, forestry and sociology.

The origin of PE can be traced back to the 1970s. Peet and Watts (1996:4) state that during this time the environment became a part of the political agenda and scholars started to highlight politics and economy in current ecological crises, especially land degradation and other environmental problems. However, the origin of PE is somewhat contentious, as evidenced by certain political ecologists that have traced their discipline back to the 19th century Russian geographer and anarchist philosopher Peter A. Kropotkin (Robbins, 2004). Others scholars perceive PE to have been built on an established foundation of related work on which future political ecologists could stand; most notably of these perhaps is the work by David Harvey in 1974 (Harvey, 1974:275).

The widely held view is that the term PE was probably first coined by the anthropologist Erick Wolf in his article *Ownership and Political Ecology* (Robbins, 2004). Bryant (1997:8) affirms that by the 1980s, PE had flourished into its own field. In their role, political ecologists examine how natural resource management and environmental quality are the outcomes of social and biophysical processes that interact and change over time (Zimmerer and Bassett, 2003:9-11).

Political ecology is an ambiguous term. Several fields such as common property theory, materialism, peasant and feminist studies constitute PE (Robbins, 2004). Due to the rich diversity of disciplines, the term has been defined in a number of ways (Robbins, 2004:72). In elaborating PE, some scholars have placed more emphasis on the political economy, while the focus of others has been on the role of political institutions (Robbins, 2004:8). Nevertheless, one of the most widely used definitions is from the work of P. Blaikie and H.C. Brookfield, scholars who are often credited with fully developing the concept in the 1980s. In their seminal book *Land Degradation and Society* published in 1987, Blaikie and Brookfield describe that:

The phrase ‘political ecology’ combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources and also within classes and groups within society itself (Blaikie and Brookfield, 1987:17).

Literature shows that the emphasis of many PE studies has long been on terrestrial ecosystems, with a lack of focus on marine ecosystems. However, other scholars (e.g., de

Sherbinin et al., 2007; Sneddon, 2000) suggest that PE should widen its focus to incorporate the study of other environmental problems in addition to land-based problems.

The subject of PE in this study is grounded in its focus on more discursive dimensions of people-environment interactions, with a greater emphasis on ‘power relations’ and how people and stakeholders³⁰ have perceived the environment and development differently in recent years (Forsyth, 2003). Concurrently, the application of the PE approach here is built on its assumption that environmental change and ecological conditions are the product of political processes, and that PE is something people do (Robbins, 2004:13). The intention is to understand the struggles and conflicts in relation to livelihoods supported by the reef fisheries or, more generally, fisheries dependent livelihoods in coastal villages of Mtwara district. The point of departure is not in the decline or scarcity of the reef fisheries, but in the social relations that relevant stakeholders have with fisheries.

The term social relation is used here to refer to the manner in which coastal fisheries are variedly appraised including regimes of appropriation, organisation and disorganisation of ownership, entitlements and control (as elaborated by Peluso and Watts, 2001). Therefore, there was a need to grasp the social, political and economic interests and conflicts that are typically associated with those concerns to understand interactions between humans and reef fisheries in the study sites (as emphasized by Bryant, 1997:6).

Furthermore, as this study concerns changes in livelihoods brought about by the perceived impacts of the degradation of reef fisheries, it was thus appropriate to view this ‘degradation’ through the lens of PE. The argument that PE is an important tool for approaching issues of environmental conservation and degradation, particularly in the post-colonial context where issues of power and access to resources tend to be complicated and long-standing issues, posited by (Peet and Watts, 1996:268), is exemplified in this study.

³⁰ The term could be used synonymously with actors; in this case refer to the different resource users (fishers, fish traders, middlemen etc.), local government authority responsible for fisheries, Mnazi Bay-Ruvuma Estuary Marine Park managers, organization strengths and knowledgeability to influence the social relations.

Until recently, the potential for conservation interventions in coastal areas of Tanzania to address environmental degradation, such as blasting of reefs and mining of live corals for lime, have faced harsh resistance from local communities. For example, the establishment of MBREMP (occupying the study villages) in early 2000 was poorly accepted as a multi-purpose approach to biodiversity conservation and improvement of livelihoods by communities, and also strongly opposed because poor communities feared to lose their traditional rights of access to and ownership of fishing grounds and marine resources. Therefore, using a PE perspective in such a context allows the analysis of the means by which control and use of resources are defined, negotiated and contested within various political arenas (Peet and Watts, 1996).

The advent of the global market in its present form in Tanzania has led to the diversity of coastal resource users with varied backgrounds and interests. Concurrently, this has not only opened up livelihood opportunities but also posed multiple challenges created by unequal power relationships within society which shape the environment, both materially and discursively. Gössling (2003:10) explains how PE is a powerful tool with which to investigate the role, conflicts, interests, aims, norms and narratives of different actors in the process of environmental change. Therefore, in this study the PE approach allowed the exploration of the multiple aspects of livelihood struggles, as well as the rationale of the actors involved and their connections.

In this study, it is argued that power relations, particularly those supporting improvement of livelihoods and influencing access to and control of resources, are also key to defining livelihood pathways and transitions. Similarly, integrating PE insights into SLA illuminates how power relations and ecological conditions, as well as a historical understanding of particular places, structure reef dependent livelihoods. This ultimately demonstrates how these socio-ecological dynamics lead to unequal livelihood outcomes.

It is interesting to note that the notion of environmental knowledge, which is another key theme in PE (Blaikie et al., 1997:223), presents an important thread to assess how the environment is perceived and represented in many different ways by social actors. Accordingly, from a PE point of view, this study contends with Peet and Watts (1996:16) in arguing that environmental knowledge, for example local knowledge of fish ecology

and fishing practices possessed by households in the study villages, is generated in and shaped by particular histories, environmental and social contexts and social structures. For example, Masalu et al. (2010:9–13) identified 14 forms of taboos and beliefs that inadvertently protect fish stocks and consequently protect (or may not) fishing habitats in Tanzania. While not all the local knowledge in Tanzania that is able to boost fish catches and protect the environment have been documented, anecdotal evidence suggests that some of the useful taboos and a traditional way of living are helpful in protecting the environment from further degradation.

However, the human perceptions of environmental knowledge invariably contest each other. Actors may understand their environment through their own experiences and those of others, and consequently the authority and authenticity of this knowledge varies (Long, 2001). Indeed, this reveals a description of knowledge encounters where some actors struggle to enrol others in understanding of the world around them.

In summary, by integrating livelihood analysis within the PE to understand the livelihood-based struggles in the study villages (as suggested by Jones, 2008), this study concurs with the arguments that these struggles are a manifestation of political processes (Bryant, 1998) regarding entitlements and control amidst different actors (Peluso and Watts, 2001). The PE approach allows the investigation of how different power relations in access, ownership and use of reef fisheries lead to continual livelihood struggles and how households and individuals use social relations, especially networks, as tools to combat struggle against unequal use of resources. These however, could not be captured and eventually elaborated through livelihood analysis.

3.9 Coping and adaptation to unprecedented livelihood threats

There seems to be consensus in research community that global change challenges rural households and communities all over the world to respond in order to secure continuation of their livelihoods (Fabricus et al., 2007). Literature show that the resulting trajectories of change tend to vary. For conventional purposes, the responses are classified as coping and adaptation. Coping is characterized as a re-action response triggered by past or

current drivers whereas adaptation is characterized as deliberate management adjustments in response to past, current and future drivers (see e.g. Ashraf and Routray, 2013:56; Fabricus et al., 2007; McDowell and Hess, 2012:343–344; Nelson et al., 2007:396). It is worth to mention that the terms coping and adaptation are not always clearly defined, sometimes overlapping in literature. However, some authors (e.g. Haddow and Haddow, 2014; Smit and Pilifosova, 2003) have carefully defined these terms but there continues to be debate about their understanding and use in policy, research and academic circles.

Coping is mainly effective in the short term because is always an immediate response to change and thus do not necessarily prepare a system for future changes (Eriksen et al., 2005; Hussein and Nelson, 1998). At household level coping strategies are however important in helping to offset (ex-post strategies) livelihood constraints and also in preparing them to face future unprecedented events (ex-ante strategies). Unlike coping, adaptation deliberately anticipates future or expected changes and is therefore generally effective in the long-term (Speelman et al., 2014).

Several examples of coping responses in rural areas including migration and diversification to off-farm activities are widely discussed in literature (see e.g., Habiba et al., 2012; Islam and Chuenpagdee, 2013; Kadigi et al., 2007; Robson and Berkes, 2011) are discussed in literature. Adaptation strategies—although some authors restrict them to climate change—are often based on (strengthened) social networks, re-orientation of agricultural production, improvement of infrastructure, improving (local) organizational structures or diversification of production systems among many others (Burton et al., 2002; IPCC, 2012; Nkomwa et al., 2014; Saldaña-Zorrilla, 2008).

Literature show that coping or adaptation strategies undertaken by people to safeguard their life rely on a number of factors such as social and economic endowments, ecological location, social network, institutional relationship, and access to resources (Kelly and Adger, 2000; Adger et al., 2007). On the other hand, these factors will constitute the potential, capacity or ability to adapt—adaptive capacity.

3.10 Scenario planning

Understanding how communities and households may transit to a well adaptive society in the future is critical if sustainable livelihoods—envisaged in food security and poverty alleviation goals—are to be achieved. Such understanding however, is best explained using scenario planning process—a strategic tool that can be used to develop a science based decision making framework in the face of high uncertainty and low controllability (Peterson et al., 2003:360). Scenarios are plausible stories telling how the future might unfolds and are increasingly used in policy arena for strategic and adaptation planning in the context of uncertainty (Biggs et al., 2007) . Scenarios will not predict neither forecast every conceivable alternative future but will provide a multiple range of possible futures in details (Boaventura and Fischmann, 2008:598) and can be used as a way to act for developing desired future (Höjer et al., 2008:1959).

Scenarios are divided into predictive, explorative and normative (Börjeson et al., 2006:725). The literature show that predictive scenarios, such as forecasts, can respond to the ‘what will happen?’ question by trying to predict what will probably happen in the future; normative scenario can respond to the question ‘how can a specific target be reached?’ Meanwhile explorative scenarios describe the possible and can respond to the question ‘what can happen?’ (Münster et al., 2013). Börjeson et al. (2006) indicate that explorative scenarios are useful in providing a framework for development and assessment of policies and strategies, which can survive several kinds of external tensions.

In recent years, scenarios have emerged as means of characterizing the future and its uncertainties through structured, imaginative yet self-consistent storylines to look beyond conventional wisdom for many applications including socio-economic and environmental change assessment (Rounsevell and Metzger, 2010; van Vuuren et al., 2012:884). It is worth to note that scenario planning creates possible futures that include many of the important uncertainties in the system rather than to focus on the accurate prediction of a single outcome (Peterson et al., 2003). For the case of this study, this may include deliberate efforts to raise awareness on and implement activities to adapt to unprecedented impacts of climate change.

Although scenario planning is more appropriate in more complex and unpredictable circumstances such as a changing climate (Chatterjee and Gordon, 2006), it could also offer a broader conceptualisation of future of livelihoods and formulation of appropriate policy in the context of the current study. Livelihoods are embedded in uncertainty, thus it is important to deploy scenarios to address expected or projected changes as a way to establish adaptation strategies and actions.

3.11 Conceptual framework

The previous sections of this chapter have considered a number of theoretical and conceptual areas in order to find relevant approaches that could help understand the problems a system faces, such as those of households in the study villages. By reviewing these areas, it became clear that it is necessary to employ interdisciplinary approach in order to address the study of human adjustments to change and environmental variability. As highlighted in chapter one, this thesis approaches livelihoods at the household level with awareness that such a study requires an investigation of the characteristics of and processes driving vulnerability and adaptation of their livelihoods to unprecedented changes including changing climate. It thereby recognises that ecological conditions alone do not cause a negative change in household livelihoods; instead, socio-economic, cultural and other factors, including climatic change, overwhelmingly contribute to characterising these impacts.

The conceptual framework for this thesis hinges on the relationship between humans and the environment as a complex socio-ecological system, and recognises that people have coped with adverse livelihood conditions and environmental stress in the past. Essentially, the theoretical framework therefore concurs with (Resurreccion et al., 2008), that people themselves are experts of their own situation. The interactions of interest in this study are the fisheries provided by reefs to humans, people and their local knowledge, and the institutions supporting reef fisheries. SLF recognises that different stakeholders are affected by several threats in different ways and have different capacities to adapt, depending on their reliance on and access to capital assets (Carr, 2008). In this context, useful lessons and ideas for adaptation to unprecedented change can be learnt by looking at the methods people have used to cope with changes brought about by degradation of

natural resources for their livelihoods (Ashley, 2000). This could contribute to our understanding of specific adaptive dynamics and options for vulnerable groups, such as households in the study villages, to ensure more effective targeting of policies and programmes. While the emphasis in this thesis is on theory of sustainable livelihoods, there is also an aim to integrate realistic views of how humans construct their own understanding of the environment. Therefore, an interdisciplinary approach involving geography, social science and ecology was considered suitable to analyse the situation of the studied households.

Sustainable livelihoods theory provides an entry into the livelihood crisis, strategies and outcomes of households in the study villages. However, PE adds value by tackling critical questions linked to different power dynamics, control over resources and history which have shaped livelihood pathways and trajectories as well as the contemporary characteristic of vulnerability among the households. The analysis on adaptation seeks to highlight that unless different coping strategies, and the types and extent to which specific coping strategies are relied on by households in Mtwara district, occur in an environmentally sustainable manner and also help people to become less vulnerable and more resilient, they may lead to increased stress caused effects of environmental change. An adaptation approach is implicitly applied to examine whether existing responses by households to the declining livelihoods qualify as or can produce a long-term outcome which can be considered as adaptation based on scenarios developed. More explicitly, the concept of adaptation is added to facilitate discussion on scenario storylines related to the envisaged future based on actions that could be taken at present.

3.12 Chapter summary

This chapter has attempted to provide a clear and lucid account of the relevant theories and concepts on which this study is conceptualised and based. The sustainable livelihoods framework, the main analytical tool for this study, was thoroughly reviewed and discussed. Through a literature review and feedback from the first field trip, the limitations of the ability of the SLF to explain issues such as power difference, access to resources and history, which could have influenced livelihood pathways and trajectories in the study villages, was realised and addressed by considering the elements of PE.

Examining aspects of political ecology allows a greater general understanding of the differentiation of livelihoods. In turn, this provides a wider background for interpreting livelihood trajectories. The livelihood trajectories concept, as emphasized by De Haan and Zoomers (2005), helps to show the direction a household is taking, since households with a similar combination of practices can move in very different directions.

The adaptation approach was also highlighted to determine whether current and potential coping strategies may increase the adaptive capacity or reduce threats on livelihoods among households in a changing climate. Scholars point out that adaptation is certainly a result not only of the impacts of climate change but also an effect of non-climatic factors, such as degradation of fisheries resources by dynamite. It becomes important to draw lessons from successful coping strategies to develop future scenarios on livelihoods through a combination of views presented by stakeholders themselves. This assertion serves to guide the responsiveness of stakeholders' actions in the context of a changing climate, with the view that the effectiveness of coping strategies can produce an outcome which can be considered as adaptation (Lazarus, 1993:236) . The use of multiple theories and schools of thought in this thesis enables the author to avoid compromising the validity of information required to examine the complex relationship between humans and the environment.

Chapter 4 Research Methods

4.1 Chapter overview

This chapter presents the methodology adopted in this study. The chapter begins by outlining the research approach and looks at the reasoning behind a ‘mixed methods approach’, chosen to address the study objectives. This is followed by explanations of the techniques used to collect data. The chapter also describes verification of data and information collected, and the process of data analysis and interpretation. The chapter ends with a discussion of the challenges faced and strategies adopted during field work.

4.2 Research strategy: Mixed methods approach

The current study aimed at understanding the complex, evolving and multi-dimensional livelihoods of coastal households dependent on reef fisheries in village settings. It was framed as a case-specific assessment study. In this study, the condition of reef fisheries required data on biophysical assessment of the resource base, and inquiry into livelihoods required the gathering of socio-economics data. A mixed methods approach (Johnson et al., 2007; Tashakkori and Teddlie, 1998) was used to conduct this study. A mixed methods research approach is defined by (Johnson and Onwuegbuzie, 2004) as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language in a single study. Benefits of mixed methods approach are widely presented in literature (see e.g. Creswell, 2003:212; Johnson et al., 2007:123).

In order to adequately answer how the researcher should understand and theories livelihood change in such a context, a mixed methods approach was appropriate, given the different strengths that mixed methods have (Johnson et al., 2007:125) and given the nature of the social process interested by this study. This study intended to incorporate qualitative approaches to complement the empirical rigour from the quantitative data, as it was considered important to explore deeper and rich of household livelihood experiences. More specific, the mixed methods in this study involved the following qualitative techniques: participant observation, focus group discussion, key informant interviews, life history interviews, and a workshop. Quantitative technique consisted of face to face household interviews.

In summary qualitative approach techniques were relevant to this research for a number of reasons. Firstly, to understand how the local livelihood systems and economic dependence on fisheries resources have experienced several changes over the past five decades. Secondly, to explore how those changes and other socio-economic factors have influenced the livelihoods development and arrangements. Thirdly, to understand and describe how coastal households cope with the changes in their livelihoods in the context of declining fisheries resources. The study considered coastal households as the main actors, hence, attempted to achieve its objectives through analysis of households/individuals presentations of how they make sense of their lives, experience, and the structure of the world. The major assumption underlined was that, local people (coastal households) are knowledgeable about matters which affect their lives. Quantitative data was sought to offer a basic overview of social, cultural, political, economic and environmental factors related to coastal livelihoods and the ways people use to build resilience to their livelihoods. More importantly, the quantitative method used in this study has also proved invaluable in establishing the context-specific and basic understanding of the population being studied although not in a representative manner.

4.3 Sampling strategies

For the purposes of the present study, a purposive sampling strategy (Neumann, 2003:213) was adopted. This is a criterion-based sampling in which ‘rich’ cases are selected to enable the researcher discover, understand and gain more insight on crucial study issues (Merriam, 1998). Although purposive sampling can be a possible source of bias, it was justifiable for use in this study given the wide distribution (sometimes hard to reach) of households across the villages and the heterogeneous nature of their livelihood strategies and socio-economic status.

4.3.1 Sampling of survey respondents

The researcher recruited a purposive sample with a focus on achieving variation among respondents’ main livelihood activities. Recruitment methods included stratifying a list of households in each study village by the main activities of the head of the household. The

register³¹ of households in Ziwani Division (Table 4.1) provided easy access to important information on socio-economics and the commonly used categories of livelihood strategies (fishing and non-fishing)—at least down to the village level. In each village, the researcher asked village informants (1 village official and 5 members³² of the local community who had stayed in the village for a long time) to allocate a livelihood activity (fishing or non-fishing) to each household name on the register. At this point however, the researcher did not visit all households for information verification.

Table 4.1 Proportion of households and total populations in the study villages in 2012

Ward	Village	Number of households	Population		Total population
			Male	Female	
Msangamkuu	Mkubiru	436	704	836	1540
	Mnete	177	386	414	800
	Nalingu	643	1936	2179	4115
Madimba	Mngoji	553	1170	1228	2398
	Msimbati	1050	4847	5008	9855

Source: Office of the Ziwani Division (*Tarafa*) Secretary. It was noted that these figures were based on the 2007 household and demographic survey and were likely to be larger in 2012/2013

From each group (stratum), households were randomly selected to make up an initial total of approximately 30%–40% households as the basis of the survey to account for uncooperative respondents Salkind (1997:107). The study however, did not deploy the classical approach to determine sample size given by Cochran (1977:81) because it was not easy to determine in advance the parameters required for computation in the formula. Nonetheless, the sample chosen (Table 4.2) in both groups was sufficient as studies such as Bartlett et al. (2001:46–48) suggest that even a 5% sample is sufficient in the survey.

Although the sampling criteria was specified as individuals being listed as a fisher or non-fisher, the survey question asking for the main livelihood activity confirmed that although some households were technically listed in a particular category, they were actually not considering that specific activity as their main occupation. Therefore, it became obvious that the categories adopted were rather blurred, as most respondents engaged in similar

³¹ Although the register formed the entry for getting household list, in the end it was realised that it was incomplete and had many deficiencies especially superfluous elements like names of some deceased or some of who are not currently residing in villages.

³² The underlying assumption for using these informants was that they knew almost all households in the village

but not exacting livelihood strategies. In other words, some ambiguity emerged on the criteria used in the register for dividing households because of the arbitrary distinction of households by main activities. Arguably, the attempted purposive sampling in this context did not work as expected. A precise approach would be to randomly sample the population instead of staying with classes of livelihood activities listed in the village register.

Nonetheless, the final sample featured two sub-samples. The first had respondents, who, according to the register, were listed as fishers. These respondents (N=183) are hereafter referred to as the “fishers group.” The rationale for a focus on this sub-sample relates to the characteristics of fisheries-dependent households recruited using purposive sampling. All resided in study villages, and were recruited on the basis of recent, regular use of reef fisheries. The other sub-sample (N=114) consisted of respondents chosen from the register who were reported pursuing non-fishing activities. The rationale for exploring this group is that, although being identified as non-fishers, these respondents were also affected by the changes attributed to fisheries-supported livelihoods, in one way or the other. Upon identification of respondents in each sub-sample, interviews were conducted by the researcher with the help of two research assistants³³.

Table 4.2 Distribution of households based on the commonly livelihood groups and respondents from each group

Village	Sample (N=297)			
	Fishers' sub-sample (n=183)		Non-fishers' sub-sample (n=144)	
	Households*	Respondents	Households*	Respondents
Mkubiru	380	36	56	14
Msimbati	610	59	440	28
Nalingu	498	42	145	63
Mnete	140	23	37	7
Mngoji	309	23	244	44
Total	1937	183	922	114

*According to household's register adopted from Division office

³³ Research assistants were selected based on their reputable knowledge of the communities and environment, and with at least an experience in collecting household survey data. These were Hassan Juma Waziri and Shabani Mohammed. Indeed, they were required to have participated in training on social research ethics and the conduct of household interviews. The researcher trained the recruited research assistants in the required research methodologies prior to collecting the data. Furthermore, one of the research assistants (Hassan Juma Waziri) had initially worked with the researcher during implementation of UNDP/GEF and FFEM project on alternative income activities for the MBREMP communities from 2006 – 2007.

4.3.2 Selecting key informants

Key informants are people perceived to have particular insights or opinions about the topic under study. As asserted by Mikkelsen (2005) they may be ordinary people and not necessary specialists, better educated, those in power or officials. Morse (1998) defines a “good informant” using several general criteria. These include having the necessary knowledge and experience of the issue or object at their disposal in order to answer the questions in an interview, having the capability to reflect and articulate, having time to be interviewed and being willing to take part in the study (Morse, 1998:73).

This study considered key informants to encompass at least one of the attributes mentioned by both Morse (1998) and Mikkelsen (2005). Key informants were expected to provide in-depth information specific to the objectives of the study. For this reason, no sample frame was prepared for selecting key informants. Instead, sampling was based on ‘theoretical sampling’ developed by Glaser and Strauss (1967). Glaser and Strauss describe theoretical sampling as follows:

Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory (Glaser and Strauss, 1967:45).

In this study, a total of 46 key informants (Appendix 2A) were selected from local community members and individuals working on issues related to the research in the district. Key informants from community members were chosen after consulting district fisheries officials, MBREMP staff and village leaders in each village, at the time of introducing the research. Characteristically, they were supposed to possess strong and sound knowledge of coastal practices related to resource utilisation, institutions and management, both in the present and the past, and they should have stayed in a particular village for not less than 15 years. Subsequently, informants from the district were involved for greater insight for their broad experience and knowledge related to coastal fisheries and environmental management. This category included personnel from government, non-governmental organisations (NGOs) and Civil Society Organisations (CSOs), political leaders, resource –user representatives, and scientists and researchers in the district.

During interviews, care was taken to limit sampling by avoiding integrating further informants, with respect to criterion for judging when to stop sampling the different groups pertinent to a category (Flick, 2006). To ensure validity, new key informants were added until the point where no new information was found. Such a point is referred to as “theoretical saturation” (Glaser and Strauss, 1967:61).

4.4 Data collection techniques

Data collection was carried out during two field phases. The first phase took place between February and July 2012, and was based on semi-structured interviews with informants (herein referred to as key informant interviews—KIIs), focus group discussion (FGD), household survey, participant observation and collection of secondary data. The second phase took place between November 2012 and January 2013, and focused on life story interviews for livelihood trajectories of individuals/households, and a workshop³⁴ for development of participatory explorative scenarios for the future of coastal livelihoods in changing socio-economic and environmental conditions. Table 4.3 summarises the primary data collection strategy.

Moreover, secondary data was also collected via various archives and reports at local and national levels. The main sources included documentary data (published and unpublished materials from government agencies, research institutes); unwritten materials such as pictures and drawings; museum facsimile especially on preserved marine fish; as well as multiple sources like economic survey reports and statistics related to fisheries. Detailed descriptions of each of these techniques and their limitations are discussed below.

³⁴ The workshop process and outputs are presented in chapter eight

Table 4.3 Data collection strategy

Technique	Selection	Participants	Main themes
Household survey	Purposive for two groups; Random selection of interviewees from each group	183 fishers 114 non-fishers	Household socio-economic characteristics; Livelihood strategies and constraints; Coping strategies
Key informants interviews	Purposively selected based on possession of special knowledge on fisheries, environment, community development, and environmental change	13 officials from the district and region; 6 village officials; 2 ward councillors (<i>diwani</i>); 1 division (<i>tarafa</i>) secretary; 5 members of VEMCs; 19 local community members	Local knowledge, view and opinions on fishing and other livelihood activities; Degradation of reef fisheries; Historical processes of resource use and market access; Indicators of wealth; Livelihood threats and coping strategies
Focus group discussions	Local community members with interest on marine fisheries and other aspect of village economy; selected based on knowledge of the subject, gender, availability and willingness to participate	98 participants in total 1 group of mixed people in each study village 1 group of women alone in each study village	Different perspectives on livelihood assets; Structure, processes and vulnerabilities; Wealth ranking; Risks and coping strategies;
Life story interviews	Original intention was to use purposive sample from survey respondents (but in practice it based on convenience and access ³⁵)	15 individuals/households	Respondents' perceptions of their livelihood change and direction;
Participatory workshop	Selection from diverse backgrounds (knowledgeable people in the district/region and community members)	1 workshop attended by 13 participants	Scenario planning exercise; Scenario storylines for future of livelihoods

Source: Field work notes 2012/13

³⁵ Implies ability of the research to locate the respondents and verbally communicate with them

4.4.1 Participant observation

Participant observation is a type of research technique that assists to reconcile theory with reality (Creswell, 2003:21). In many research cases where it has been used, participant observation was found useful in understanding the ways people live and their opinions as related to a particular situation. Participant observation however, does not emphasize the importance of objectivity and distance, like other methodologies (Kawulich, 2005). Participant observation aims to get as close as possible to the phenomena being investigated (Laurier, 2003). Despite that, the researcher is open to a wide breadth and depth of information compared to other qualitative approaches, and is able to triangulate different impressions and observations, and to follow-up emergent discrepancies in the course of the field work (Bauer and Gaskell, 2000:44).

Participant observation is derived from anthropology and has been used as a data collection method for over a century (Kawulich, 2005). Anthropology however, as elaborated by Eriksen (2001:24), differs from other social sciences because the researcher stays in the field long enough for his or her presence to be considered ‘natural’ by the permanent residents, although he or she will always, to some extent, remain a stranger. Although the time spent for this study in the field was not relatively long as in ‘ethnographic’ fieldwork (Gobo, 2011), participant observation made was particularly useful because it captured actual rather than reported trends.

It was not expected that participant observation would be amongst the primary research approaches in the current study, but the limitations of documented records on the dynamic and coping strategies for livelihoods of coastal households in Mtwara District necessitated immersion in the field setting and participation in a variety of ways with coastal people throughout the duration of field work. During participant observation, the researcher managed to experience events several times and therefore establish regularities and irregularities.

The researcher attempted to take part in local life as much as possible, with the aim of entering as deeply as possible into the social and cultural field of the area researched, as is emphasized to be important by Eriksen (2001:25–26). For example, the researcher took

part in village assembly meetings held during the duration of the field work, joining some fishing trips where could be able to watch, listen, learn and interpret actions and events as they occurred. Besides that, the researcher joined in some activities a couple of times; especially fish processing in Msimbati, seaweed farming in Nalingu, market places in each study village, and numerous fishing groups. Such opportunities allowed seeing in detail the intricate and dynamic of those activities. Indeed, it offered a more feel their activities and the way they are pursued by different people. In one of the observation scenes at Mnete village, the researcher encountered a set of local made blasts that is used for dynamiting. This experience exposed the researcher into a more direct way on how communities arrange and prepare for dynamiting, which is a big threat to the coral reefs. Furthermore, the researcher went to funerals and celebrations such as *ngoma* (traditional dances), traditional healing practices and *shughuli* (wedding). Interestingly, observations were also undertaken in five selected households (one from each village). Within households, the researcher observed daily routines and tasks. Unfortunately, the weakness of participant observation for this study was that it gave limited opportunities to grasp past social reality explained by respondents.

At a times, the researcher mingled with villagers to build rapport and become a non-threatening to the respondents. Bernard (2006) refers this approach as 'hanging out'-it involves meeting and conversing with people through which the researcher gains trust and establishes rapport with them. This was especially useful for the current study as it helped the researcher to acquaint with local community members outside his professional role, especially to those who thought that the research aimed to collect information for the purpose of MBREMP's surveillance and enforcement activities.

An overt observation, a type of participant observation where the researcher is open with the group they are studying (Lofland and Lofland, 2006) was preferred for this study. The other type is covert where the researcher is not open with the group they are studying. In overt observation, the society is aware that they are being researched because they have been informed of this beforehand. As observed by Esterberg (2002), boundaries were established on exactly what to observe, decide on the amount of participation and observation, develop trust relationships and properly interpret observations. This helped to focus the attention on issues pertinent to the research

questions such as how people interact with each other on reef fisheries and livelihoods, opportunities in livelihood landscape etc. rather than attempting to observe everything at one time (Merriam, 1998).

For most of the observations made in the current study, formal permission³⁶ was not required. However, the researcher was sometimes accompanied by someone from the village, usually a person appointed by the village leaders, who was well known in the village to direct the researcher to various areas within the village and help with introduction in case of queries concerning the research. To ensure that certain factors did not affect the observations, the researcher considered the limitations of observing and participating in activities which are dangerous or illegal, as warned by DeWalt and DeWalt (2002). The authors highlight that the researcher should be aware of the compromises in access, objectivity, and community expectation that are being made at any particular place along the continuum (DeWalt and DeWalt, 2002:23).

Being a participant observer in his own country, and in an area where the researcher had worked before, presented enormous challenges due to his insider/outsider role in this particular study. The working relationship the researcher had with the study villages rendered it difficult to initially comprehend all observations objectively, since he was accustomed to the social settings, behaviour and most of the activities he was witnessing. In due course, however, familiarity with the study villages provided some hints about where to begin observations within the framework of the current study objectives particularly in: seeing issues and concepts through the lenses of those being studied.

Being known to some people from the study villages as an employee of MBREMP also had its demerits in some instances. For example people engaging in destructive fishing activities were often suspicious and unwilling to take part in interviews thinking that the researcher is too heavily involved with the inner-workings of their daily lives to assist MBREMP know their whereabouts. While a fully objectivity cannot be claimed, the

³⁶ The permission to conduct the study was already given by the Regional authorities, who introduced the researcher and the purpose of the study to responsible district officials and village leaders. Furthermore, before the actual data collection process, an introductory meeting, attended by representatives of village government and natural resource management committee was organized in each study village where the purpose of the research was reiterated.

researcher routinely reiterated his role as a student performing research for the partial fulfilment of his studies.

4.4.2 Key informant interviews

Systematic information to understand local context of dynamics of livelihoods, variation of wealth among households, perceived changes in fisheries resources and the various ways of coping with livelihood stresses in the past and today were explored through key informant interviews (KIIs). After key informants were selected, initial contact was made to determine if informants would be willing to participate in an interview. Once the individual had agreed, the researcher scheduled the interview at the place and time convenient to the respondent. Interviews generally lasted between 40 minutes and one and a half hours depending on the level of detail offered by informants. During the interviews all questions were asked in Swahili language. The majority of interviews were held in the homes of local people, in offices for the local experts, in common areas in the villages or at locations where the respondents felt most comfortable.

At the beginning of each interview, the researcher introduced himself and informed a respondent the purpose of work before requesting oral consent to proceed with the interview and to record the interview. Denzin and Lincoln (2005) assert that it is important to be clear with the respondent at the start of the interview in order to avoid confusion and erroneous expectations, as it is likely that the participant will later discuss the interview with other community members. Anonymity of respondents was assured and throughout this study the respondents were reassured that the information they provided as ‘individuals’ would not be linked directly to them and would remain confidential for the purpose of this research.

Key informants were consulted through semi-structured interviews (SSI) with general topics and open-ended questions³⁷ (Perecman and Curran, 2006). This guided³⁸ them to provide in-depth information about fisheries resources including use and trends, coastal livelihood dynamics and the various means communities had developed to adjust to

³⁷ The interview guide prepared was not meant to be rigid; it had more flexibility than with structured interviews and was adapted constantly following the results of a session. In fact, it was intended left open-ended in order to explore new ideas and topics which could arise during the interviewing session.

³⁸ Preparation for interview and tips on the kinds of questions to be asked was enriched by the discussion on the various styles of interview styles by Esterberg (2002:92-106).

declining fisheries resources. Questions also covered the following topics: all aspects of income generation for livelihood security, perception of degraded resources and strategies to cope with it and decision-making processes, a wider range of problems on livelihoods, local institutions, social dynamics, climate variability as well as on the extent and impacts of destructive fishing activities especially dynamiting and mining of live coral for lime production. The list of questions, which served as a guide for key KII is presented in appendix 1B.

The majority of key informant interviews during this study were not recorded since most of the informants felt strongly that they should not be. Some informants were so unnerved and bewildered at the prospect of being recorded that they threatened to leave the interview. Consequently, only seven interviews out of 46 were recorded. The researcher believes that the objection to be recorded stemmed from personal perspective and interviewing fatigue. Subsequently, it was realised that some interviewees were afraid of being recorded because they felt that they could be heard by their friends and did not want to appear ignorant on tape or mention something they might regret.

4.4.3 Focus Group Discussion

Focus group discussion (FGD) is a data collection tool that aims to generate discussion and interaction within a small group of local people (Morgan, 1996). Kitzinger (1994) views FGD as a type of group interview wherein the communication between the individuals in the group generates and forms the data:

[...] they challenge one another, the questions they ask, the evidence people bring to bear on an the issue, the sources they cite, and what arguments seem to sway the opinion of other members of the group (Kitzinger, 1994:114).

Focus group discussion is adopted as a method of inquiry³⁹ because it reveals a variety of perceptions that individuals in a community hold regarding issues of interest (Silverman, 2011), which support the objectives of the research. Focus groups were chosen because

³⁹ In this research phenomenology and elements of grounded theory formed the inquiry methodology. They are informed by constructivism paradigm. It should be noted however, the phenomena investigated in this research are not completely unknown and therefore not all the procedural steps of grounded theory (Charmaz, 2000; Glaser, 1992; Strauss and Corbin, 1998) were used.

the current study aimed to create a participant-informed opinion that would reflect the needs of the population investigated.

The FGDs were found to be adequate for this research because they provided insights into the research questions that would have been less accessible without the interaction found in groups. As an example, the groups explicitly discerned the different coping activities such as those aimed at survival, consolidating or accumulating wealth as well as the interdependence of those activities. They were useful for wealth ranking exercises and time-line analysis. It would be difficult to ascertain such information by interviewing only one individual. FGD therefore allowed participants to interact with one another to build a consensus, and sometimes disagreement, around different points of view.

Using guided themes, two FGDs of 8–12 participants per group were conducted in each of the five study villages. Participants in each FGD were deliberately chosen based on their knowledge about the subject and gender. One in each of the two FGD in every study village was exclusively for women participants. Issues discussed however, were similar to those discussed with the mixed group but with emphasis on the role of women (single, married, widow) in the process of livelihood diversification and how they cope with changes brought about by degradation of fisheries resources. It was also geared to give them free opportunity to express the things that they could have not done so in presence of men taking into account the cultural barrier of women to speak in front of men—a typical of coastal areas of Tanzania. In total, ten FGD meetings were held for this research.

The question guide for FGD is provided in appendix 1C. The time taken for each FGD ranged between one and a half to two hours. This was an ideal duration as longer discussions tend to lose momentum. Most of the FGDs were not recorded as the majority of the participants did not give permission for this. The researcher tried to persuade them for recording but majority showed to be unwilling to share and participate candidly in case recording could be made. As a result, the researcher took notes during the discussion and attempted as far as possible to capture notes regarding group dynamics, mood and gesture, as these produce a rich qualitative record of a FGD. In fact, such notes were useful in incorporating material which could have been captured by audio or video recording.

4.4.4 Household survey

There were a number of methodological justifications for employing household survey (HHS) in this research. At the time of field work for this study, the last household survey carried out by Malleret (2004) was nearly eight years ago, during which remarkable socio-economic changes have occurred within households (and even at an individual level). This, therefore, was an ideal platform for households to express their own experiences and how they had responded on their own to their livelihood changes. Besides that, it was important to obtain data of households and their activities in a more definitive way—this is captured by survey method.

The HHS used the questionnaire (Appendix 1A) and served several purposes to offer data as highlighted by Parfitt (2005:79) including: collecting basic data related to apparent economic situation, assets, demographic information, set of activities and access to essential services for coastal households. The survey also aimed collect data on all aspects of income generation for livelihood security, fisheries status, resource use strategies, perception of declining fisheries resources and strategies to cope with it, perceptions of individuals on the environmental changes that have occurred over the past decades and decision-making processes. Moreover, contextual data such as the choice of livelihood strategy copied or adapted at heightened vulnerable situations were also woven into the household survey questionnaire.

The survey was undertaken over a fourteen week period between April and July 2012. The main respondent sought in the household survey was the household head (HH) or key decision maker in the household regardless of gender. If the HH was not available, another suitable household member (wife, son, daughter or relative) was interviewed.

The sampling approach deployed did not intend to create a statistically representative sample or achieve representative results for a larger population; rather, aimed to derive trustworthy, credible and confirmable data about coastal households and their livelihoods strategies. In other words, the researcher is fully aware of the limitations of the design of this research; the findings from HHS, therefore, are not claimed to be representative in a quantitative sense. However, they clearly enable the identification of certain patterns and tendencies of resources degradation and coping strategies among the two groups sampled.

The questionnaire was pre-tested in Msimbati village during a pilot survey where the researcher randomly selected thirteen households. The interviews were only possible with seven heads of the thirteen households selected. The interviews were completed in five days. The results of pre-testing interviews highlighted certain characteristics. Firstly, it was apparent that coastal people would not honour appointments if they did not perceive there to be immediate benefits or incentives. Thus it was necessary to arrange the interviews so that respected people in the community were involved in approaching potential respondents for interviews. Secondly, the pre-survey helped to identify questions that were irrelevant in answering the research questions, questions that were popular as well as those which were consistently unanswered. The questionnaire was therefore refined by removing those ineffectual questions.

Lack of privacy when interviewing survey's respondents arose during the pre-testing exercise. In certain occasions, people tended to be suspicious when the researcher was conversing with their akin or close friends. Consequently, additional people were always listening, watching or sometimes joining in the interviews without the researcher's consent. This sometimes led to answers in unison with unintended respondents. This was unavoidable since to intervene would disrupt the flow of potentially useful information and affect the rapport established between the researcher and respondents. On the other hand, answers from more than one household member especially in cases of recall data were also an opportunity for the researcher to understand the intra-household dynamics and access to and control of resources, and supplemented information requested. Indeed, it was useful bearing in mind that in some instances, the head of the household was not necessarily a person most closely involved in economy activities in the village.

All household survey interviews were conducted in Swahili language directly with the respondent and lasted between approximately fifty minutes and one and a half hours. The intention was to carry out the interview with the respondents at their homes. This proved useful in cross-checking responses through direct observation to certain questions, such as those about household assets. There were very few cases (less than seven) where respondents were unavailable for interview during our first or second visits to that household. There was no interview with the households whose individuals were not present on a third visit.

4.4.5 Life story interviews

Initial data analysis from the first field research phase revealed an absence of old information that can be found in diaries, letters or other documents that could be used to retell the past coastal livelihoods, and related decisions and processes, in a revealing, vibrant and lively way. Additionally, unlike in other parts of the world such as Mexico (Sáenz-Arroyo et al., 2005), the researcher found an absence of archives that could provide audio versions of oral histories, biographical data and written transcripts describing past events for Mtwara district. As a result, the researcher could not gain any insight into livelihood trajectories of individuals and households or gain a glimpse into how people would construct their past worlds (i.e. what they believed, imagined and valued).

While written sources are essential for the study of the past, an individual's testimony can supplement those sources by providing a detailed and personal look at historical events that may be underrepresented or even absent from written works (Atkinson, 1998). For example, in the early 1980s a fire broke out in Mngoji village as a result of seismic tests carried out to explore oil and natural gas. The fire set ablaze many properties and caused deaths in the village (Mngoji village chief, pers. comm.). This was an important tragedy that had devastating effects on the village livelihood and has never been documented, but was captured in life story interview. Other good examples of aspects highlighted during life story interviews include new experiences of today's livelihood trends, how they started to take fishing unrelated activities, to mention a few.

The researcher conducted fifteen life story interviews between November 2012 and January 2013. Selecting participants for these interviews based on iterative process that sought to maximise the richness of data to address the research question. Participants included individuals from both wealth status (poor, middle, rich) while attention was being paid to age, gender and livelihood occupations. In some instances, snow-ball sampling technique (Neuman, 2003) was used to get further participants for the life story interviews.

Life story interviews were conducted in Swahili in a semi-structured format, with open-ended questions that followed a pre-determined sequence. Informed consent and

permission for audio recording of interview sessions was requested prior to the actual interview, and at this point the purpose of the study was reiterated. Interviews were undertaken in private; in places considered to create a comfortable and free environment. Thus, the majority of these interviews took place at the respondent's home at suitable times chosen by them. Each interview session was approximately fifty minutes to one hour. A digital recorder was used to record the interviews. The researcher also took some notes based on certain observations.

All audio files were transcribed in Swahili. No editing of stories was made to avoid reducing a story's authenticity. In reporting, pseudonyms for all participants of life story interviews, as listed in Appendix 2B are used. Indeed, because of the nature of issues narrated, the village names were not references but rather presented as XA01 through XA05 as a way to minimise the possibility that someone reading this thesis who knows the villages can extrapolate the names of participants by relating to their expression in this thesis.

The interview process began in an informal manner, contrary to typical interviews which commence in a rather formal and abrupt way (Fontana and Frey, 1994). For example, the researcher started by asking respondents to tell their life story concentrating upon changes in livelihoods over the past twenty or thirty years. The researcher was completely aware that over this time period not only have people's lives and their wider social, economic, political and environmental context changed, but so too have policies and approaches to their lives. This was useful as it provided an instant image of respondent's first thoughts. Indeed, it helped the researcher formulate questions that prompted further discussion.

Participants were allowed to take their own direction in telling their story to reflect their experiences. After free form story, the respondent was asked some additional questions about livelihood pathways, present livelihoods and life styles. The researcher, however, often prompted and guided the respondent in cases where they had settled into a steady and comfortable recount of their experiences. The interview proceeded situationally and on the respondent's conditions. Consequently, the interviews were not necessarily identical, nor were all of the topics raised in each interview.

Some of the accounts of events explained by respondents were not in chronological order; they were mostly recounted in an unstructured manner as one memory sparked off another relevant memory within it. The majority of respondents expressed those events that they attached importance to. In some instances, the account was based on enthusiasm; for example, those who felt their status of well-being is worse were more straightforward but more extreme in their responses, whereas those with a better well-being status, especially from Msimbati and Nalingu villages, were more cautious in telling their stories. Such cases rendered the data analysis time-consuming and complicated. Thus, it became necessary to constantly check and recheck anecdotes to ensure that the events were depicted as accurately as possible. This was taken as a challenge regarding the more practical processes of conducting oral history interviews (Silverman, 2011).

It was initially assumed that respondents would be able to articulate memories and events as they happened and that those things would be remembered in a clear and concise way. Interestingly, in some cases respondents' memories had explicit connections as one memory triggered another. Memories in some cases were erratic, leading respondents to describe experiences which were not directly relevant for instance the recent discovery of natural gas and huge influx of people to buy land for coastal tourism development. In such instances, the researcher had to decide whether to allow the conversation to flow, and gain as much information as possible, or interrupt the conversation to gain more relevant detail.

4.5 Secondary data collection methods

A variety of documents and reports from government, NGO, research institutions, and newspaper articles were collected as secondary data sources. More specifically, household's demographic and health survey reports, periodic reports on the state of the national economy from the Ministry of Finance and Economic Planning, and poverty reduction related documents (e.g. National Strategy for Growth and Reduction of Poverty-*MKUKUTA*⁴⁰ I and II; National Vision 2025) from government line ministries were collated.

⁴⁰ [http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/Tanzania/\\$file/NATIONAL-STRATEGY-FOR-GROWTH-AND-REDUCTION-OF-POVERTY-TANZANIA.PDF](http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUIImages/Tanzania/$file/NATIONAL-STRATEGY-FOR-GROWTH-AND-REDUCTION-OF-POVERTY-TANZANIA.PDF) [Accessed 11.07.2012]

Other documents included weather forecast reports and precipitation and temperature records for Mtwara district from the Tanzania Meteorological Agency (TMA) and various reports and documents released by the Division of Fisheries of the Ministry of Livestock and Fisheries Development. Along with, publications and research articles related to fisheries, coastal livelihoods, coastal anthropology, climate change, and community development in Tanzania were reviewed and internet sources useful for the research questions were also visited. In addition to the aforementioned sources, the literature on rural livelihood research, rural development and adaptation to climate change have been widely consulted. An extensive literature engaging with political economy of coastal communities prior to Tanzanian independence has also been influential. Other valuable source of information has been unpublished local reports engaged in coastal livelihoods and management of coastal fisheries.

4.6 Verification of data collected

Verification of the data and information collected was made throughout the research process. The researcher used several means to corroborate information collected, including: triangulation (checking repetition in responses from the various techniques used to collect the data), asking the same questions twice if not convinced of the first response and cross-checking data with key informants in the community (community members) and outside the community (technocratic and local experts). The findings were also corroborated with direct observation in the field and the use of secondary data such as government reports and statistics as well as information synthesised from literature. This was purposively done to increase the validity and reliability of the results. Consistent with this, the researcher followed strategies for ensuring trustworthiness in qualitative research, such as credibility, transferability and confirmability, as outlined by Shenton (2004).

Briefing meetings on research findings were planned at the end of the research process in each village; however these were all cancelled following protests against the construction of a 532 – kilometre pipeline to haul natural gas from Mtwara to Dar es Salaam. As the researcher had finished reviewing the interviews, he opted to contact some respondents by phone with follow-up questions in cases where further clarification was required.

4.7 Data processing and analysis

4.7.1 Quantitative data

Quantitative data obtained through the household survey for the two sub-samples was entered in spreadsheets in Microsoft-Excel (2010). The file was later exported to Statistical Program for Social Science (SPSS-version 20) for analysis using descriptive techniques. Responses from survey are presented as percentages. Although initial it was anticipated to construct the asset pentagon based on indicators within which livelihood capital, the problem caused by sampling procedure restricted this process.

4.7.2 Qualitative data

Prior to embarking on analysis, field notes from interviews were organised into digital format. The verbatim files from audio recorded interviews were transcribed in Swahili and subsequently translated into English. However, not all of the information from verbatim transcripts was translated into English to avoid misinterpretation due to translation; only those parts of the text that were quoted for the purpose of reporting were translated. Interestingly, the researcher was conversant with the frequent use of colloquialism in the study village; therefore this did not present any communication challenge but was rather an opportunity for enriched insight.

Overall, analysis of the qualitative data and the interpretation process followed in this study were closely aligned with the iterative process of qualitative data reduction, organisation and interpretation promulgated by Silverman (2011). More specifically, the analysis tasks involved the following steps. First, all interview transcriptions, unrecorded field notes, and secondary data or information were proofread, scrutinized and inspected to obtain a picture of the overall data (Creswell, 2003). In the case of interview transcripts, the aim was to uncover the meanings respondents ascribe to their actions. Themes were subsequently identified through repetition, cutting and sorting (Ryan and Bernard, 2003). This occurred both during and after the field work.

Second, data reduction was repeatedly undertaken through segmentation, summarization and editing. This process also entailed coding and finding themes, clusters and patterns,

conceptualization, description and explanation. Coding⁴¹, which was based on predetermined investigative themes, was central to the data reduction exercises, in which a word or sets of words were applied to data sets to summarize their content (Gibbs, 2007; Grbich, 2007). At this stage, care was taken to avoid any significant loss of information related to the study objectives and that data were not stripped from their original context (Punch, 2005).

After the codes were developed, summaries were prepared by themes and sub-themes outlining the key issues, their nature and relationships, and possible links to other issues, including references to potential quotes for use later on.

The data reduction process was followed by data organization. This entailed repeated and interactive display, compression and assemblage of data and information to produce descriptive data, especially in text form (Miles and Huberman, 1994). The fourth step in the analysis involved data interpretation. Interpretation was done in a manner consistent with the hermeneutical approach, which involves introspection and distillation, whereby individual constructions are elicited and refined through interaction between the researcher and the respondents. The purpose of the hermeneutical approach was to interpret and reveal people's lived experiences and the meanings of these in order to develop an understanding of their world (Liamputtong and Ezzy, 2005:27). Accordingly, the study findings were effectively rich accounts of people's realities, the factors shaping them, and how they act within their life (Bryman, 2008).

Direct quotations and episodes from respondents supported and emphasized the key conclusions of the study, are employed in this thesis, identified only by pseudonyms. Photos taken during participant observation are also used to illustrate and backup specific facts about the study settings.

Data analyses were not limited to the iterative process of data reduction, organisation and interpretation described above. Other data analysis methods employed were content analysis (Atkinson and Coffey, 2011; Bauer, 2000) for the analysis of documents, and narrative analysis (Silverman, 2011) for the recorded life stories.

⁴¹ According to Dick (2005), coding is viewed as both an analysis and a specific activity. There are two types of codes: descriptive and inferential (Punch,2005)

4.8 Limitations of the study

Besides problems mentioned in the previous sections related to research methods, there are few limitations (challenges) to the field research process in relation to sample size and validity, time constraint and the relationship between the researcher and individuals (community) researched.

The field research is not meant to generalize for the whole Tanzanian coastline, Mtwara rural district, or coastal villages but to provide one of the many perspectives in coastal villages of Tanzania. Respondents for the survey needed to be drawn from different two livelihood strata. Unfortunately, the sampling approach did not work out in the end but since the aim was not looking to do statistical sampling nor want to generalise this should not have any impacts on the results. The overall research findings are therefore, a representation of the researcher's understanding of the views and perceptions of those respondents (Guba and Lincoln, 1989), assuming that the individuals interviewed in each category represent more or less the general perspectives of their represented group unless otherwise stated. Nonetheless, through transparently stating this weakness, the researcher tried to achieve credibility (Hardwick, 2009:441–445).

The limited time and resources for this research was also other challenge to the field research. The intended individuals to be the subjects of this research (coastal households/individuals in Mtwara district) are renowned to be scatted in pursuit of their living, making it difficult to fix appointment with someone or even to predict if they will appear regardless if a meeting time has been agreed between you two. Because of this, the researcher spent considerable time roving in and around the five study villages, trying to meet up with respondents for interviews. As a result, it was not feasible to reach many other potential respondents. Sometimes it would take 2–5 appointments before the researcher was able to have an interview, if at all. Adapting to this required high flexibility, which was somewhat affected by time and resources. Moreover, in such unpredictable situation, the researcher attempt to involve respondents with key roles and who were part of key processes to research questions. Despite this, the researcher was at least for the most part able to carry out interviews with almost all of the expected respondents by overcoming this limitation by persistence. The essence was to ensure that

the information being collected was accurate and mirrored the local reality of respondents.

Findings of this study relied on views and perceptions expressed by the members of local community, which is likely to have been influenced by researcher's relationship and the researched. The researcher is employed by the Marine Parks and Reserves Unit (MPRU) of the ministry of Livestock and Fisheries Development. This relationship enabled network and knowledge, but created a by-product to be considered as a 'government marine conservation official'. In the beginning it was uncertain if researcher's relationship with the research subjects would favour him or not. The researcher tried a lot to show more interest in respondents as people and not make them feel as merely research subjects whom he need to get information from by taking the position of an insider in the study villages. This involved immersing in the village life such as eating at *magengeni* (food stalls owned by women in villages), purchasing basic groceries from shops owned by villagers, and spends some moments walking through the village chatting to people, normally trying to follow up regular conversations in villages. No matter how hard the researcher tried to locate himself among villagers, it is natural that some of the local community members perceived the researcher as 'government official' and not a 'student'.

The researcher therefore, still felt that some information could have deliberately given as radical criticisms about coastal livelihoods, resource dynamics, coping strategies and the government, or subjective expression of their issues. To address this issue explicitly, which reflect power relations in the research process, and positionality (Denzin and Lincoln, 2005), the researcher was very honest about the limits of his research in affecting changes in the lives of individuals who agreed to be interviewed. Indeed, the researcher was also open in answering any questions people had about him and being aware of the critiques of the information required, while belittled his employee status, and that the research was independent from his employing organisation. The researcher preferred to present himself as a student by telling respondents that he was trying to understand something about their livelihoods, and that he was using the village as a case study to understand the social and economic changes that were taking place, making degradation of fisheries as one of the drivers of change. Although no researcher can truly understand

how their position affects their relationship with the respondents, it is believed that the villagers understood the position of the researcher as independent student and separate from his organisation. For example, although when the project began there was rumour (listing of dynamite fishers) in the first few days which however disappeared quickly, the researcher was never informed or heard from any villager that his work was part of the surveillance and enforcement of MBREMP.

The other significant limitation of the research process was interviews fatigue. A puzzling observation in study villages, Msimbati and Mngoji in specific, was the aloofness of several respondents towards the researcher complaining that over the past ten years they have received measurably visitors in the coat of research: hence they are tired of spending too much time in interviews. Naturally it is possible that those individuals had numerous interactions with various researchers doing rather different things, and that the background of interactions has generated some scepticism about the potential contributions from researchers. To this was added the fact that the researcher did not come with financial resources to boost their activities such as fishing groups or small scale business. As a result, some individuals in the community perceived the research activities as irrelevant, thus making the researcher to find appropriate ways to persuade them to take part in interviews, which in some few instances was far to be realised. The researcher entry into each village was facilitated by village government that made entrance into the village easier by introducing the researcher independently of previous researchers visited their villages.

Gender posed another limitation on the current study. In coastal areas of Tanzania, women seem to have a passive role in decision making regarding livelihoods and management of fisheries resources. In a few exceptions, women hold key positions in village institutions (e.g. village chiefs or village executive officers). Following this, a separate FGD for women only was arranged in each study village to gain insights from women themselves without presence of men. In such situation, there is opportunity for women to give their own perspective of things however, since the facilitator (researcher) was a man—was not possible to recruit a female facilitator because of financial limitations—it is likely that this made impossible for participants to reveal some of the

sensitive issues as they would have done if facilitated by a woman, and that could have strengthened some of their arguments.

Chapter 5 Household livelihoods in the context of deteriorating reef fisheries

5.1 Chapter overview

Coastal villages in Mtwara district are not only a home to the *Maraba* people, who form one of the three sub-groups of the *Makonde* ethnic group of Tanzania (other sub-groups are *Nnima* and *Ndonde*), but they also contain rich marine biomes with hundreds of species of fish and other living organisms. However, as the district is a remote rural area and previously part of the isolated southeast region of Tanzania, pervasive rural poverty has driven profound degradation of local natural resources. Anecdotal evidence suggests that livelihoods of the *Maraba* and other local communities along the coast have deteriorated rapidly since the heyday of dynamite fishing (especially between 1990 and 1997) and its strong resurfacing in 2008.

While the selected villages possess a number of relevant assets and opportunities that can be capitalized for livelihoods, households residing in these villages continually face difficulties to access livelihood opportunities outside the deteriorating fisheries sector and poorly performing agriculture. Households in the study villages differ in various ways, particularly in terms of access to modern fishing gears, agriculture implements, savings and access to credit, groups with linkages that often have better access to resources especially outside the community such as from government and NGOs, skills, and in the local institutional context. Within this context, how do households establish their livelihoods and adjust to changing environmental and socio-economic conditions?

This chapter builds on the results of interviews, focus group discussions, and secondary data to illustrate how households and individuals make a living within their capabilities, in the context of perceived degradation of natural capital (marine fisheries). Attention is given to the role of other forms of capital discussed in the sustainable livelihood approach (SLA) in order to determine how these help or inhibit coastal households to achieve sustainable livelihoods. Accordingly, it is argued that although households from the study villages have been blamed directly for the increased degradation of fisheries resources, policy and interventions have accelerated the rate of degradation in pursuit of livelihoods. The impact of the wider failure to understand the complex issues surrounding present

livelihoods, people's aspirations, and possible interventions has reduced the resilience of livelihoods through human-induced threats.

The chapter is divided into several sections. Firstly, the main socio-economic information of the respondents surveyed is presented. Then, livelihood strategies and assets are explored with focus on the state of fisheries resources and governance. Next, the impact of the perceived decline of fish stocks in supporting livelihoods is investigated. Finally, other threats to current livelihood strategies, and how they are understood by people within their local context, are examined.

5.2 Socio-economic characteristics

Socio-economic characteristics of the people interviewed in the present study are shown in Table 5.1. The respondents (divided into two groups) were drawn from a sample of 297 villagers likely to be "fishers" and "non-fishers" head of households. Gender distribution in the two sub-samples showed a bias; however, this can be explained by the recruitment criterion (respondent had to be a head of household). Men predominantly assume this role in many coastal areas of Tanzania. More than two-thirds of respondents in the two groups were married (lived in a consensual union) and of these most had children. In both groups, the level of education of respondents was generally low; with the majority reporting to have attended seven years of primary school, while very few respondents had any secondary or tertiary education. Unsurprisingly, some respondents in both groups reported that they had never attended any school. This is quite similar in many rural coastal areas of Tanzania. The common ethnic group was Makonde (*Maraba*) and an overwhelming majority of respondents were Muslim.

About 4% of respondents in fishers' group and 2% were affiliated to social groups such as saving and rotating fund scheme, religious, traditional healers and handicraft. Less than 10% of the respondents in the sample reported using financial services such as having bank account or accessing credit. Most respondents in both groups were characterised by seasonal food shortages although majority of respondents in fishers' group believed that fishing was worthwhile for regular income to purchase food, but that in recent years their income had been adversely affected.

Table 5.1 Main socio-economic characteristics of sample respondents

Variable	Fishers (N=183)		Non-fishers (N=114)	
	n	%	n	%
Gender				
Male	175	96	89	78
Female	8	4	25	22
Age				
15-30	45	25	43	38
31-50	121	66	51	45
>50	17	9	20	17
Education				
No formal schooling	34	19	11	10
Primary	141	77	87	76
Secondary/ Tertiary/Others	8	4	16	14
Marital status				
Single	34	19	27	24
Married	129	70	69	60
Divorced	14	8	11	10
Widow/Widower	6	3	7	6
Own land				
Yes	148	81	103	90
No	35	19	11	10
Own livestock				
Yes	169	92	96	84
No	14	8	18	16
Crop income				
Yes	68	37	105	92
No	115	63	9	8
Fish income				
Yes	174	95	44	39
No	9	5	70	61
Other income				
Yes	33	18	103	90
No	150	82	11	10
Own bank account				
Yes	6	3	9	8
No	177	97	105	92

Source: Household survey, 2012

A large proportion of respondents in both groups reported to be living in the houses built of poles and mud, roofed with thatch. Ownership of household materials (physical) such as bicycle in both groups is given in Table 5.2.

Table 5.2 Assets ownership

Asset type	Fishers (n=183)		Non-fishers (n=114)	
	n	%	n	%
Radio	65	36	43	43
Bicycle	78	42	55	48
TV	5	3	6	5
Motorbike	17	9	14	12
Car	2	1	1	0.9
Solar panel	8	4	2	2
Mobile phone	76	42	42	37

Source: Household survey, 2012

Table 5.3 summarises the main characteristics of households according to the wealth. When asked to describe themselves according to local characteristics of wealth status, the majority of respondents in both groups felt belonging to poor wealth category. However, few respondents especially from fishers' group were considered to be wealthy by the local standard but most appeared to be in the middle category of wealth. A common feature to wealth ranking in both FGDs was that the majority of female-headed households were ranked as poor. This is in line with several studies, which show that gender is a crucial factor in contributing to an individual's access to resources and livelihood opportunities.

Although ownership of materials that could depict social status of respondents appeared low, many key informants believed that material wealth as evidenced by a limited rise of modern items such as mobile phones, television (TV) sets and satellite dishes had risen in the study villages during recent years compared to the 1980s and 1970s. One key informant from Mnete village reported that these modern tools have made it possible for people like him to access the outside world. His opinion stressed that many people in his village did not even know what a TV looked like until the 1990s when TV stations started to broadcast their programmes in some urban areas of Tanzania.

Some key informants felt that the increase of material wealth could be attributed to a few individuals that have amassed relatively huge amounts of personal wealth and political influence. Evidence of such wealth was predominantly apparent in Msimbati followed by Nalingu and Mngoji villages. This wealth included cars, better houses, and satellite dishes. Unfortunately, it was not possible to use social research methods adopted for this

study to determine how these individuals were able to amass such wealth on a timescale previously unseen in these villages.

Table 5.3 Local perceptions of wealth status across the study villages

Poor	Middle	Rich
Owned no coconut trees	Owned up to 10 coconut trees	Owned more than 10 coconut trees
House of bad quality or no house at all	A house of sun-dried bricks (or mud with poles) and corrugated iron or thatch/grass	A house of burnt bricks or cement blocks, roofed with corrugated iron sheets
Food insufficient	At least food sufficient	Almost food sufficient
Little land for cultivation, usually not more than 2 hectares	Land for cultivation of about 3–6 hectares	A field for cultivation of about 8–10 hectares per season
Poor fishing gears or no fishing gears at all	Owned at least one set of gill net or hook and lines, 2–4 traps, and a dugout canoe	More than one fishing gears and could employ people to fish for him/her
Not able to pay for health services, school fees	Able to pay health services, school fees	Able to pay health services, school fees
Does not know how to read and write	Able to read and write	Formal education above primary education level
Household head is female	Household head is male	Household head is male
Does not own a mobile phone	Own at least a bicycle, mobile phone, motorbike etc.	Own fishing boat, car, farms
Use hand hoe for cultivation	Use hand hoe	Use hand hoe, but with casual labour

Source: Focus group discussions

5.3 Livelihood strategies and sources of income

Respondents were asked to mention the activities in which they were involved and the relative income derived from each of the sources. Given the diverse number of activities mentioned (Table 5.4), it was appropriate during data analysis to aggregate them into fairly representative categories. These resulted into agriculture, fishing, business, livestock keeping, waged jobs, self-employment, migration and others. Table 5.5 shows the current livelihood occupation of the study respondents. It is worth to mention here that some respondents for example, reported that they may or may not fish for income and therefore would prefer to be identified among non-fishers.

Table 5.4 Categories of a selection of coastal livelihood activities mentioned by respondents and groupings for the purpose of analysis

Category of activities	Examples mentioned
Fisheries dependent	Fishing, fish trade, shell collecting, fish processing Salt making Lime making Crab fattening Boat building Net repair Lending fishing gear/boat Selling fuel for boat engines Selling ice blocks Seaweed farmers/fish farming
Farming	Crops for subsistence and income
Livestock	Keeping cattle, goats, poultry,
Small scale businesses	Selling prepared food Selling vegetables Selling kerosene Selling staples Selling raw materials like sulphur, colour paints, building materials Selling clothes Commercial enterprises (e.g. kiosk, stalls-‘ <i>magenge</i> ’, shops, restaurants,) Selling miscellaneous items like stationary, bicycles spears,
Waged jobs	Teacher Nurse Policeman/woman Agriculture extension officer Ward executive officer/village executive officer Technician(watchman/cook/assistant in gas exploration companies)
Self-employment	Miscellaneous professions such as masonry, carpentry, electrician, mechanic, tailor, money lenders Exchanging foreign currency Local brewery Producing and selling charcoal Traditional medicines Handicraft Black smith Quarrying Harvesting mangroves poles/sales Transport (boda boda/commuter bus/boat ferrying)
Others	Casual labourers/migrants Smugglers Entertainers Politicians Religious teachers

Table 5.5 Main occupation of respondents (percentages)

Occupation/Activity	Fishers' group (N=183)	Non-fishers' group (N=114)
Fishing	56	20
Agriculture	24	49
Engaged in business	9	11
Engaged in livestock keeping	1	4
Waged jobs	0	3
Self-employment	4	5
Others ^a	6	8

Source: Field survey, 2012

^aFor convenience, activities related with migration were included in the 'others' category

Overall respondents in both groups seem in principle to mix two or more activities in their livelihood strategies. As an example, many respondents in fishers' group described that often besides fishing; they do crop farming, petty business and casual jobs. Some reported that in their households they had members taking up waged jobs as teachers and nurses. Only less than 10% of the total surveyed households stated migration as their main livelihood strategy. The main forms of migration mentioned were fishers moving to fishing grounds outside their villages, and relocating of some individuals (fishers and non-fishers) to search casual jobs outside their villages.

Income data was hard to derive, as respondents in both groups hesitated to disclose their income in absolute value. A classical approach of explaining income proportion (relative) as was carried out in the study of Hick et al. (2010) was applied. Respondents were given ten shells having a value of 10. Squares were made on each strategy they had listed and respondents were asked to place the number of shells to represent their income earned annually. The contribution of different income sources varied between respondents in both groups; however, fishing appeared as the main source of income in both groups (Fig 5.1). This finding suggests that the potentially of decreasing pressure on fisheries resources have yet to appear. When promoted to explain if their incomes have increased in recent years, most respondents in both groups indicated that their incomes have rather gone down. They linked it with lack of training and credit support that could have made them access profitable opportunities. Indeed, most respondents had limited access to waged jobs, requiring the possession of a specific level of education and relevant skills as a prerequisite. The other important source of income (admitted to by a few respondents in

both groups) was smuggling of goods to Mozambique and illegal activities (aggregated into “others”).

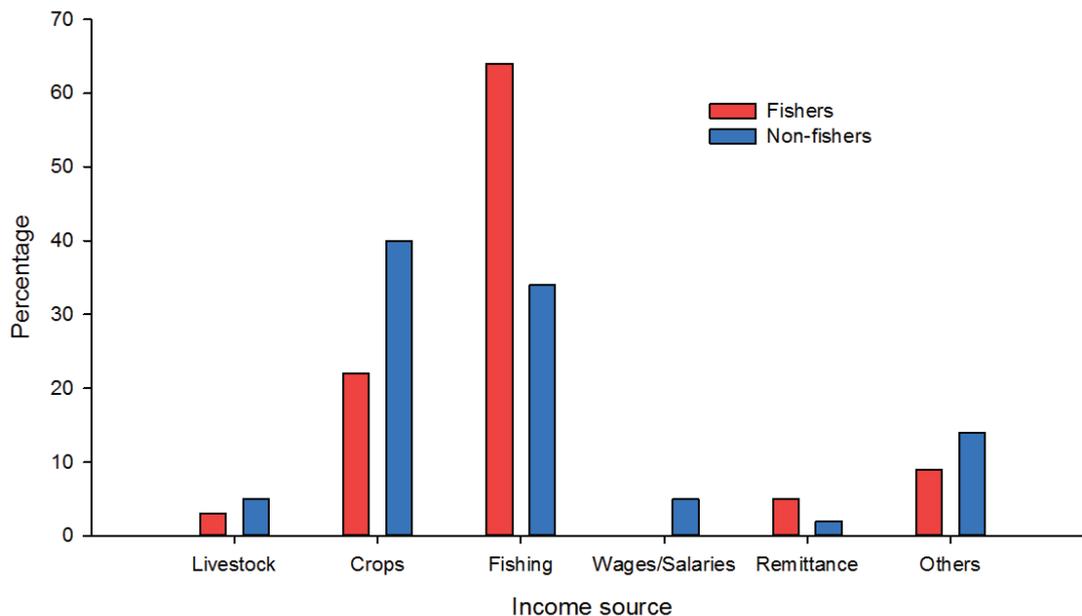


Figure 5.1 The main sources of income of the sample respondents

Elaboration on household expenditure during FGDs revealed that a substantial part of income earned is used to purchase food, followed by other expenses such as purchases of important needs for the household (kerosene/fuel), clothes, payment for school fees and health services, covering expenses for ceremonies, as well as buying airtime for mobile phones. Participants also described that cash income was needed for various needs such as transport fares, fishing and farming implements, and luxuries such as alcohol and cigarettes.

5.4 Livelihood capital

5.4.1 Natural capital

Most respondents in the survey felt that their major source of food and income was sea- and land-based resources. Although the survey did not establish precisely the quantity of land held per household, many respondents in both groups stated that they possessed a landholding of at least one hectare. Furthermore, most respondents said that they could

access the sea, and non-fishers respondents also had a well-established relationship with sea-related activities. This meant that a large proportion of respondents were dependent on both sea and land resources in sustaining their livelihoods, and that any changes in either of them could affect the status and the rate of dependence on the other resource. With information from FGDs, it was evident that destructive fishing activities had also caused some fishing households to shift to land-based activities, such as growing food crops and small scale business. On the other hand, low agricultural productivity and poor markets have caused some non-fishing households to opt for fishing- based activities. This has, in turn, increased pressure on fisheries resources and overexploitation attributed to a higher dependence rate. In turn, the decrease in fisheries resources has caused people engaging in fishing to alter fishing techniques to ensure a successful catch. Interviews and FGDs revealed a number of factors (Table 5.6) that affect fisheries resources in the study area. Although most of these factors were evident among many respondents, some were likely to be prevalent to few respondents and confined to their local knowledge of fisheries resources. For example, lack of alternative sources was more specific to fishers than to non-fishers.

Table 5.6 Perceptions of respondents on the main cause for the decline in fish catch (multiple responses)

Reason	Fishers (n=183)		Non-fishers (n=114)	
	n	%	n	%
Destructive fishing practices	164	90	80	70
Poverty and lack of diversified activities	151	82	49	43
Poor fishing vessels and gears	121	66	65	57
Overfishing from rapidly increasing number of fishers	113	62	71	62
Increase in fish price	104	57	40	35
Poor institutional arrangements for fisheries management	98	54	29	25
Establishment of marine park (MBREMP)	53	29	73	64
Climate change	14	8	23	20
No specific reasons/ Don't know	39	21	31	27

Source: Household survey, 2012

According to the survey interviews, the increase in destructive fishing activities had led to an important reduction of nutritionally valuable fish in their diets. When asked about culturally preferred eating habits, a large proportion of participants during FGDs stated that people in the study area have a long history of consuming edible marine products.

They reported that land-based sources of protein, such as cattle and poultry, are not common in their villages. However, some few participants believed that, in recent years, introduction of poultry farming spearheaded by initiatives to improve food security and poverty reduction has taken momentum in some households. This agreed with comments raised by several key informants that food items like vegetables and pulses (e.g. beans, chickpeas, dried peas etc.), which were uncommon in the diet of coastal households until the 1980s, now constitute approximately half of their diets. This was also established during participant observation, where the researcher was shown several plots planted with green vegetables, which, according to respondents, were rare in the past. Green vegetables are used for relish (*kitoweo/mboga*) in place of fish.

Participants during FGDs, however, felt that non-fisheries products are of low quality and do not provide the same flavour as fisheries products, despite having a positive image as a food source. This could have been attributed to the fact that most coastal communities have historically consumed fish rather than other food items (Higgin, 2011). This is similar to pastoralist communities in Tanzania that, until very recently, were consuming only meat and milk (Nelson et al., 2010).

The majority of survey respondents believed that the current status of fish stocks has forced them to turn to small fish (*dagaa*) instead of big fish (*samaki*), such as snappers, rabbit fish, kingfish and emperors. Interestingly, respondents in both groups reported that, although the availability of small fish was relatively high, quantities they consumed seemed low. When asked why this was so, many respondents attributed it to the increase in fish traders, who buy directly from fishers, and dry and transport fish to hinterland districts such as Masasi and Nachingwea, where they obtain higher market prices.

5.4.2 Social capital

Social capital, taken to mean the web of social relationships that influence individual behaviour, and thereby affect economic growth, is usually built on associations of trust and reciprocity (DFID, 1999:9). Among the two groups surveyed, it became clear that livelihood stresses were evidenced from increasing food shortages and lack of cash income for necessities, leading to a considerable decrease in social capital among villagers.

Survey results underscored the qualitative finding that there has been an increase in social differentiation among households. However, when asked directly about the difference across wealth classes in the study villages, surprisingly most FGDs participants denied that there was such a social difference. Many responded by suggesting that they were all equally poor, although few conceded that there were some who were slightly more affluent. This could have been influenced by the widely held notion that Tanzanians are poor and therefore many, even the better off, embrace this stereotype of claiming to be poor even if it is not the case. This assumption was common during the *Ujamaa* era, during which people were organised in communal villages supposed to build a self-reliant national economy upon a foundation of collective hard work and rural cooperation (Lal, 2012:). Although this state does not exist at present, casual conversation tended to reflect the *Ujamaa* philosophy where individuals were believed to be equal; thus, people simply responded by stating that they are all poor or all rich.

Observational data and further information from key informants revealed that although social differentiation is not particularly large, coupled with little evidence of serious social division between the interviewed households (and perhaps across the entire study site) at present, the 'egalitarian' social structure that until recently characterised coastal households (Swahili people) is gradually being transformed into a more differentiated one. Some older participants expressed during FGDs how customary law (*mila*) and level of organisation is declining in the public sphere, and that the influence of *mila* leaders in each village is slowly disintegrating since communities feel that such arrangements are no longer relevant in the current context of their livelihoods as it was over 30 years ago. However, elements of *mila* are still common in funerals, traditional rituals, marriages and some fishing and cultivation processes.

While it could be convincingly argued that since the majority of survey respondents are Muslim in faith, and that the role of *mila* has increasingly been replaced by religion, *mila* would still play an important role in uniting people in the communities such as in the most respected ceremonies (*jando and unyago*), as well as in solving social conflicts and decision making processes, use of land and marine resources, and in family matters. The functional role of *mila* in aspiring community spirit in the past was exemplified by the

mode of working termed *mukumi*, whereby people helped each other; recently however this is dissipating quickly as summed up below:

[...] mistrust has grown up, the 'kujitolea' [offer to do something without payment] moral has gone! Now everything waits for the village government to push. [...] there is lots of corruption and lack of transparency in village government, may be people see what the central government does. It is leadership crisis and this creates classes; supporters and splinter group against the village leaders. This has adversely affected people in their day to day life including our instruments for social control such as 'mukumi. (Key informant interview KII6, 12 March 2012)

In recent years however, a few instances of environmental, political and personal factors became apparent in their cultural practices; probably as expressed by a FGD participant from Nalingu village as a residual effects of the establishment of MBREMP. The participant's opinion explains how false and misunderstood information about implementation of conservation activities was received by most households in Nalingu village, and eventually led to negatively cooperation and interactions among and between households. Many households in Nalingu allegedly fanned the conservation threat by propagating that establishment of a marine park will make them get expatriated. They did this through strong opposition to any of the process related to MBREMP in their village. In a short while, their move spread (thanks to social networks) to nearby village of Mkubiru and as a result, MBREMP was not able to implement its activities in those villages from 2002 to 2009. Ultimately, opposition to conservation spearheaded mostly by individuals based in Nalingu village disunited households not only in Nalingu village but in almost all sea front villages delineated within the MBREMP jurisdiction. This residual of the impacts arose due to establishment of MBREMP is visible in attempts by households to limit reciprocity and trust between them. This opinion was also shared by participants of FGD in Mkubiru village as summed up:

*So many people were scared...those supporting MBREMP were seen as enemies and being robbed of their dignity. Some villagers there [Nalingu] and even here [Mkubiru] were no longer participating together in weddings or funerals because of animosity between those who support the park [MBREMP] and those who are against it. Divisions affected not only families and households, but the entire village, and social interactions between people of different positions became limited and suspicious. You would have not been able to go there and cooperate with villagers even ask questions as you are doing now. Efforts to mediate the conflict were futile as anti-conservation kept saying *hatutaki* [we don't want] wherever*

opportunity for negotiations was available. And you know in such circumstances, people started gradually reducing cooperating with each other. (Participant FGD in Mkubiru, 4 June 2012)

The tension created by the different views concerning the support of the MBREMP meant that traditional institutions, which sometimes assisted to bring people together in the community, were at risk. Indeed, discussion with MBREMP managers revealed that lingering fears combined with a lack of trust among community members have played a role in the decisions of some young people not to be involved in certain roles, such as sharing their catch with their neighbours or elderly people, as well as offering labour exchange in fishing and farming without payment.

Despite changes towards social differentiation, most respondents in the fishers' group felt that fishers interact in a different manner to serve their economic and social interests. Although currently fishers are not under the leadership of the village *mkumbi*, there is existence of several fragmented group-based *mkumbi*. Sometimes *mila* and kinship play an essential role in guaranteeing community members access to vital resources. Some respondents stated that there were instances where internal migrants, who belong to different ethnic groups, are "ostracised" by being called *wakuja* (new comers/not native), in order to deny them opportunities to access resources or integrate into the community. One respondent from Msimbati commented on a case of a teacher, who decided to abandon his duty station following such stigmatisation, and linked it to the development hurdle throughout southern Tanzania.

Participant observation during this study confirmed the role of social networks, not only as a source of reciprocal exchange, but also in providing access to productive assets, kin arrangements, collective labour arrangement and livelihood opportunities. Some key informants indicated that people with strong links could, for instance, acquire good rice⁴² seeds to sow from their connections as an alternative to those prone to *Litondwa* disease. Those without social links could not access good seeds and, consequently, were not able to avoid the risk of *Litondwa* in their rice farms as they repeatedly sowed the disease-prone seeds ultimately drowned in food shortages.

⁴² Rice (*Oryza sativa* L.) is a popular food (production and consumption) in almost all coastal villages in Tanzania. Insect pests on rice such as stem borers stem and root feeders, and leaf and panicle feeders have caused several rice diseases including *Litondwa*.

Diversification of relationships was noted as another option for well-off households to cope with livelihood uncertainties. Additionally, those with developed social networks outside their villages were able to depend upon these networks in times of crisis, such as debt, illness, theft of fishing gears, drought and business collapse. For the poor households, relationships were reported to be formed with the immediate family and clan members; however, these relationships were less able to relieve pressure in cases of livelihood stresses, such as food shortage and need to cash income to repair properties like houses.

Despite the fact that many survey respondents mentioned that they belong to a social group, the reality is that most of those groups were for religious or political purposes. However, few respondents agreed participating in Village Community Banking (VICOBA), rotating savings and credit groups (*mpeano*) and other economic association such as fish farmers, bee keepers.

Interestingly, sharing of information among kin members were reported to be higher compared to non kin members in both group surveyed. Typical example was cited for most kin members from Msimbati occasionally access casual jobs in companies as they tend to disclose news about offers among themselves before known to people from other villages.

Furthermore, it was reported during several FGDs that various livelihood strategies had emerged following the decline in fisheries as a result of social networking, for example trade ties and moving to unfamiliar areas for investment or seeking jobs, though most were largely practiced by well-off households. For the poor households, social networks were reported to facilitate “light” strategies such as accessing *ming’oko*⁴³ (wild roots and tubers) and fruits as food sources during periods of famine while restricting them to have better access to resources.

5.4.3 Financial capital

Survey results show that access to financial capital is a large problem for most of the households interviewed. Most of the current activities do not bring sufficient returns to

⁴³ *Ming’oko* is a small tuber which grows in the mountain forests, between March/April to December. Usually, *ming’oko* is eaten at home as a snack and sometimes sold on roadways. In recent years, it is increased consumed when there is a food shortage.

reintroduce capital into enterprises; only basic needs are met, as was also found by Harrison (2005:5). A lack of financial capital prevents households specialising in alternative economic opportunities when fish catches are perceived to be declining. Furthermore, even when they took these new opportunities, they could not be sustained because of increasing competition with those with higher financial capital.

Only 2.5% of the surveyed respondents agreed to have savings in financial intermediaries, while the majority do not have a tradition of saving. Furthermore, the majority of respondents cannot access credit facilities, which is common in most rural households in Tanzania (Ellis et al., 2010:28–31). Virtually, artisanal fishers and hand-hoe farmers in Tanzania cannot access financial credit from banks as the set-up of almost all banks in the country does not allow them access bank loans. Inability to get credit was reported among others to limit households in improving performance of their livelihood activities.

Some participants during FGDs asserted that the increasing need for cash income, for example, for making mandatory contributions for constructing schools, has partially disrupted the cultural significance of how traditional livelihood activities were carried out. Key informants narrated that, in the past, exchange of items like food and fish was done under a barter trade system, but in recent years the monetisation of fishing activities and trade has disrupted the nature of fishing. It was also explained by these informants that many people have begun to divert their focus on cash-based activities.

5.4.4 Human capital

A vast majority of respondents in both groups surveyed lack skills and understanding of their livelihood activities especially concerning market conditions, technology, entrepreneur skills including quality control, and risk assessment. As previously reported in section 5.2, most respondents have education up to primary school level; as a result they are not particularly suitable for employment where jobs require formal skills and training. In a similar vein, coping with livelihood stresses such as the fish decline would entail the uptake of new fishing methods which requires specific skills (e.g. use of gears and seasonality of fish). For example, it was elaborated during FGDs that one group of fishers in Msimbati village was provided with a fishing boat and engine, and gills nets to initiate a pelagic fishery in the open sea. Although the group aimed to improve their

fishing activities, they did not know how to operate a pelagic fishery. Consequently, they stored the nets and took the boat to Kilambo village (at the border with Mozambique) to work as a ferry taxi.

Many survey respondents spoke about the rise of human population and felt that it has increased competition for livelihood space. This was also supported by several comments given on land conflicts where some families currently have little land to suit their needs. Internal migration of people from hinterland villages, which in turn increases population, was also noted to add pressure on livelihoods in the study villages. Although not everyone migrating in these areas is involved in fishing activities or other forms of extraction of marine resources, information collated from FGDs affirmed that indigenous households in the study villages have seen increased competition in local livelihood struggles. As revealed during FGD in Mkubiru and Mngoji villages, this is due to some of the internal immigrants forming a powerful caucus, with access to cash and networks. Sometimes they penetrate village politics and ultimately become elected in village governments, thereby influencing most of the day to day activities. In addition, as emphasized by the village executive secretary of Mngoji village, once within the village government they usually impose their motives and favour their peers in economic opportunities arising in the village. Conversely, for a few respondents in both groups surveyed, population growth was not acknowledged to aggravate adverse livelihood changes, as remarked by an elderly respondent who said that large family is good for provision of working force.

Although the survey could not establish this, several key informants reported an increasing number of village children attending schools. This, however, was also seen to increase the need for money for school fees. According to key informants, until 2004 there was no secondary school within the study villages, and only a few children from these villages passed their primary education to qualify for a boarding school in other areas. Most of those who completed a primary education were males. It is worth mentioning that, for many years, education in the Mtwara district was characterized by a large high school dropout rate and, thus, low high school completion rates. Nonetheless, a rapid expansion of the educational system in Tanzania within the past decade (see e.g., Wedgwood, 2007; 2010) has resulted in the building of more schools even in remote

areas like the study villages. When asked to comment on why in recent years villagers have encouraged their children to attend schools, compared to in the past, some key informants shared that this is driven by the diminishing access to and availability of natural resources—fish stocks in particular. Several survey respondents in the fishers' group stated that they have to ensure that their children attend school, because they fear that in a few years fish will no longer be available, and an education will be the only security for their children.

The level of traditional knowledge was also viewed as essential human capital among the respondents. Among fishers' respondents, many raised the issue of knowledge of species and fishing grounds, although they stated that this is decreasing. As, in recent years, young people do not want to learn from older people. For the non-fishers' group, nearly half of the respondents appreciated having traditional knowledge and indicated how it helps them cope with climatic variability as they can learn in advance about the next farming season and plan accordingly.

5.4.5 Physical capital

Physical capital has been defined as the basic infrastructure and commodities which have a bearing on livelihoods (DFID, 1999). Infrastructure in Mtwara district, as in most of the southern areas of Tanzania, is less developed than on the northern coast and regions (Fan et al. 2005:9). Although mud (unpaved) roads now provide more access to the urban markets especially in Mtwara town, their condition is far from good, particularly during *masika* (the rainy) season. Besides that, about two-thirds of the areas in the study villages are not connected to the main road network and have very limited interconnections. A few people across study villages now own *bodaboda* [motor cycles] and these have become the nearby communities and household's mode of transport when they want to go to Mtwara town. One resulting issue that immediately becomes apparent during interviews is the increased low performance in activities in terms of earnings, which could have been high if not restricted by the poor quality and seasonal state of roads. Many households surveyed reported living and produce far away from major roads, markets and other socio-economic service centres. Ziwani Division Secretary (*Mtarafa*) remarked that these households in those areas face high transactions costs, including high

transport costs that raise prices of fishing or agricultural inputs, and impair further access to markets and information.

Participant observation and key informant interviews revealed that fish processing plants that could help to reduce post-harvest losses and increase catch volumes are lacking. Currently, the only active fish processing facility is in urban Mtwara. The facility is owned by Tanpesca Ltd. with the objective of carrying out the business of processing and export of sea food products such as prawns, lobsters, octopus, squid and other seafood products off the coast of Tanzania. However, it is not accessible easily to most of the households in the study site due to the distance (20–50 km from the study villages) and lack of facilities to keep fish fresh, besides the fact that their production is not of large scale to meet its demand. As a result, households engaging in fish trade buy and sell locally, with little access to outside markets because of the high cost of travel and transportation of their products. For example, during bumper season most often fish get rotten and only few are dried up as *ng'onda*, and thus there is loss of income to fishers. The price for *ng'onda* is relatively low; most consumers don't prefer it because of its odour. Consequently, competition in fish purchasing power remains low, which keeps product prices low. Given this, as was confirmed during a woman's FGD in Mnete village, revenues in these households are generated largely within the village.

It became clear during interviews that improved accessibility, as is the case of Msimbati–Mtwara gravel road, has introduced new threats to these households' livelihoods. One example cited was the growing number of external fish traders with enough cash, which create shortage on resources and motivate some people to deploy destructive methods to meet their fish demand. Some respondents also said that it create conflicts, as happened in case of more migrants to Msimbati, because the area is the centre of gas exploration companies and good location for new economic activities. These migrants are dominated by a mixed group of traders and unskilled labourers and now increase competition for opportunities and jobs that could be available for local residents only. One especially influential key informant from Mngoji village stated that some households are also becoming worried that the improvement in access to their village will allow more negative influence to enter the village from outside world, such as the risk of armed robbery and alcoholism.

5.4.6 Cultural capital

The issue of cultural norms and its relationship with livelihood strategies arose during FGDs. Participants of FGDs from Mngoji, Nalingu and Msimbati villages mentioned cultural norms, such as specific taboos and gender allocation of labour, to be stressors in their livelihood strategies. A clear example was the prohibition of planting *njugu mawe* or African groundnut/Bambara groundnut (*Vigna subterranea*) (Brink et al. 2000:2) in Msimbati village, which was described as old-fashioned and an obstacle in the fight against food insecurity and problems associated with drought. The views of Msimbati participants that planting *njugu mawe* would result in calamities in the village contrasted sharply with those of Mngoji and Nalingu participants who mentioned *njugu mawe* and *karanga* or groundnuts (*Arachis hypogea*) (Mwale et al. 2007:345) as a crop that could grow even in years with low rainfall and be useful in times of food shortage, and even be sold for cash to relieve stress from low fish catches or low yields from agriculture. These participants felt that such a norm should be abandoned as it is not useful at present. It seems, therefore, that certain norms are likely to limit households from taking up options that might buffer them against stresses and shocks in their livelihoods.

District community development officials interviewed talked about how cultural norms had caused big problems in households, adding the problems of child bearing at a young age and high rates of divorce. They described how *unyago* and its associated ceremonies and ‘special events’ is misunderstood and misused by some households. One of the consequences mentioned was the high drop-out rate of young girls from schools immediately after their *unyago*, ending in early marriages. These girls lack basic education and hence basic skills to maintain their lives. As a result, they take up activities that do not require any skills, particularly those related to exploitation open access resources. Consequently, these jobs do not help them improve their lives and they face difficulties in times of crises, such as illness or food shortage. In one of the FGDs, it was observed that the presence of in-migrant in the study site, who are predominantly unaware of some of the cultural issues mentioned above, has recently started to contribute to weakening them. This has resulted in changing norms, from diet to the roles that certain crops as well as activities play in household well-being.

5.4.7 Political capital

For over half of the survey respondents, one of the stressors to their livelihood strategies mentioned was inadequate assistance and support from government. Except for very few respondents, almost all surveyed respondents replied that government assistance after a crisis (e.g. capsizing of fishing vessels, disruption of crops by pests, and famine) is belated and insufficient. A village official from Mkubiru village spoke of the lack of assistance and intervention by the government following the sparking disease outbreak in the late 1990s that affected many coconuts trees in the village. Another key informant from Mngoji village spoke of how the general lack of support by the government has been detrimental to their livelihood struggles. Although young respondents (18–30 years old) grew up in the era of trade liberalisation, most of them felt that young people in other regions of Tanzania have received greater livelihood assistance from the government. A Nalingu village chairperson argued that since independence⁴⁴, the government has given less attention and a low priority to the modernization and development of coastal communities. With the recent experience of a decline in fish catches and poor agricultural yields, villagers have relied heavily on their families for support. Thus, the inherent weakness of the family livelihood portfolio and coping strategies are passed down and many believe that they are still marginalised in the landscape of country's socio-economic development.

For many years, the government has not prioritised fishing communities and has failed to invest in fishing activities despite its adoption of a series of macro-economic and sector policies which have helped the country move from a command-and-control economy into a more open, market-oriented economy. For instance, from 1980–2008 the government allocated only 2% of the GDP to fisheries, which has hindered growth of the fisheries sector. Indeed, much of the allocation was for freshwater fisheries, particularly the Nile perch fishery in Lake Victoria. Although in 2000–2010 investment in fisheries increased to 5% of the total government expenditure, the distribution of funds for marine fisheries did not reach local levels (NBS, 2011). Very few radical attempts have been made by the government of Tanzania to promote growth and influence change in coastal areas where fisheries form the significant part of local economy, for example subsidies for fishing

⁴⁴ The respondent was referring to the independent of Tanganyika in 1961. Tanganyika united with Zanzibar to form the United Republic of Tanzania in 1964.

equipment with the aim of increasing the capacity of artisanal small scale fishers to exploit fisheries opportunities beyond the commonly visited grounds in reef flats.

More specifically, several key informants stated that changes in government policy and strategies have not been in accordance with development of the fisheries sector and its associated livelihoods. These strategies have frequently alienated coastal people, rather than involving them in the desired development; they have relied on command-and-control or top-down approaches to economic and resource management. As emphasized by many key informants, the majority of fishing activities carried out by coastal households are technically outlawed by new and old guidelines issued by the government on fisheries management since independence.

This undesirable attitude has had detrimental effects on the sustainability of coastal livelihoods. For instance, most of the respondents strongly opposed the fisheries regulations of 2009 because they believe it does not favour them but instead severely undermines fisheries dependent livelihoods. Their opinion is that the government should first provide modern fishing gears before enforcing a ban on the gears outlawed in those regulations. Almost all participants in FGDs held agreed that they had observed a sharp decline in income from fishing because of the ban of small size fish nets that had been in use for nearly four decades. Most of the fishers' respondents stated that they have been using small size nets for many years.

5.5 Vulnerability context of livelihoods

Perceived changes in the status of fish stocks, and the imposition of strict fishing regulations after establishment of the Marine Park, were reported during FGDs to impact household livelihoods. Many participants claimed that since the park (MBREMP) was established, access to fishing became more restricted. As a result, it was expressed that some fishing households shifted to fishing grounds outside the park, and, as a consequence of conservation regulations, turned to dynamite and other destructive fishing activities to increase their catch. Some key informants stressed that, in the past, only a few households in Mnete, Nalingu and Mkubiru invested much in farming, but in recent years they are forced to do so as their fishing gears have been outlawed.

Survey respondents in the non-fishers group explained that their activities (especially in agriculture) are faced with many threats, including climate variability, lack of markets, a low level of support for extension services from the government, and wildlife and pests that destroy or negatively impact crops. It is interesting to mention here that although some pests were regarded as threats to crops, several FGD participants said that they could control them using traditional means, such as sacrifices and praying to their ancestors. These pests included certain types of beetles that feed on crops. Further, key informants described how income from coconut farms has dropped because coconuts are increasingly affected by pests, and villagers have not yet received support from the district agricultural office to mitigate the problem. An interesting remark on destruction of coconuts and other crops is illustrated below:

They [coconut plants] used to bear many fruits and you will need them to live for the year around. Look, it there! Their roots are nowadays exposed and you see they are eaten by pests. Every now and then we are told in village assembly that the government has vowed to find solution to diseases affecting coconut trees in efforts to increase coconut production. [...] We don't know the diseases and therefore, we have to wait and see as it has been with cassava and other plant diseases. (Key informant interview KII35, 19 June 2012)

Apart from a decline in returns from fishing and agriculture, FGD participants also mentioned other threats to their economic activities, including poor roads, lack of warehouses to store their produces, and access to markets, forcing them to sell their products within their village's circles at lower prices (Table 5.7). Interestingly, respondents from both groups of the survey agreed that market mechanisms, such as insurance, which seem to have become important in other communities especially in agro-pastoralists are quite lacking in their villages. Insurance is important to support equitable growth and resilience among poor communities.

Table 5.7 Overview of livelihood stresses faced by households in the study villages

Livelihood stress/shock	Explanation
Resources (land and sea) use change	Lack of awareness (or confusion) on new technologies in farming like use of seed varieties that are resistant to pests and diseases have in turn, made some households ignore these emerging crop varieties. Farmers are reluctant to abandon traditional crops as they believe that are more health compared to the improved (introduced) varieties. Fish catches for poor fishers using simple gears such as hook and lines are now seriously diminishing. Loss of fish has resulted from increased destructive fishing methods leading to higher prices of fish and eventually absence of fish in diets
Crop diseases	Increased crop diseases on food crops especially cassava makes household sensitive to hunger and destabilise economic activities related to cultivation of these crops. Farmers are left helpless and therefore their vulnerability to food insecurity is increased.
Pre- and post-harvest losses	Poor road network and lack of infrastructure such as warehouses and ice cooling devices have forced households fail to deliver their produce in markets at appropriate duration. This has severely led to wastage before reaching markets, pushing households to economic losses
Food shortages	Production from economic activities such as fishing, crop farming and small business is not enough to get surplus, consequently many households are faced with food shortages almost every year.
Increased salinity	Few sources of water for domestic consumption are increasingly intruded with salt; effects on soil fertility
Illness	Many households do not have necessary cash to make the long journey to the district hospital (about 30-50 km), and once there, to pay for consultations and medicines
Increased fuel cost	The majority of household spend up to 30% of their cash income on basic lighting. The use of kerosene lanterns and frame harm human health and can cause air pollution, which in turn forces households to spend a huge amount of their cash income for treatment. High prices on fuel put pressure on household budget and can contribute much to poverty.
Lack of economic capacity	Many households rely on the most unprofitable and low investment activities. Their income levels are low, they lack ability to save—apparently, they become vulnerable to any crisis such as loss of fishing gears, chronic illness and erratic weathers
Lack of social safety net	The vast majority of households lack formal social security and health insurance, implying that they lack access to basic and minimum social protection
Harsh weather (e.g. storms, hurricanes, drought, floods)	Cause damage to fishing equipment and reduce number of fishing days. Also associated with destruction of crops, damage of roads, and spread of pests and crop diseases

Source: Table developed based on information retrieved from household survey and focus group discussions

5.6 Household livelihood outcomes

Discussions with key informants revealed complex and diverse resource use changes in both villages over time. Typical examples mentioned included the replacement of depleted populations of octopuses in reef flats. This practice was previously dominated by women and children, by collection through diving using local man-made devices. Fishing in inshore reefs, in most cases in close vicinity to villages, has been replaced by long-distance fishing in the outer reefs, especially in the Msimbati channel and areas around the Namponda and Membelwa Islands. There has also been a replacement of monofilament nets by gill nets with a mesh size larger than four inches or above. While some fishers have changed their use from either fishing in reef areas to open water, others have only changed their preferred fishing grounds, while targeting the same resources. Generally, these findings imply that resource use changes with time, and that these changes are often induced by resource users, although these practices have not necessarily improved their quality of life.

Despite the manifestation of the effects of different stressors on livelihoods, there were divided opinions on outcome of activities pursued. Some participants in FGDs believed that the resources they depend on, such as fish stocks, are not in danger. The main argument raised was that fish stocks are guarded by their ancestors, who are guided by *Allah*. Accordingly, it is *Allah* that replenishes fish stocks, and, therefore, stocks around their fishing grounds would never be depleted, and fish will persist because their “ghosts” never die. In this case, they were optimistic that issues like food security and availability of jobs will always be there, provided that they obey *Allah*. Although this was not connected to the purpose of FGDs, few respondents stressed that a good example of their bright future is evidenced by the recent discovery of huge reserves of natural gas in offshore waters near their villages.

However, when asked why *Allah* had not replenished some of the species, such as groupers, which were abundant in past years, their responses were generally negative, noting various reasons. They claimed that this had been so, because people have increasingly abandoned *Allah* as well as forsaking rich traditions and rituals for *Allah* to bless them. Specifically, they cited that, nowadays, social vices such as theft, household friction and adultery (*zinaa*) are prevalent. Interestingly, some stated that going into the

sea and obtaining sufficient resources from the fishery is based on what *Allah* is willing to offer on that particular day. Absence of documented long-term declines in marine fisheries in Tanzania restricted corroboration of this observation.

Although the overall comments raised by the district fisheries officer indicated that many households in Mtwara coastal villages obtain an income from diverse sources, the importance of those sources vary from household to household. Equally important, the officer remarked that among those sources, many have little effect in improving the ability of a household to withstand livelihood stresses given their low returns and viability. When describing those sources, the officials mentioned that some involve activities that are associated with destruction of the natural environment, such as charcoal production from mangrove trees and production of handicrafts from precious trees and natural bush. Further, when asked about the long-term impact of such activities, most participants in FGDs expressed frustration that despite their knowledge that such activities are a serious environmental threat, they have no other option and must partake for the sake of survival. This, in turn, could suggest that, in the end, the nature of their activities is mostly attached to basic survival.

During the period of field work for this study, Mtwara district, in general, and specifically the study villages witnessed an escalation in the number of investors for various businesses and for gas exploration. Many people were optimistic about job opportunities as well as financial gains through the sale of portions of their lands. In some villages, especially Mngoji and Msimbati, households reported to have received compensation for the value of their land, taken to allow construction of a gas pipeline to Dar es Salaam. Gas exploration and the envisaged operational activities began to instil changes in livelihoods and the quality of life in the area. When key informants were asked to comment on this situation, many were pessimistic, because they felt that although there could be more economic opportunities, only a few would be available for villagers.

5.7 Chapter summary

This chapter has highlighted the major features of livelihood strategies among the study respondents. The main focus was the examination of livelihood capitals, the nature of

household livelihoods, and the perceived impacts of degradation of reef fisheries. The chapter shows that the households' livelihood systems reflect a highly diversified income pattern. However, fishing and crop cultivation are the dominant livelihood activities pursued in the study villages. More importantly, crop production has increasingly become a basic source of income for almost all of the people interviewed. Although the role of fisheries in livelihoods seemed to have decreased, most respondents valued it because of the cultural relationship they have with fishing. This chapter has also pointed out the major socio-cultural changes resulting from increasing ecological threats to livelihoods.

Chapter 6 Response to livelihood insecurity

6.1 Chapter overview

The aim of this chapter is to provide empirical evidence of the dynamic responses that households prone to rampant destructive fishing activities-related livelihood insecurity has made to the complex interactions between external and local economic, social, political and environmental processes. Throughout this chapter, the major arguments put forward are examined through the analytical angle of vulnerability. First, it is argued that according to the sustainable livelihood framework individuals are considered to live within a vulnerability context. This implies that they are exposed to risks, stresses and temporal changes. As previously discussed in section 3.3.5, these external factors are generally impossible for people to control, forcing them to develop coping strategy. In the current study, some forms of stresses, such as those caused by ‘destructive fishing activities’, are socio-culturally induced. There are two groups of audience, the small powerful group that creates and maintains stresses and the majority group that suffers the consequences. The other forms of stresses, such as the outcome of livelihoods following rise in sea temperature, are rooted in natural systems and exert a pressure on whole communities with differential effects to various groups.

Second, it is argued that the coping strategies that households are forced to employ or choose for survival and well-being under given sets of unusual stresses are dynamic and will change as the development context of a community develops. Further, they are highly uncertain. For example, changes in reef systems attributed to destructive fishing activities are typically overlooked by resource managers and community altogether in their early stages when they can be most easily addressed. They only become noticeable when their negative consequences appear, by which time they are irreversible or more costly to cope with (mitigate). Therefore, considering uncertainties is crucial for reducing vulnerability and safeguarding fisheries dependent livelihoods.

6.2 Coping strategies employed

This section puts forward a set of common actions, mentioned during key informant interviews, household survey and focus group discussions (FGDs), taken by coastal households to re-establish their livelihoods when faced with multiple stresses and shocks.

All except two key informants reported that coastal households in the study villages have a different range of strategies for coping with livelihood insecurity. While the results suggest that respondents are coping with a decline in income and food sources by diversifying and delocalising their livelihood strategies, they lack the capabilities and/or opportunities to access favourable coping options and, hence, are engaged in a desperate and unsustainable struggle for subsistence. It is evident that households adopted a wide range of coping strategies, combining them as necessary for survival and well-being at various times (Table 6.1). In other words, the majority of coping options involve a multitude of less favoured and frequently complicated activities with marginal returns. At the same time, most coping strategies employed, as narrated during FGDs are influenced by the culture of people in villages and their perceived risks to the threats. However, in recent years as emphasized by several key informants, some extraneous factors—both social and commercial—have begun to bring changes among households in the study villages.

Most participants in FGDs agreed that a wider range of economic opportunities are available for well-off compared to poor households. Coping strategies for the poorest households, as mentioned by FGDs participants in Mnete and Mkubiru villages, consist largely of re-allocating labour (including women and children) and reducing consumption and expenses. To some key informants, coping strategies related to asset disposal, such as selling land, appeared less common because it meant risking their life by losing land and diminishing their self-esteem in the community. However, they mentioned that such strategies could only be employed in cases where no help or intervention from relatives, friends or village councils was received.

Table 6.1 Responses to the open question (multiple answers) ‘*what did you do or what have you been doing to cope with stresses like food shortage, decline in income, loss of fishing opportunity etc.*’ The number and percentage of respondents that mentioned each action is provided (Response category are not in any orderly ranking)

Response category	Fishers (N=183)		Non-fishers (N=114)	
	n	%	n	%
New technologies in farming; e.g. use of seed varieties resistant to pests and diseases	13	7	51	45
Diversifying to non-traditional crops; e.g. wage labouring, entertainments,	8	4	83	73
Intensification of family labour; e.g. make more use of women and children labour	32	18	71	62
Diversifying of fishing based activities; e.g. expand fishing to new fishing grounds, becoming less selective in target species, improving fishing technology, extending fishing time	136	74	29	25
Reducing household expenses; e.g. abandoning traditional ceremonies, stopping paying school fees for children, reduce buying new items	60	33	65	57
Changes on food consumption; e.g. eating wild fruits, roots and tubers, reducing number of meals or food types, reduce number of people eating at home, purchase food from shops, consumed stored food, exchange food with relatives and neighbours	38	21	61	54
Selling household assets; e.g. leasing/selling fishing equipment selling portion of land, selling furniture and jewellery, selling livestock	80	44	55	48
Diversification to non-fishing activities; e.g. resort to casual labour, charcoal making, carpentry, masonry, tailoring mart, entertainment and cultural groups, traditional medicines, politics	126	69	24	21
Savings; e.g. use savings to replace damaged fishing or worn-out farm tools, get loan from relatives and money lenders	17	9	31	27
Petty business; e.g. food vending, kiosk, selling fuel, selling clothes etc.	74	40	52	46
Use of indigenous technologies; e.g. farmers make use of certain areas to counteract drought, farmers make use of early maturing crop varieties	12	7	28	25
Resource protection measures; e.g. enforcing bans on destructive fishing activities, getting information on	40	22	43	38
Migration; e.g. migrating to new fishing areas, migrating to new farm field or work as labourers in harvesting, road and building construction etc.	82	45	43	38
Others; e.g. smuggling and illegal activities, sacrifices and traditional rituals to appease gods, begging from others in villages, abandoning family, relief food from government,	65	36	72	63

Source: Compiled from household survey (2012) with extra information on examples from focus group discussions

Furthermore, the majority of key informants believed that there is suggestive evidence that households select coping options based on urgency rather than the characteristics of effectiveness and robustness, all of which lead to low livelihood resilience. Such coping strategies are invariably threats to the environment and health of household members as emphasised below:

The researcher encounters with key informants and informal conversations with agriculture and livestock officials working in Mtwara region showed that little human capital (education level) and lack of access to financial capital have limited the range of options for coping and adapting to livelihood dynamics. The following sub-sections report and analyse some of the coping strategies frequently mentioned during interviews.

6.2.1 Casual jobs

Over half of survey respondents in the two sub-samples reported that many people in the study villages usually work both for themselves and on an *ad hoc* basis for others during the course of a typical year. For instance, over half of respondents in fishers' sub-sample stated that they fish during the *kaskazi* (northeast monsoon) period, but work sporadically for other fishing groups, especially those that own boats with engines, during the *kusi* (southeast monsoon) period. They are employed as fishing labourers at an agreed rate, which is often not binding because payment is received after fish sales. Following the extensive degradation of reefs and extreme weather events, which has apparently affected fisheries productivity, almost all respondents in this group agreed that individuals and families are currently leaning towards *vibarua*⁴⁵ (casual jobs). When asked in an open-ended question whether they have been taking casual jobs, more than half of respondents in non-fishers group stated that such jobs are one of the best available options to earn cash income that could be used to purchase food items and other necessities.

Most respondents in non-fishers group felt that casual jobs within villages, which are paid in cash, usually involve the provision of labour by the poor households to the better off during crop cultivation. However, respondents from fishers group felt that it is non-fishers who often offer labourer during harvesting and fishing bumper seasons. In addition

⁴⁵ *Kibarua* (plural: *vibarua*) is a form of wage employment, which is frequently arranged by the rich at the request of the poor for cash. It has roots in the colonial period when a system of labour pay for people to load and unload in ships, and works in plantations (see Eastman, 1997:94).

comments volunteered by some respondents from the two groups suggested that the type of casual jobs has been increased in recent years. Many respondents mentioned several types of these jobs—though usually without distinguishing between the main participants under each job—when describing those jobs. Examples of casual labour jobs mentioned include collecting cashew nuts, selling coconuts, repairing fishing vessels and gears, repairing houses, household chores and transporting items (e.g. cassava, millet) for farms or suppliers in Mtwara town.

Some key informants suggested that access to casual labour jobs is influenced by the wealth status. They remarked that the middle-class and poor households access labour opportunities in nearby urban centres, specifically Mtwara town. However, accessible jobs are to be limited to hotels as porters or cleaners, salt farms, fish processing at Shanghani fish landing site, construction companies, the transport sector and large shops. Besides the difficult facing people migrating to search casual jobs, some participants during FGDs described that few members of households, especially those with strong social networks as noted in Msimbati, Mngoji and Nalingu villages, seek casual labour in Dar es Salaam. It was not clearly established which kinds of jobs could be accessed, however it is likely to be unskilled labour jobs. Interestingly, search for casual jobs is said to be opportunistic, although this opinion varied with respect to two groups in the survey with fishers considering that it depend on individual efforts, while non-fishers reporting availability of opportunities.

When asked on the trend towards casual jobs, district fisheries officials reported that the majority of the young members of households (20–40 years) mainly search for casual jobs outside their villages at the end of the cultivation and planting season. This was attributed to a strategy to ensure that households had at least one acre of food crops before searching for alternative work. However, many non-fishers surveyed perceived that young members of households especially in Msimbati, Mnete and Mkubiru villages, which are known to have poor soils, search for casual jobs irrespective of farming season.

6.2.2 Temporary migration

Almost all survey respondents in both groups talked about food insecurity in the study villages. Understandably, they commented on how some households use migration to

cope with food insecurity. Many respondents in fishers group admitted that some individuals, especially those aged 20–45 years, often re-locate to Kilwa, Mafia, Dar es salaam, Bagamoyo and even as far afield as Tanga, where large-scale fishing activity occurs almost year-round. Some respondents among fishers expressed that a relatively low proportion of individuals occasionally move further south to Mozambique. It was not within the scope of this study to assess the specific areas to which those individuals temporarily migrated or the average duration spent in those areas per person per year. Although migration was reported to have been adopted as a strategy for coping with fishing seasonality even prior to the perceived decline in fisheries (McClanahan et al. 1999), a vast majority of respondents indicated that those who migrate spend longer periods outside of their villages at present than in prior years, suggesting that migration has increased due to the declining fish catch and availability.

Interestingly, there was a general consensus among many respondents in non-fishers group that temporary migration an important strategy in ensuring continuous access to cash income. When asked who exactly migrate, respondents mentioned young men and women, who voluntarily move to Mtwara town for various casual jobs, in particular those not requiring specialised skills. However, only few individuals with access to social networks were able to afford the start-up costs and exposure to new environments necessary to motivate migration for job opportunities in a vibrant economy in areas close to, or even far, from their villages.

There was mixed thoughts on temporary migration, but surprisingly few respondents in fishers group were critical of temporary migration per se, and many respondents in non-fishers argued that temporary migration is not a viable option for the poor people since they lack the resources to accumulate sufficient capital to allow them to leave their homes. For example, during interviews in Mnete village, several heads of households (non-fishers group) explained that they could not allow their sons to search for casual jobs in the rehabilitation of Mtwara port (in Mtwara town) because they did not have money for the bus fare to Mtwara. Additionally, they were concerned about accommodation for their sons whilst employed in these jobs since they did not have close relatives to host them. Therefore, as discussed during survey in both groups, many of the poor households

are incapable of covering transport costs for migrating, despite the fact that it could result in better economic conditions.

There was awareness within the fishers group not all jobs migrated for are consistent and almost a quarter of respondents in this group complained about those that do migrate for only daily work (*deiwaka*). For many fishers respondents were adamantly against migrating daily by foot or bicycle to work as *vibarua* on farms in nearby villages. These jobs were reported even by non-fishers respondents to provide a very low daily income. The vast majority of respondents in both groups of the survey reported temporary migration of youths from Mkubiru, Nalingu and Mngoji villages to Msimbati between 2005 and 2010 to search for manual work in gas exploration companies. Of those that did report individuals whom they know had migrated, most stated that they were not always successful since the companies arrived with people from areas outside their villages to fill casual job positions.

6.2.3 Moving away from fishing

Survey respondents were asked about fishing activities and if they have moved away to take other economic activities. Almost half of respondents in fishers group indicated that they had switched their livelihoods altogether from fisheries based (fishing in particular) to other activities, in particular those unrelated to fisheries. The vast majority of these had been involved in reef fisheries, before experiencing decline in fish catches perceived to be attributed by dynamite fishing. Many respondents in this group expressed strong negative opinions on dynamiting. Indeed, many provided a variety of reasons why they decided to leave fishing.

Several respondents in fishers group felt that they were disadvantaged because of increasingly risks associated with fishing operations following recurrent periods of extreme weather events. Over a third of the respondents in fishers group also expressed concern that moving away from fishing is actually influenced by the availability of other economic opportunities. There were concerns expressed about fishers in Msimbati village who quit fishing and take up casual work in various gas exploration companies. There was also a feeling, particularly from FGDs, moving away from fishing generally involved diversification into activities unrelated to fisheries; these activities had low entry barriers, such as petty trade and casual jobs in Mtwara town and other areas of the country.

Several respondents in fishers group stated that moving away from fishing is highly fluid as individuals who quit fishing often re-enter once other opportunities cease to exist or when there are development interventions, as observed between 2005 and 2012 due to the MBREMP projects. While not the purpose of this study to explicitly explore those projects, there was a general feeling from many key informants that MBREMP initiated a number of projects to support fishing groups, such as supplying large boats and engines for offshore pelagic fishing, replacement of low mesh fish nets with larger ones, and training fishers in new fishing techniques.

When asked whether those moving out of fishing could classify themselves as occasional or more frequent fishers, many fishers' respondents replied that distinctions between occasional, part-time and full-time fishers are likely to be arbitrary. They argued that although households might choose to participate in economic opportunities outside fishing at one point in time, that did not necessarily imply that they are not fishers and do not rely on fisheries resources as an important contribution to their livelihood systems because of the open access nature of fisheries. Accordingly, one of the biggest challenges in determining the level of impact of moving out of fishing as a coping strategy is defining those that can be considered to have quit and retired over a specific period of time.

Spatial variation in moving away from fishing was reported to occur because fishers may access different economic opportunities outside their villages. Evidence from FGDs indicated that households identified as not being active in fisheries in their village could have a record of participating in fisheries activities during the previous 4–6 months elsewhere. This was quite common in Msimbati village where eight survey respondents in fishers group reported that they quit fishing activities; however they had actually finished a fishing season in Kilwa and would return there, or to other fishing villages, after a period of five months. While it is best to consider moving out of fishing as a coping strategy, it may be appropriate for short term and temporary impacts only; an assessment of long term impacts, requires consideration of spatial and temporal variation in quitting rates.

6.3 Effectiveness of coping strategies employed

Unlike other sectors such as crop farming (Kadigi et al., 2007), water (e.g., Liwenga, 2008) and pastoralism (e.g., Baide and Leslie, 2013); contemporary and recent coping strategies among fisheries dependent communities in Tanzania have received relatively little attention in empirical research. As is the case in other sectors, coping strategies for livelihood threats in coastal areas are numerous and evolving, but there are mixed results on the outcome of these options. For example, felling mangrove trees in Mngoji village for construction poles and charcoal was regarded by some participants of a FGD as a viable option to compensate for income lost from the decline in fish catches. Other participants in the same FGD viewed it as a distressful coping option that accentuates the risk to fish species inhabiting mangroves. Complicating this situation is the fact that other kinds of coping options, such as the use of poison and dynamite to obtain a sizeable fish catch, are banned by legal frameworks. Nonetheless, according to the majority of respondents in fishers group several members of households in almost all villages studied have circumvented enforcement control and engage widely in these practices.

About one-third of respondents in fishers group believed that they had likely relied on coping strategies which are destructive to fish and habitats. Some of the specific options mentioned were converting mangrove areas into fish ponds and salt farms in Mngoji village, and felling trees and natural bush for firewood and *mipalenga* (special poles for boat building). This is supported by a statement by district fisheries officials that the majority of coastal households in Mtwara district have not been able to withstand and manage the impacts of the recent decline in their livelihoods in contrast to rural households in hinterland districts of Mtwara region. Respondents from non-fishers group similarly considered many of the coping strategies they undertake have negative repercussions and insufficient to cushion their livelihoods. However, a slight low proportion of respondents in this group considered their responses distressful.

Although coping strategies were believed to degrade resource base or impair human health in one way or another, almost two thirds of respondents in fishers group and half of respondents in non-fishers group stated that they are deploying them at higher levels and more frequently than during the past 10 – 20 years. However, some fishers' respondents believed that the use of adaptive coping strategies, such as offshore fishing with modern

fishing gears and boats and uptake of non-fisheries based activities, has also increased in the study villages compared with the previous 10–20 years.

6.3.1 Diversification of fisheries based activities

A few respondents survey in the fishers group stated that they in the past 5 –10 years they had shifted their fishing activities to other areas, particularly to Namponda and Membelwa islands which are said to have rich fishing grounds and benefit from relaxed enforcement against destructive fishing gears, or to fishing areas around Kilwa and Mafia district where large pelagic fisheries have continued to attract relatively large numbers of fish traders compared to Mtwara. Most respondents in the same group felt that they had changed the type of fishing gear to target fisheries they did not exploit in the past rather than abandoning fishing. Very few respondents believed that they have shifted to open sea fishing targeting tuna and tuna-like species because certain intertidal areas are getting shallower.

Typical cases concerning changing fishing gears, as described by many respondents from fishers group involved switching between different types of fishing gears and boats. For example, hook and line fishing in inshore reef areas of Msimbati village is said to increasingly shift to boat-based gill net fishing in open seas along the Msimbati channel. This strategy, as explained in FGDs particularly in Msimbati and Mkubiru villages, was noted to be effective because fishers were able to keep their fishing activities operational and profitable by accessing other marine resources such as large and small pelagic fish instead of reef fish. Despite this positive opinion, most respondents felt that pelagic fishers utilise cheap labour from their villages and those nearby, as many individuals from poor households shifted from being self-employed to working for others. This shift arose as individuals could not access capital to purchase fishing gears or invest in economic enterprises, thus creating a large pool of cheap labour in urgent need of cash income for daily necessities.

When highlighting how shifts are made in fisheries based livelihood activities, respondents in fishers group stressed that these shifts were not limited to specific pathways. Some respondents said that variations were observed based on financial capital, household choice of activities and overall condition of the perceived

opportunities. With information generated in FGDs, it became evident that different fishing households gauge their own sets of priorities, resulting in an analysis of the pros and cons of each action. In Nalingu village, two groups of seaweed farmers were reported during a FGD. However, the general consensus among FGD participants was that these groups became ineffective because of lack skills and technology know how required for running seaweed farming. The groups were reported to face various problems including low production prices, poor marketing for their products, and even being unable to move their farms into deep waters (which could increase production). Thus, the expected outcome of building up endowments and savings, even small amounts, to offset a decline in fish catch was not achieved. Consequently, members started to withdraw from the groups and re-engaged in individual fish production, especially the hook and line fishery.

The other example of shift within fisheries was observed in Mngoji village, where groups and individuals participated in the farming of milk fish. Their farming input included natural pond production while some conducted supplemental feeding. Like the seaweed farmers in Nalingu, milk fish farming groups in Mngoji were seemingly unable to attain adequate earnings to solve the problems attributed to low fish catches. It is believed that milk fish farming was a new enterprise and the groups were facilitated by MBREMP. After this initial trial, the groups were unable to scale up in terms of pond size and production capacity, and harvests per fish pond were reported to be relatively low. When commenting on such development, many key informants emphasised that the activity could have been productive if they had the appropriate skills, knowledge and technology to run it effectively.

The degree of effectiveness of some of the strategies involving shifts within fisheries was also found to be influenced by political and social networks. The majority of respondents in fishers and non-fishers groups agreed that strong political networks within and outside their villages are valuable to secure opportunities that arose. Similarly, survey respondents in fishers group were divided on the issue of significant increase in the cost of securing access to community based intervention projects through bribes and relationships in order to influence decisions on inclusion of individuals in those projects. Some respondents agreed that these projects were masked with nepotism and giving of

kitu kidogo (bribe) to village leaders in order to be included in those enterprises, while other denied.

6.3.2 Diversification beyond fisheries based activities

At a more subtle level, opinions of respondents in both groups survey highlight that diversification away from fisheries based activities varied within and between villages. Activities initiated because of a synergistic effect of fisheries were common in Msimbati village where fishermen could open small businesses for their wives with capital from fishing activities. In Mngoji village, those who took up non-fisheries activities benefitted from the sale of food crops, especially cassava and rice. The majority of respondents in fishers' group described how financial assistance from relatives living outside the village has contributed to uptake of non-fishing activities. Many key informants asserted that diversification into non-fisheries based activities largely entailed the transfer of labour and other resources from less (i.e. fisheries) to more productive activities, even if these activities actually resulted in little or no productivity growth. Conversely, this could be perceived as labour being re-directed in the wrong direction; a common trend in Tanzania as elaborated by Therkildsen and Bourgoïn (2012:9).

Overall, respondents in both survey groups reported both positive and negative cases of shifting to non-fisheries activities. One of the examples mentioned was the formation of a group of women from Nalingu village trading *khanga* (clothes) who previously worked buying and deep frying fish. Their new activity, which involved buying products from Dar es Salaam and selling in Masasi, existed for three rounds only before business slowed down and finally collapsed. When commenting on this group, Nalingu village executive officer associated this failure with high illiteracy and a lack of networks to distribute their products. Indeed, this informant was concerned in particular to the low capacity of local institutions to prepare villagers to tackle threats of livelihood decline.

6.4 Discussion

6.4.1 Reflection on findings

The survey results and FGDs in this study revealed that many households based in the study site are adopting multiple strategies in order to cope with stresses and shock on their livelihoods. One of the most common strategies undertaken was diversification. This

finding is similar to those from other rural livelihood research investigating coping mechanisms in rural households (e.g. Kalaba et al., 2013; Motsholapheko et al., 2011) . While diversification is likely to increase the resilience of livelihoods against stresses and shocks, this study found it presently holds few prospects, particularly for poor households. In terms of stability, it can supplement income but this is insufficient for investment or to have a significant effect on livelihood stability, with little scope for expansion. In both groups surveyed (fishers and non-fishers), the majority of respondents were actually unable to specialize in one favourable activity, instead engaging in many low intensity activities. Unlike the study of Eriksen et al. (2005:), many respondents had limited access to favourable coping options due to the lack of relevant skills and capital.

The issue of effectiveness of coping responses was relatively ambiguous despite the fact that a wide range of coping strategies were employed. Potentially, several participants in FGDs stressed that the array of conditions under which their livelihood strategies operated have resulted in locally inbuilt strategies which, however, have had little immediate (and even medium) impact on livelihood stability. The effectiveness of coping options in mitigating the effects of stresses and shocks on livelihoods, such as the ability of a household to effectively recover from an unexpected loss of a fishing gear to return to their pre-crisis state, is questioned. There is also little evidence to show that short-term government intervention, e.g. through food aid and supply of farming or fishing equipment, has unequivocally resulted in an enhancement of fisheries dependent households. It was evident that most of respondents' reactive measures are not developed in advance and are implemented after the risk or threat has been observed.

Furthermore, decisions taken by households surveyed could be judged that were not necessarily rational, but could have been influenced by the dynamics of both local and remote worlds. For example, Msimbati sand dune area is currently disturbed by residents hunting small animals for food, and searching for poles to make handicrafts for supplying to tourist markets especially in Dar es Salaam. The dunes are potential sites for ecotourism, the opportunity which is not yet explored. It is hoped that acting rationally would have stimulated them to go for such an opportunity and avoid activities with counteract impacts on their livelihoods.

It is clear that the respondents' transition from vulnerability to declining fisheries based livelihoods to more dynamic implementation of adaptive coping strategies is due to the current socio-economic climate affecting their daily lives. Arguably, in the current situation the risks of decline have not received required priority by many respondents in both survey groups. On the other hand, lower levels of implementation of adaptive coping strategies reported in this study may partly be due to the dominance of a subsistence life style and the need for survival only. This is evidenced by the fact that coping strategies for survival took a large share of response mechanisms mentioned during FGDs. A very small share was for accumulation and consolidation.

Livelihood change in the study villages, to a large extent, does not reflect the '*deagrarianisation*' concept proposed in rural livelihood research (Bryceson, 1996; 2002). Although non-fisheries based livelihood activities have become increasingly critical to buffer household cash income and food source deficits, many respondents in the survey, including non-fishers still ranked fishing as among their most important livelihood activities. This can imply that many surveyed households have developed short term responses that have failed to limit their dependence on fisheries resources, and engaged in activities threatened by degradation of reef fisheries.

Concurrent with the ongoing degradation of reef fisheries in the study villages, it appears that the policies heralded in Tanzania to improve the quality of life in rural households have partly contributed to destructive fishing activities, and difficult to achieve. For example, different development programmes in the fisheries sector after economic liberalization have certainly opened up new livelihood opportunities to coastal households, but they have also encouraged many households to opt for destructive fishing activities for quick gains and to intensify their fishing operations even in fragile areas for much larger fish catches to supply market needs outside villages. This is supported by evidence of availability of materials used for constructing dynamite bombs as well as illegal fishing nets. At the same time, coastal management plans (especially the establishment of a marine protected area) and a coastal development framework have engendered critical limits to access traditional fishing grounds which, in combination with poorer soils, have propelled and sustained distressful coping strategies in localized areas. These strategies impact negatively on fisheries based livelihoods.

6.4.2 Lack of political action

Measures to develop the fisheries sector in Mtwara district, as in other coastal districts in Tanzania, have not become a political issue, as they have in other sectors such as mining and crop farming at crucial political moments before general elections. Consequently, the Tanzanian government has taken few initiatives to address the structural causes of impoverishment in coastal communities (see Pauw and Thurlow, 2010; 2011). Due to various assessments commissioned to study poverty and how to alleviate (Sigalla and Carney, 2012:547; Tobey and Torell, 2006:847), it is quite convincing that government already know enough about why coastal households are on the ‘periphery’. As highlighted by the present study, the matter of more urgency now is indeed to prioritise doing over knowing as the government (and other actors such as NGO, CSO, donor community, and scientific community) know so much that the current coping options clearly represent unsustainable problem solving approach to the already impoverished livelihoods.

The heightened use of adaptive coping mechanisms would likely be associated to greater livelihood resilience and exposure to resolving problems associated with fisheries dependent livelihoods. Based on the present findings, households dependent on fisheries in context other than the current study need to change from spending the days of their lives explaining and explaining why they are where they are in the first place. Obviously, they have explained their situation away, as was for this study, in various excusable ways; the point is to change and that is where the need for political will also come in.

The findings have compelling potential for effective coping mechanisms to contribute to creating conditions and institutions that assist in reducing vulnerability and fostering greater livelihood resilience among households in coastal villages of Mtwara district, in particular those dependent on fisheries. From a policy perspective, these findings identify a need to prioritize interventions that increase access to skills, financial capital and modern fishing gears when designing projects and programmes that aim to support coastal households affected by the decline in fisheries based livelihoods. This will reduce the likelihood that households will engage in distressful coping mechanisms, such as invading areas of natural terrestrial vegetation with records of interesting endemic tree

species (e.g. *Strychnos cocculoides* along the Msimbati–Mtwara roadside) for firewood and materials for handicrafts.

6.5 Chapter summary

This chapter has analysed the coping strategies employed as responses to livelihood instability, following the continual degradation of reef fisheries. It shows that as households have faced these changes they have attempted to employ a wide variety of strategies to offset livelihood threats such as food shortages and lack of cash income. These are derived from economic opportunities, social network, environment, and to a lesser extent institutions (governmental and non-governmental). Nonetheless, households are irrational in their choice of coping strategies. There is no clear evidence on whether they respond to opportunities emerging by changing socio-economic and other conditions. It is more likely that they respond by muddling through and pursuing the only life they know whereas the spectrum of their strategies involved multiple copies of one approach that could not be used together. The findings of this chapter are relevant to policy makers and practitioners seeking adequate information on coping strategies into sustainable development plans. As such, they will need to consider the differentiated nature of responses because even in the study villages, not all survey respondents or groups exhibit the same strategies.

Chapter 7 Livelihood trajectories

7.1 Chapter overview

The purpose of this chapter is to investigate some of the main livelihood trajectories of sampled households adopted from the 1970s until 2012, associating these with reef fisheries dynamics over time. The focus was on the nature and extent of processes of differentiation and the assets that have been critical in such processes. Analysis of life stories was used to provide an indication of the different directions the livelihoods of coastal households in the study villages have taken, building upon diverse livelihood strategies. The chapter begins by highlighting how livelihood trajectories were constructed. This is followed by a presentation of the main empirical findings and the wider policy implications of these findings. The chapter ends with a summary that reflects livelihood pathways and how downward trajectories could eventually be reduced, if not halted.

7.2 Constructing livelihood trajectories

Livelihood trajectories were constructed based on the life stories of 15 individuals/households. Purposive sampling was done to recruit potential participants from the list of respondents surveyed. As indicated earlier in section 3.7, a livelihood trajectory is conceptualized as an embedment of numerous events/episodes in the life course (Bagchi et al., 1998; De Haan and Zoomers, 2005; Dijk, 2011). According to Murray et al. (2012:2457), the methodology underlying livelihood trajectories implies a longitudinal research design to tease out major pathways over a period of time. This is done to answer the question of how pathways are constructed, and the impact of key events and changing circumstances. Although the current study is cross-sectional, the concept of livelihood trajectories is applied to refer to the pathways and transitions in which households in the study villages derive their livelihoods in the context of degradation of reef fisheries and how history, local knowledge and power differences influence the strategies individuals and households adopt.

The main assumption that led to the development of livelihood trajectories in the study villages is that livelihood strategies involving common pool resources such as fisheries are never really ‘secure’, but they are constantly faced with ‘uncertainty’. Unlike risk, uncertainty describes a situation characterized by indeterminacies that render the

calculation of probabilities impossible. Actors can deal with risk by calculating alternative probabilities and can avoid or at least minimise it if economic and social costs allow (Mehta et al., 2001:3).

Despite lack of recent research on how uncertainty affects various spheres of livelihoods in coastal areas of Tanzania, evidence from other rural areas such as Nepal (Bhandari and Grant, 2007), Kenya (Ulrich et al., 2012) and Mozambique (Osahr et al., 2008) have revealed the various types of uncertainties (e.g. ecological, knowledge and social-political) which shape livelihoods in many different ways. Consequently, as emphasized by Scoones et al. (2012), there is relatively clear evidence of the changes occurring in livelihoods, in terms of where, for whom and how they have been possible. A livelihood approach reasserts the claims that people make their own history as they strive to make a living by creating, managing and maintaining a series of livelihood strategies. However it does not show how they respond to uncertainty (De Haan and Zoomers, 2005).

The household cases presented in this chapter highlight the difficulties associated with capturing the results of livelihood strategies pursued and outcomes achieved. However, its focus was not to unravel the challenges in the analysis of livelihoods and how development interventions are researched, identified and appropriately implemented as in several livelihood studies (e.g. Baulch and Davis, 2008; Dressler and Fabinyi, 2011; Fuwa, 2007; Hilson, 2010) The focus was only on construction of livelihood trajectories and the way livelihood change influences, and is influenced by, political economic processes and issues (Sallu et al., 2010). In this realm, the study intended to place ecological management and coastal and marine resource politics within the wider assemblage of economic, political and socio-cultural activities that compose everyday lives of households. It should be remembered that the life story interview sample was not representative; thus, speculating on the number of individuals/households that moved in any direction of the trajectory is not useful. Conversely, the target was to understand in a qualitative manner why, in the context of poverty linked to ongoing degradation of fisheries along with other factors, some individual's livelihoods are secure whilst others are deteriorating and become highly vulnerable.

Analysis of life stories revealed that, overall, the livelihood status of almost all interviewed respondents changed in a negative direction following the perceived

increasing degradation of fisheries. The analysis of this chapter, therefore, is built on the ways in which livelihoods changed according to the accounts of respondents. They were all vulnerable but differed to a certain degree. For clarity in distinguishing between different trajectories, participants were categorised as “highly vulnerable,” “vulnerable” or “secure,” at the time of the study. More specifically, four livelihood trajectories were identified. The situations of some respondents that could typify the trajectories falling under those categories are discussed. This is followed by a narrative analysis of selected respondents’ experiences. The main factors that explain the different trajectories are also identified and discussed in depth at the end of the eight narratives.

7.3 Case examples of livelihood trajectories

Over the past four decades, livelihoods of households in the study villages have undergone wide-ranging changes (Barr et al., 2011; Malleret, 2004). Whilst traditionally livelihoods were based on gathering and collecting of fish and other sea products for food as well as crop farming, and to a lesser degree for trade under the barter system, fisheries activities have become increasingly monetized and have diversified with the introduction of offshore fisheries and development of new activities which depend on fisheries (Robinson et al., 2012). With the emergence of new, sometimes extra-local, non-fisheries activities such as casual work in gas exploration companies (e.g. cooks, cleaners, watchmen, drillers and lifters) and petty trade, and their rapidly growing importance in providing jobs and contributing to the cash income of local communities, diverse livelihood paths are being pursued in the study villages.

In general, among the 15 participants of life-story interviews, four different and complex livelihood trajectories were identified. The first one included a cluster oriented to livelihood activities unrelated to fisheries, initiated by support from relatives and development organisations, as well as self-initiatives taken by individuals, such as the beginning of non-traditional activities, for example, selling mobile phone recharge vouchers (*biashara ya vocha*) and participation in entertainment groups (*wasanii*). Both men and women often chose these activities based on the perceived benefits; however, outside this common trajectory, women or female-headed households were more likely to choose food preparation (*mama lishe*), whereas men or male-headed households were

more equally distributed between selling fruits and vegetables, selling staple foods (e.g., maize flour, cassava, beans), and other small-scale businesses outside the village. However, despite such differences, both of them are truly subsistence based compared to people who are specialised in cultivation of cash crops like cashew nuts and sesame or operate a big fishing boat with modern gears such as ring nets. In short, this trajectory pertains to individuals or households that undertake activities unrelated to fishing, with start-up capital coming from family members or kin, and those who are self-employed in activities outside fishing. Usually policy tends to affect activities pursued under this trajectory, for example when the government ban maize trade, traders would not come and their business become dormant. Important characteristics of this trajectory are highlighted below:

[...] I got assistance from a saving and rotating group to open a business stall you see over there where I sell food to traders coming from Mtwara town to buy sesame and coconut here. I don't get regular income, is until when these people [traders] are here. (Respondent R6, 26 November 2012)

The second category of livelihood trajectories identified involves a fisheries diversified oriented cluster. Fishing and the seafood trade represent the top two reported activities in this cluster, followed by migrating to work as labourers in fishing crews in areas like Kilwa and Mafia. This trajectory, as captured in life stories, comprises mainly male individuals or heads of households. Individuals in this trajectory are associated with ability to meet their essential needs and improving livelihood status. They have at least better houses that can be identified easily in villages. Although this trajectory entails also subsistence activities, people under this category recognise importance of cash income. They strive hard, changing and combining different livelihood activities to earn cash income to fulfil their living standard. This is clearly elaborated by the types of assets they own and their lifestyles as summed up below:

The money I saved from fishing days in Kilwa made me to increase the size of rice farm. In a good farming season I earn much money, and expand my fishing activities. [...] I was able to buy TV and many other things which are not produced in our villages. It is not that am proud but I have to tell you that in my house we manage to drink tea with milk and often we have drinks like soda [Fanta/Pepsi] like people in town. In such circumstance, I'm not confined to one activity only. (Respondent R5, 8 December 2012)

The third trajectory involved a combination of fishing and non-fishing activities. One important trend in this trajectory is that some individuals or households facilitated by access to financial credit, network well with the macro-economy policy of the country and generally reported higher earnings from their activities. Apparently, their well-being was considerably better. This trend suggests that, with access to assets, such as financial capital to expand their traditional activities as well as to venture into new ones, the proportional amount of livelihood portfolio and the financial return from each activity increases.

The fourth category of livelihood trajectories identified includes exceptionally improved trends from most of the other three categories mentioned above. For example, this category included particular cases of individuals using assets, such as houses, fishing boats, business inherited from parents or relatives. It is worth noting that under this trajectory, respondents said that the property inherited simply formed the starting capital; re-investment was made in other activities, including diversification away from fishing as well as within fisheries, depending on the circumstances.

In the subsequent sub-sections, a few cases from interviewed individuals are used to describe livelihood trajectories in the study villages with accounts of place, time and age of the participants. However, the identity of individuals was kept anonymous.

7.3.1 Respondent R6

Respondent R6 is a 52-year-old woman with six children. She was married in 1979 to a polygamous man, who also lived with two other wives in another village. She considers herself to be the head of the household, as her husband has not contributed to support for the necessities of her home since the late 1980s. Her main economic activities involve drying fish and selling them at the local market in the village, farming of cassava, millet, groundnuts, and, occasionally, she has been taking part in minor businesses, such as selling charcoal and firewood. However, after the decline in fish catches, which she perceives was accelerated by destructive fishing activities around the 1990s; she described how she had faced a number of challenges. The fish trade, which used to earn substantial income for her, became unpredictable, although she reported sporadic high fish catches after the campaign to phase out dynamite fishing in 1997. At the onset of

year 2000, she reported that she had strived hard to meet the necessities of her household by venturing to other economic opportunities, such as selling fruits/vegetables and clothing as well as staples, such as rice and maize. That, however, was irregular. She had also offered her labour to better-off households for their farms, as well as taking casual jobs, especially the repair of roads offered by the district council and Tanzania Roads Agency (TANROADS) Mtwara regional office. Besides that, in cooperation with six other women in her village, they have been making mats from raffia since 2005. These are given to their sons to sell in urban areas, especially in Mtwara town.

Respondent R6 felt that she does not receive support from anywhere else apart from her own initiatives, although she thought that in 2010 some organisations, especially the Agha Khan Foundation and MBREMP, were better potential support for villagers like her. However, conditions to reach out to these organisations are somewhat complicated, based on her opinion. Regarding food security, she described that although food items, such as maize flour (*sembe*), beans and rice, are found in shops in her village; she has been lacking food for several days each month. This was uncommon to her household during the 1980s. However, she was not willing to disclose on average how many days a month pass without food to eat. During the period of this interview, Respondent R6 had a house roofed with thatch. Based on the deteriorating condition of livelihoods associated with the reef fisheries in the local economy, respondent R6 is classified as having a vulnerable livelihood with threats, such as lack of access to financial capital or institutional support.

7.3.2 Respondent R2

Respondent R2 was born in 1967 and raised in a village located about 35 km from his current village. He learned to fish from his father, who owned a fishing boat and *jarife* (mesh size greater than four inches) nets. His father used to fish in nearby villages, and sometimes travelled afield to Mafia and Bagamoyo, especially from 1980s to the late 1990s. He was married at the age of 19. During that time, he relocated to village XA01, where he opened a business stall selling items such as sugar, maize flour, and other important household goods. The business was not large, as the starting capital, which he received from his father in 1986, was only around US\$10. While in XA01, he joined a group dealing with the collection and sale of sea cucumbers. The business stall continued

under the supervision of his wife until 2001 when his 14-year-old son took over. One of the roles of Respondent R2 in the group he had joined was to travel to Mozambique to buy sea cucumbers and bring them to XA01, where traders from various areas, including Mtwara, Dar es Salaam, and even the Far East countries, would travel to buy them.

Following the change in the macro-economy policies in the 1990s, Respondent R2 took advantage of these policy changes and the networks he had built earlier with people in Mozambique. Respondent R2 ventured to a new business that involved purchases of *mitumba* (second-hand clothes) from Dar es Salaam, originating from Europe and other regions of the world, to sell them in Mozambique. This business was profitable, and he began to sell other goods such as cooking oil and sugar, which were in high demand in Mozambique during that time. From Mozambique, he brought items such as kerosene, diesel and petrol by boats, which landed in villages YB01 and XA01. There was a good market for these products in many villages—even as far up to Mtwara town. Respondent R2 opened a bank account in a branch of the National Bank of Commerce in Mtwara town in 2001. In 2003, he purchased, together with a friend who lived in Dar es Salaam, a used Land Rover. They used it to commute between Mtwara town and Kilambo, at the border with Mozambique, until 2009 when they replaced it with a large truck (*Fuso*). With his savings, Respondent R2 was able to reinvest in fishing by buying two fishing boats and machines (engines) in 2011. Currently, he owns three acres of cashew nut farms and has another five acres planted with cassava, maize and ground nuts. He attributes his upward mobility to his taking up diverse activities and his ability to reinvest profit obtained in new opportunities, most of which emerged following increasing and changing local needs, expenses, and policy. He added: “I have been doing so many things to help me survive with my family. I have also been engaging in diverse economic activities to get extra income.”

Respondent R2 also said that his clan is very famous based on the history of their grandfathers, who ruled over large areas that cover most villages in the area currently delineated as Ziwani Ward. Interestingly, Respondent R2 narrated that most people in his village judge him as a successful man, and this keeps him closer to traders who visit their village for business deals. The livelihood of his household is considered secure, because the respondent has regular and stable sources of income and social networks that enable

him to take advantage of new opportunities as they emerge, not only in his village but also in other areas. Indeed, he was able to diversify his livelihood portfolio by taking advantage of new opportunities that could easily be adapted based on his personal circumstances and financial capital.

7.3.3 Respondent R3

Respondent R3 was an uneducated woman, age 48. She had three daughters—the oldest born in 1985; two are married in nearby villages while the youngest lives with her. Her youngest daughter was expecting to give birth a few months after the time of interview. Respondent R3 had worked in a *tandilo* fishing group for over the past 20 years, earning, on average, less than US\$10 per month, until the time when their *tandilo* was confiscated by the MBREMP in 2009 in an operation to phase out all illegal fishing gear. Although Respondent R3 had a small farm, she said that often times the yields were low causing her to suffer food shortages. She was not connected to any organisation supporting or empowering local activities in her village. Then she shifted to the tea business, where she had worked at the fish landing site in her village until early 2010. The business was unreliable because her customers used to gain the service in agreement that they would pay once they returned from fishing trips. Some made their payments, while the majority took several days to pay her. Thus, her financial capital went down until she was no longer able to run this business. From that time, she got a loan from a women revolving fund group in her village to start another business. Respondent R3, in collaboration with three other women, invested her capital in the food crop business, where they went to the villages along the Ruvuma River to purchase rice and transport it to the Newala, Masasi and Nachingwea districts. This business, however, as she narrated, stopped within a couple of months in 2011, following a disagreement among participating members. After that, she had to remain at her home considering any possible business avenue, while maintaining basic needs for her household.

In 2011, when her young daughter was going for *unyago* (female initiation rite), she sold a half of her small cashew nut farm to get money for that important traditional event. She described that she is now regretting this, as it would have been beneficial if the money had been spent to repair her house, as her daughter is now pregnant, adding another

burden to her household. Respondent R3 was against *unyago*, feeling it is linked to widespread early pregnancies and an increase in school drop-out rates for young girls. She felt that her family is going through a tough life: “We can afford to have one meal a day, just a boiled meal, sometimes; this meal is with no salt or oil.” She added that her family cannot afford to buy meat, and at the same time, fish is not available from the sea. Furthermore, this respondent regretted not sending her children to school. [...] “I didn’t go to school either, because of the wrong perceptions towards education during my childhood.”

At the time of the interview, she had received around US\$50 from her brother, who works in Dar es Salaam to re-establish her business of operating a small cashew nut farm. While this respondent was eager to re-invest the money in her previous business, she reported that at that time there were many women in the same business. Thus, she was uncertain about how she would compete with them. Furthermore, she said that she would need to use part of that money to rehabilitate one side of her house, which, at the time of interview, was a dilapidated and needed urgent repair. Otherwise, it could pose a danger, when rains came. When prompted to say whether she had any support from her neighbours and the entire community in the village, she said that she had recently (early 2012) become a member of the savings and sharing group—consisting of 15 other women. However, she said that a majority of the members in this group are women like her with very few earnings, and eventually their savings become very small. She reported that since 2009 when their *tandilo* was confiscated, she had sold most of her household items, such as a table, chairs, and eating utensils she had received from her married daughters, who live in town, and had also borrowed food to try to meet her food requirements. Yet, in terms of food consumption, she said that her household members are not eating very well, as they cannot afford to buy fish or meat. Instead, they consume *ugali* (stiff porridge) and *kunde* (cowpeas) on a daily basis, although they buy rice and fish whenever they afford to do so. Overall, the livelihood of Respondent R3 has become highly vulnerable to threats, such as loss of natural resources, poor markets and access to skills and financial capital.

7.3.4 Respondent R11

Respondent R11 was a 47-year-old widow with a primary-level education; her husband had died in 2009. Before the death of her husband, she was involved in the cultivation of their three-acre farm, selling prepared food, and tailoring. They cultivated cassava, rice and millet. Their family also owned several acres of a cashew nut farm and coconut trees they inherited from the parents of her husband. Her husband left her with five children; the youngest is now in form three⁴⁶ at the secondary school located about eight kilometres from their village. Although her husband used to earn nearly US\$170 annually from selling coconuts, up through 2008, he didn't make effective use of that profit, such as paying school fees for their children. This was evidenced by the fact that the two elder children had both dropped out of secondary school studies in their first year, because they were expelled for failure to pay the annual school fee. Her husband used to drink and repeatedly married and divorced. It was also reported that he had sold the tin-roofed house they had lived in during 1996. These two older children joined fishing groups and relocated to Kilwa. Unfortunately, only one is in touch with his mother, while the other offspring does not make effective engagement with his family since he left in mid-2006.

Respondent R11 did not have any savings; she also stated that she had been sick since 2010. She is not a member of any other economic group in the village but sometimes walks around the village to talk to people her age. The family of respondent R11 is not able to produce enough food, all year round, and gets surplus that they sell to earn cash income. Sometimes, respondent R11 and her family have to forego some of their basic consumptions, including reducing the number of meals a day from two to one. She also said that since the onset of crop diseases in the late 1980s, it has not been possible for her to increase the yield from her cashew nut farm because of her inability to acquire pesticides, such as "sulphur." Because of her ill health, respondent R11 said that she could not work for other people (rich) as a labourer on farms or conduct fishing activities—the activity she had engaged in during the 1990s. Due to the living conditions of respondent R11, with her taking responsibility for two sons, one who is still in school and the other with a diagnosis of HIV/AIDS, in 2007, this household can be considered

⁴⁶ In the secondary school education cycle, students use the first four years for ordinary certificate of secondary education (commonly referred to as O'level). Thereafter, those who pass the exams are selected to proceed in advanced secondary education (high school), which usually takes two years.

highly vulnerable. Respondent R11 also disclosed that there was tension between her and her older son's wife, who feels that she is a burden to her husband, and she is trying to convince her husband to secure a house and separate his family from their mother.

7.3.5 Respondent R5

Respondent R5 was 54 years old and is married to three wives, with a total of 14 children. He started to collect *jongoo* (sea cucumbers), immediately after finishing his primary school education in 1974, in village AX04. His main targets used to be the most valuable commercial fish species, such as: *Pauni nyeupe* and *Pauni nyeusi* (White Teatfish and Black Teatfish, respectively) (*H. fuscogilva* and *H. nobilis*), and *Jongoo mchanga* (Sandfish) (*H. scraba*). He stopped this activity following the depletion of resources in the mid-1980s, which necessitated exploiting sub-tidal areas by diving, an activity he did not like. Respondent R5 also said that during that time it became very rare to find these valuable resources (big fish, sea cucumbers and octopuses) in catches around his village and nearby areas. Thus, it was important that they look for different livelihood occupations. He agreed, knowing that his parents exclusively derived their living from fishing activities. He moved to Dar es Salaam to work in a textile factory in 1988, where he married his second wife, who was also working in the same factory.

While in Dar es Salaam, he met an individual who used to buy sea cucumbers from his village, and who convinced him to go to work as a captain on one of his fishing boats in Tanga. He took his second wife to the village and left to work in Tanga. While in the village, his two wives were involved in farming cassava, beans, peanuts, sesame and cashew nuts. He used the money he earned from his new job to expand these farms, back home, under the supervision of his two wives. Every season after harvests, his family bought a significant amount of corrugated iron tins for roofing. At the same time, they opened a small shop selling basic household items, such as match boxes, cooking oil, kerosene, sugar, salt, rice and maize flour. In 1993, he decided to return to his village where, occasionally, he joined some fishing crews. He bought a generator in 1997 that used to light his shop and entire house. The generator also was available for hiring to various social events and ceremonies, especially *unyago*, wedding, and *Maulid* (Islamic ceremony).

Later in 1999, building on the contacts he had established with Mozambican sea cucumber traders, he visited Quirimbas. He had the opportunity to take products such as sugar and cooking oil to sell and to bring back kerosene and petrol from there. The profit he made, altogether with his previous savings, was used to construct a fishing boat (which cost nearly US\$3700 in 2006). The boat began to fish in areas around Kilwa. The profit generated was reinvested into fishing; once again, where he bought ice-cooling boxes so that fish caught will be kept fresh and could be transported to markets further afield without becoming spoiled. Respondent R5 reported that his boat has, since 2009, been among the big boats transporting finfish—particularly demersal fish—to traders from Mtwara and beyond. He is proud of the social networks he developed with Mozambican counterparts because, according to him, access to livelihood sources there could be inconceivable. The steady income of this respondent and his access to social networks has enabled him to cope with the effects of change in reef fisheries, which is obvious in the availability and price of fish. Therefore, he can be considered secure, because he had savings, and still he could get support from his friends and relatives.

7.3.6 Respondent R14

Respondent R14, in his early fifties, lives in XA02 village. This village is mainly a fishing community. However, some of its residents cultivate cassava, millet, rice and beans. Yield is low because of poor soils and a lack of technology and extension services. Additionally, the village depends on cashew nut farms, which are also faced with the spread of disease (powdery mildew—a fungal disease that reduces production). As explained by Respondent R14, life for poor families of XA02 has been very hard since the establishment of MBREMP in the early 2000s, because it resulted in strong enforcement to stop beach seining, which employed many villagers and contributed a significant portion to the village economy.

In 2006, Respondent R14 joined a group of gardeners in village YB02. The intention was to raise capital for the purchase of appropriate fishing tools. The gardening activity was not successful as there were no proper markets for their products after Artumas Group Inc—exploring gas in the bay of Mnazi—closed its camps in nearby villages and moved

to Mozambique in 2008. He was forced to return to fishing, this time being with a fishing group operating a boat around the islands of Namponda and Membelwa, closer to the Msimbati Peninsula. Respondent R6 is only educated to the primary level. He has encountered great difficulty in finding a job or venturing into new activities. To try to improve his life, in 2009 Respondent R14 joined other people in a nearby village to start seaweed farming. However, they lacked the financial capital to start this new activity, and they did not have solid knowledge, including business skills, on how to operate this venture. He said that since 2010, his main goal has been to obtain assistance, for instance, fertilisers for his cassava plot, and his focus is on improvement of his farm activities to obtain more significant returns. At the time of the interview, his earnings were not sufficient for his or his family's basic needs, including food and other necessities, such as paying school fees for his children.

Respondent R14 related how, on several occasions, lack of income had caused problems for his family. Although he did not have any savings, he had borrowed US\$90 from his friend to purchase materials needed for seaweed farming and to cover medical costs when his wife had to have a caesarean section for their sixth child (in 2011). He also needed funds for school fees of his two children. He said that he was struggling to repay back that money, since the friend was pressing for it every now and then. Respondent R14, however, is optimistic that if he could acquire financial assistance to purchase modern fishing tools, such as gill nets and a boat, his life (and that of his family) would improve, due to the fact that he would be able catch many fish in deep waters. Unfortunately, respondent R14 is worried about applying for financial credit, as he doesn't have any assets to risk or to put up as collateral. He added that it is common that once you have credit, and you are not able to repay, the lender (institution) will take your assets such as livestock, fishing gears, even your land: "It is better that I work with what I have." Although Respondent R14 is struggling to improve his livelihood, barriers to access financial credit, lack of appropriate skills, and strong associations with networks that could connect him to high return activities, render his household livelihood vulnerable.

7.3.7 Respondent R7

Respondent R7 was a 37-year-old woman. She did not complete a primary school education because of a pregnancy that occurred while she was in standard five in 1989. Her family forced her to marry, in 1990, to the father of her child. Before marriage, she used to help her family in agriculture and household chores, such as fetching water, cooking, collecting firewood, and going to the fish landing site to collect fish from her two brothers, who were fishermen. Her husband had two other wives and his main activities were fishing and *kupunga mashetani* (trance healing rituals). He stopped fishing after his fishing gear (monofilament nets) was confiscated in one of the fishing patrol operations organized jointly by the district fisheries officials and MBREMP authority in September 2006. Unfortunately, Respondent R7 did not bear any additional children and was, therefore, divorced in 2008.

Soon, after her divorce, she married another man whose activities were agricultural labouring and fishing for lobsters that involved diving in deep water, using a locally made mask. Following soaring costs of living, her husband left to join a *mashua* (dhow) fishing crew in Kilwa in 2010. He did not return, and she received a letter from a member of the fishing crew informing her that he had left her and is now married to another wife. She decided to go back to her parent's home, where she joined the family in making mats and handicrafts. These products, however, do not reach external markets and sales are limited to buyers from their village and nearby villages. She said that the highest sales she had ever made was only US\$5, after selling eight mats. In 2011, her father decided to sell his two-acre coconut tree farm so that they could repair their house that had been destroyed by strong winds. He was already heavily in debt at that time because of costs he incurred, since 2009, in finding a solution to the infertility problem of his daughter, in order to reinstate her marriage.

Respondent R7 has never benefited from any social safety net programmes and thinks any involvement, for example, those leading to access to empowerment through microcredit schemes, will cause more problems than they are worth. Unanimously, she describes her life as desperate and associates all that she does, for example, taking on casual jobs in a road construction company (as a “flag girl” or labourer) or selling food to construction labourers (*Mama Lishe*) in Mtwara, since early 2011, with survival only. Earnings are

both low and irregular. For example, one can take home less than US\$1.5 after spending ten hours of intensively crushing stone aggregates at the construction site, Respondent R7 emphasised. There is no certainty for securing work on a daily basis, which could result into going back to living with nothing. Respondent R7's limited income, access to financial capital and assistance from NGOs or closer relatives meant that she was facing severe difficulties in managing her household. Therefore, she had become highly vulnerable.

7.3.8 Respondent R8

Respondent R8, age 56, a retired fisherman, had moved from village YB03 (northeast) in 1992 to his current village. Fishing contributed only a small amount of extra income on his arrival to his current village (XA04). He started cultivating mainly millet, cassava, beans and *bambara* nuts, for food, and sesame and rice for sale. He also started keeping cattle and goats. His wife was a nurse working in regional hospital in Mtwara town. In 2003, he attended livestock keeping training at Naliendele Agricultural Institute (NARI)-Mtwara; the training was organised under the umbrella of the Tanzania Social Action Fund (TASAF) to empower local communities to improve their livelihoods. After training, he and five other people from his village received five cows to start producing milk. He was successful in this activity as he was able to sell milk and was earning around US\$100 every month. Respondent R8 said that due to little support from the extension service, two of his cows died in 2009 after he had failed to acquire vaccinations to protect them against the East Coast fever⁴⁷. Even though he was able to continue producing milk with the remaining cows, he was discouraged by the lack of support he received from district extension officers, who visited his farming activity only occasionally.

Moreover, his capacity to produce about two tonnes of rice annually, since 2005, counteracted the gap left by the milk trade. He also had raised local chickens in collaboration with his relatives since 2010. Farming and livestock have been important mostly for his consumption, but also to generate a cash income that was re-invested in fishing activities, where he owns two boats. The boats are, however, a recent endeavour, bought in 2011. Following his renowned activities, especially in selling milk, Respondent

⁴⁷ Also known as *theileriosis* (Kivaria and Noordhuizen, 2010:187)

R8 became known to local politicians, who started to use his entrepreneurship as a role model in most of their speeches. This, in turn, made him known even outside his village, and he was ultimately connected to many people who wished to create businesses. In 2009, respondent R8 took part in local councils and village elections and was successfully elected as village chief of XA04. At the time of the interview, Respondent R8 was responsible for a rice farming project supported by the Agha Khan Foundation and was actively engaged in VICOBA groups, where he had substantial savings.

Respondent R8 hails from a kinship that was famous in the seafood trade in the 1970s, and, as he said, this facilitated him to gain access to other people and business opportunities, especially when he migrated to Kilwa to take part in a large pelagic fishery in 1995. These new activities and associations, such as VICOBA, that he is currently involved in have offered him a form of patronage that influences his livelihood diversity. Unlike most of the recorded life stories, Respondent R8 also inherited fishing boats and farms. Interestingly, he described how he was able to make effective use of the properties he inherited because he also assigned them to his children as their assets. Respondent R8 also said that he had accessed financial credit from National Microfinance Bank (NMB) in early 2012, together with other people where they formed a group that was registered to engage in the supplying of agricultural implements, especially sulphur for spraying cashew nut trees. Migration experience, which offered Respondent R8 with economic opportunities, access to skills, and exposure to the market, with new forms of patronage, as well as the inheritance of properties and having an educated wife with waged jobs, have contributed to the secure livelihoods of his household.

7.4 Mechanisms facilitating livelihood trajectories

The comparison of the narratives presented in the previous section highlight the particular success of a few individual (households) as well as deteriorating for others. In terms of pathways, it is obvious that various different and complex mechanisms have been favouring or hindering transition towards secure and sustainable livelihoods. Unfortunately, stories recorded from interviews show that some respondents were better off than others depending on the prevailed circumstances. . The respondents reported a wide variety of mechanisms, likely representing why their livelihoods was in that way.

The following sub-section reflects on some of the mechanisms mentioned to have likely driven the livelihood change and ultimately livelihood trajectories for the participants of life story interview.

7.4.1 Diversification and gender

Diversification of livelihood activities especially for poor rural households has received much consideration in literature (see e.g. Barrett et al., 2001; Niehof, 2004; Salayo et al., 2012). Several authors have clearly emphasized the central role of diversification in most types of natural resource dependent communities. In the current study, diversifications too form the basis on which household members or individuals have changed their portfolio, as new opportunities arise. As elaborated by Bryceson and Jønsson (2010:380), diversification as captured during life story interviews is emblematic of historical and cultural life experiences. An excerpt below illustrate how the respondent moved beyond the cultural experience to maximize the advantage of exogenous factors such as large scale economic change that influence the level of opportunities and constraints in the livelihood landscape:

Initially I was a food vendor in fish landing sites [...] if women could have started earlier to go for opportunities which used to be dominated by males, they would have been very far. Look, it was difficult for me... I decided to take kibarua [casual work] in road construction company. That is where I earned income to open the business you see here. It was a cultural barrier and most people would call you a prostitute if you could have gone to jobs like that. But now they come to get advice from me...it is a change. (Respondent R1, 28 November 2012)

The argument of the above respondent concurs with Krishna (2007:1952) that complex power relations operating in diverse contexts (history, cultural political) within which they are embedded can be a constraint to the process of obtaining a livelihood. While exogenous factors have shaped the options through the setting of new opportunities, as was the case of most women in Tanzania after the “Beijing conference” (Friedman, 2003:313), endogenous factors have defined strategies according to locally specific qualifications. As was for the case of this very respondent, some women in Tanzania, including study villages are diversifying their livelihood strategies to activities previously thought for men only—a response to multiple economic opportunities.

During the 1980s-1990s living conditions in rural Tanzania were hard (Benson, 2001:1905). Villagers particularly in the study villages rarely had access to secondary education schools or health facilities. Opportunities for livelihood strategies, besides fishing and subsistence farming were similarly difficult, especially for women. National statistics during that time show that income poverty was higher among women compared to men. Majority of coastal women generally received no cash income at all. Facing such difficult living conditions and limited livelihood alternatives, some parents started giving priority to education for both girls and boys since the 1990s. It was not uncommon in the past for children to start working at an early age and many parents have very limited formal education. This started as fishing households reduced confidence in fishing activities as a secure occupation and thought for alternatives. In the words of respondent below, fluctuating conditions in the mainstay livelihood activities is responsible for changing individual/household attitudes in their traditional occupations toward increasing in flexibility to secure their living under changing socio-ecological conditions. As a result, it necessitated to adopt new skills that could create a path by diversifying away from traditional (fishing) as emphasised hereunder:

[...] in the past, nobody would allow his children to go to school, he thought the sea was there and nothing will change. My grandfather was however, different from other people and of course he knew the importance of sending children to school. So you see that thing made him not to rely on his coconut trees and fishing wealth. So he [grandfather] was able to make us be anxious to acquire knowledge and training that could lead us not to depend entirely on the sea as this would have made us be getting our food and small needs only. This is how I became a carpenter... and actually it was important especially in lean season where you catch less fish and in times when coconut harvest is affected by diseases. (Respondent R4, 08 December 2012)

The accounts of individuals or household members who believed that fishing was the monopoly source of income in the study villages present clues to its adequacy with respect to declining returns, and the need to secure alternatives. The long serving fishers across the study villages differentiate between themselves and those who in recent times, diversified their livelihood strategies by taking activities beyond fishing, as is evident in the account of Respondent R10, who is now in his sixties:

On the contrary..., it is shown that majority [fishers] have now lost hope. Who does not know that nowadays fishers are working for other people [better off]? Rich people, mostly from town [Mtwara] use their relatives living here to run their fishing activities. These people are the ones benefiting, you go to fish for them, they take all fish for sales and pay you sometimes less than Tsh 2000 [US\$ 1.2] per fishing trip. Do you think with that money you will improve your life? It is not enough even to make you have ugali [staple starch in stiff porridge form] with your family besides other necessities. I have been fishing from the 1970s...that is why I know those people who came afterwards and combined fishing with business and they are now rich. They are the ones where I borrow money and seek assistance in many cases. (Respondent R10, 30 November 2012)

7.4.2 Illegal activities

Participants of life story interviews in general and most of respondents of this study suffered severe consequences, including isolation and marginalised from education system discussed in section 1.6. The consequent of lack of alternatives for fishing households, even after the government implemented the Structural Adjustment Policies in the late 1980s and the restructuring of macro-economic policies in early 1990s, left many households without reliable income sources. Following trade liberalisation and emergency of new economic activities in nearby areas, some individuals were slowly beginning to take up non-specific activities, which they described as incidental and specific to individual family circumstances or just lead by own deep intuitive instincts such as capitalising unspecific diversification, as reported below:

I know one tajiri [rich man] very well...He started fishing with my relatives in the 1990s. He didn't own any fishing boat. He offered fishing labour both here and Kilwa. His wife was selling cooked food and fruits in a stall in front of their house. We all know that the profit they got was very low, sometimes less than Tsh 700 [US\$ 0.5] per day, which couldn't take them to anywhere. Following life hardship, he moved to village YB03 for agricultural labour in rice farms. His bosu [employer] ... was also facilitating panya [illegal] routes to illegal immigrants wishing to go to sauzi [South Africa]. He became active in helping him in this business and in each successful deal he took home about US\$ 90. Unbelievable...that is where he made his way out; now you can't speak anything [...] he's known by everybody. (Respondent R7, 4 December 2012).

7.4.3 Inheritance of properties

Inheritance was reported to be one important aspect of an individual's or households assets and can have profound effects on their livelihood strategies as it determines the individual or household access to particular resources, including land, fishing equipment, house, business, and association to groups such as lending and borrowing. Inheritance across the study villages is a complex and extremely interesting issue that merits its own thesis. In the current study, the discussion is limited to the inheritance aspects that have some influence over livelihood dynamics and pathways. Traditionally, Makonde people are a matrilineal society meaning that kinship, inheritance and decision making are all defined through the matrilineal line. However, their influence is typically expressed through their male relatives (e.g. father, uncles, brothers and sons) rather than directly (Ndege, 2007:83). Evidence in recent decades however, suggest that matrilineality is dissipating among Makonde people (e.g., Mbeba et al., 2012; Soup, 2011:179).

Inheritance is among the issues that emerged during the life story interviews, suggesting that it is a crucial element in the livelihood trajectories of several households. Respondent R8 explains that using properties inherited from his parents was among the options open to his household to enhance their livelihoods:

... my father died in 1992. I inherited his house found in town [Mtwara], coconut and cashew farms, which are widely distributed in many areas around this village. I have been using the rent generated by the house to enhance my daily activities including fish trade, the shop over there and the hotel. [...] it helps keep my business going, you see. Because I really struggle economically but thanks to the things I got from my father.
(Respondent R8, 7 January 2013)

A case reported above exemplifies how inherited assets have fostered livelihood pathways and ultimately resulting into distinguished livelihood trajectories. The fact that inherited property is involved in enhancement of livelihoods does matter if an individual makes an effective use of it. The ability of individual to maintain the assets he has inherited often guarantee long term benefit and continuity of particular asset in the livelihood pathways.

Inherited assets can be established as a source of income that in some cases it completely overtake any consideration of livelihood activities especially the one with low returns or

whose utility seem to be on the decline. However, it became clearly that not everybody who inherited properties from his parents or kin members have utilised those resources effectively to an extent of enhancing his/her livelihoods. This is particularly highlighted in the case of Respondent R9, who took over ownership of *daladala*⁴⁸ (commuter bus) from his father and continued in plying between Mtwara town and nearby villages:

I lived here with my parents and everything was fine. I didn't think of what to do as my father paid extremely high attention to his family. He died a few years ago. He left his daladala and the family authorised me to take its ownership. You know...needs maintenance, payment for driver, sometimes stopped by traffic police and so many things. I used to see how my father operated it; thus I was very carefully. It continued plying and the profit raised were used to purchase another daladala. Now we have three, they are all active and have helped even to take care of my mother and siblings. But until then... is only proper care and desire to succeed. [...] I know some people who got things like these from their parents. They did nothing, except selling them...at very low prices. Do you understand? Once you see these people who had opportunity to inherit properties and wrongly used them, it is unbelievable...they have nothing. (Respondent R9, 25 November 2012).

In the past inheritance of assets especially land was not an important factor, as the head of clan and other elders would make the necessary arrangements. The procedure was that the land would automatically pass to the sons of the deceased. However, today in the case of death of a better-off person, many questions raise as to who should inherit his assets such as brick house, car, land, fishing gears, permanent crops etc. According to the “custom”, the heir should be the elder son of the deceased. In recent days, people are rarely adhering to the institution of inheritance, because everyone eyes for the assets for his own life. Respondent R11 cleared narrated this:

In the past, quarrels and struggle over inheritance were uncommon. No person, except the elder son had a right to claim exclusive ownership of assets left by the deceased. Nowadays people love money so much that to the extent of selling properties of their parents even when they are still alive. [...] I would say that depending on inherited assets was only useful in the past as in recent times is declining very fast. Because once you take over be ready to stand in the court where your brothers and sisters, and even your own children ask for their share...then how can you make the best of it? (Respondent R11, December 11, 2012).

⁴⁸ Licensed, small capacity and privately owned minibuses (or sometimes vans and trucks with the capacity of up to 4 tonnes)

Understandably, the role of inheritance of assets is the result of complex dynamics — therefore; locating its causes solely in livelihood trajectories should be treated cautiously. More specifically, it is important to understand that complex processes related to gender, class differences and ethnic expose some people into a more vulnerable position when they inherit assets than others. It seems that traditional rules of inheritance and succession are under pressure to change in favour of the nuclear family where every member has to benefit.

7.4.4 Social networks

Social network was another important factor, especially having connections with local politicians, which often resulted in obtaining ‘favours’ when operating fishing activities and businesses, and getting access to agricultural tools especially ‘sulphur’ or priority in community development projects particularly those supported by UNDP through MBREMP projects. As was revealed during interviews, social networks, especially kinship, were the major factor for providing basic support and exchange of information in marketing and business opportunities around sea front villages as emphasised in the excerpt below:

Members in a clan usually support each other including exchanging information on good fishing grounds, sharing good seeds for food crops and in times of crisis. [...] but I agree that as life is soaring, people will not be able to assist each other, but I believe will continue to network for opportunities and increase trust among akin members. I tell you in our village, arrangement for emerging opportunities mostly occur within akin people, once satisfied they may share with outsiders. (Respondent R13, 12 December 2012)

However, as explained by Respondent R3, the networks operated through relatives or friends lower the prosperity for upward mobility. Respondent R3 also associated them with limited range of economic opportunities compared to self- initiatives and interactions with outsiders.

7.4.5 Development interventions

Among life stories recorded, it was evident that development interventions available in the study villages were appreciated to have catalysed enhancement of livelihoods. The

potential of interventions such as VICOBA became obvious during the interviews. Since its initiation in 2007, VICOBA has persisted in almost all the study villages, replacing other micro-credit schemes established by various organizations such as Finnish Rural Integrated Programme Support (RIPS) and CARE during the 1990s (Seppälä and Koda, 1998).

According to life stories, some individuals who have seen significant increases in their financial capital and stable livelihood strategies attribute this to their association with VICOBA. The scheme was greatly advocated by female respondents reiterated below:

[...] benefit generated from VICOBA has led some households in village XA03 to replace their thatches and grasses housing roofs with mabati [corrugated iron sheets] just two years after they have engaging in them. You see new things here, new business, these have increased tremendously and VICOBA have provided the incentive to renovate houses like the one next to the market place in which people from gas exploration companies are accommodated. (Respondent R15, 9 January 2013).

VICOBA have also, as explained by individuals from XA01 and XA04 villages, provided cash income to install electricity power supply in one house in XA04 and six houses in XA01 village. While electricity alone may not bring development, in rural areas such as the study villages, which have long history of poor socio-economic amenities like power supply and health facilities, it is a highly desired commodity. However solar photovoltaic (PV) electricity has been used for off-grid electrification in a few households. Most villagers consider the solar PV electricity to be expensive, but it was generally associated with a better quality of life, as affirmed by respondent R13 after investing some profit from VICOBA to purchase a large solar panel:

PV systems are expensive to most families in coastal villages to afford. I bought my first sola [solar PV] from Mozambique in 1994, was very small... can't remember, [...], but were very few here. I obtained the big solar panel you see over there four years ago after I have sold the portion of my five acres cashew nut farm to people from Mtwara, and extra money from VICOBA profit. Besides lighting and helping to extend opening hours of my shop, the PV has served numerous purposes including barber business and recently [since 2010] charging mobile phones. I feel happy and comfortable with PV because I make substantial earnings from business associated with it which also provides extra income that I save in the VICOBA group (Respondent R13, 5 January 2013).

In addition, individuals (or households) with electricity are reported to have been able to open venues for watching television programmes and video shows. This tends to attract people from villages without electricity as the price for a single programme, such as the Union of European Football Associations (UEFA) Champions League⁴⁹, has decreased from Tsh⁵⁰ 500 (US\$ 0.40) in 2000s to the current price of Tsh 100 (US\$ 0.10) —reports Respondent R13. However, since December 2012 Tanzania commenced switching analogue⁵¹ television signals to digital. This will incur extra costs to these operators for the purchase of decoders estimated at Tsh 39,000 (US\$ 28) which are required for digital transmission broadcasting. Besides these operations, and apart from freezer, light, TV, barber shops and mill machines, electrical appliances are not used for productive activities as captured in narratives of many interview respondents.

As was suggested earlier, the outcome of VICOBA, in combination with cumulative income from informal sectors such as selling coconuts, owning small stalls for petty business, *kibarua* (casual work e.g. building or repairing houses) was also reported as a central factor in the success of upward trajectories. Respondent R6 commented that:

The motorcycles you see there... they are used for boda boda business. The majority were bought with profit from VICOBA added to savings people had from lower risk but still giving substantial alternative source of money. You may not believe me, fishing or farming alone isn't enough to buy a motorcycle! This business [boda boda] provides relatively regular cash income. (RespondentR6, 26 November 2012).

Many respondents stated that until very recently *boda boda* has created employment opportunities for its operators. In general, an overwhelmingly majority of respondents argued that income generated through *boda boda* business has resulted in significant changes in life styles by increasing the range and number of activities for the households engaged in it. More importantly, this type of business has enabled people to save time and be more punctual, enabling activities like transporting fish to market in Mtwara town, and increasing their personal performance and output, which are key to their livelihood trajectories. For example, respondent R8 added that he owned a *sanlag* (motorcycle) since 2010, which he uses for transporting fish to markets in XB03 village and Mtwara town.

⁴⁹ There is a huge fans base of European soccer in Tanzania, with leading English clubs such as Manchester United, Chelsea and Arsenal having a large fans base even in rural areas

⁵⁰ Exchange rate by December 2012 was 1US \$ to Tsh 1,400 (Central Bank, Tanzania)

⁵¹ <http://www.cto.int/media/events/pst-ev/2013/DBSF-2013/Tanzania-Country-Status.pdf> [Accessed 16.08.2013]

7.4.6 Unreliable livelihood sources

As far as unreliable and fluctuating livelihood sources are concerned, it is generally assumed that the consequences will be negative on the overall livelihood strategies pursued by a household. Chambers (1995) for example argues that increased poverty and inability to invest through accumulation often restrict a household to attain a desired livelihood outcome. Looking at the 15 life stories as a whole however allows for the possibility to see the limitations to change and the way these households attempt to overcome these problems.

Unstable livelihood sources such as dependent on profit from short term and seasonal activities like collection of wild tubers such as *ming'oko* (*Dioscorea hirtiflora*⁵²) is a barrier when it comes to assessing the livelihood strategies in poor households, including their pathways as it is often argued that this has negative consequences for their trajectories. This seems to be the case for respondent R14, who said that they had suffered particularly difficult set-backs due to the type of livelihood activities undertaken and had failed to make a smooth transition from being 'vulnerable' to reduce threats on their livelihoods.

It could be quite possible that in Respondent R14's case it was unreliable livelihood activities that pushed him into frequent food shortages and lack of cash income to meet other basic needs, and consider higher venturing into higher earning activities, either through the money he could be able to save while engaging in these diverse activities. Respondent R14 was not able to overcome the difficulties to take advantage of other opportunities like emerging jobs in his village or nearby urban areas as they required specific skills. His life is not significantly different from those of others who were not educated or just reached the primary level education as was the case of respondent R10 whose situation is summed up here:

After the death of my husband, the only work I had was to collect and dry ukindu [raffia] and dye the resulted strips into vilago [mats]. Ahhh...the price I got after selling the mats were very low, around US\$ 2-4 per mat. Was hard to sell even three mats in a month. That was the only thing I

⁵² Further reading about ming'oko see http://rrgp.uoradea.ro/art/2010-2/10_RRGp-203-Majule+.pdf [Accessed 19.07.2012]

could do... no education, no capital to run a business, nobody to help me! I found it difficult to buy necessities such as food. If I would be provided with markets for my works [vilago] or loan to start something different, my hardships will be reduced. (Respondent R10, 6 December 2012).

Furthermore, unreliable livelihood sources were evident in households that appeared to have been dependent, in the course of their lives, on certain activities which are currently associated with a lower income or obsolete.

7.4.7 Socio-cultural events

Participants reported that a series of episodes such as *jando* and *unyago* (initiation rituals) and other traditional ceremonies that form a crucial part of their culture, have eroded household wealth and have been playing profound role in teenage pregnancies and early marriages. For some people, these cultural events meant that they encourage child bearing at teenage where livelihoods are stressed by the need to care for additional people, often in poor financial status, with the result that their livelihoods are become more vulnerable. Respondent R3 mentioned several times that costs associated with *jando* and *unyago* accelerate loss of household income which could have invested for other necessities:

These [jando and unyago] are not a simple celebration; resources are needed both in terms of food, clothes and money. I know the main purpose [unyago] is to teach a girl certain life skills... preparing her for motherhood and makes her ready for a married life. [...] A second function is celebration. The celebration is also some kind of announcement to young men and sometimes even to those men who wish to have second, third, and fourth, wives that they are invited. (Respondent R3, 14 December 2012).

As described by Respondent R3, *unyago* (and *jando*) brings prestige to the family, and more importantly, the teachings are based on gender roles. From the first day where the girl is kept inside, the family start to organize for resources, money for clothes, food, drinks, entertainment, in preparation of *ngoma* (dance) that will be held some months or years ahead. The *ngoma* is a big feast and as was pointed out clearly by R3, it needs a lot of money:

The family has to provide food and drinks for all people who will attend for a maximum of three days; new clothes for mwali [secluded girl], gifts, clothes for parents to mention a few. [...] All the costs are incurred by parents, although relatives can also contribute. The costs are higher; the

lowest could be US\$ 100-200. They [parents] try to make all people happy...Everyone would love to make the ceremony the best so that people will keep on remembering that day... (Respondent R3, 14 December 2012).

Consistent with the narratives about *unyago*, nearly all respondents who mentioned it were of the opinion that it has significant negative effects on the household's economies. Initiation ritual itself is not bad, except that what is spent could otherwise be channelled to the improvement of productive activities for enhancing the quality of life as explained by Respondent R3 again:

...the school fee is needed, plus money for meals. [...] It is difficult for most of the parents here to provide these...but they will strive hard, even by selling their chickens, properties such as bicycle, fishing nets or farms harvest that otherwise would have been kept as food reserves to ensure there is ngoma in their house. Worse is that, ngoma takes place immediately after harvest...can finish food and family go into food shortage until next harvest. After the ceremony, they are in hardship, with nothing to start, [...] actions for failure to bring their children to school they complain! (Respondent R3, 14 December 2012).

Another respondent, reported to have done *unyago* ceremony for his three daughters between 2000 and 2005, explained that he is currently against it following the drop in fish catch which used to make him earn a lot. He also pointed out that as most of those taken into *unyago* are of low age (recently being common to girls aged between 8–12 or less), there has been effect on their sexual life (Halley, 2012). Some got married early and end in divorce while others are prone to infectious diseases especially HIV/AIDS:

They get to unyago...from there they are free [sexuality]. They are likely to get married at younger age, sometimes between 10 and 12 years. They drop school, start bearing children at very young age. Some are divorced, then get remarried, continue like that. They increase life burden to their parents and society. (Respondent R2, 11 January 2013)

In a nutshell, initiation rituals especially *unyago* illustrates the bleak side of socio-cultural factors that lead to constraints to livelihood improvement. In consistent to other studies (e.g. Mbeba et al., 2012) initiation ceremonies such as *unyago* and *jando* are some of the factors contributing to teenage pregnancy, and early child bearing, which have negative impacts of household welfare. Mtwara district where this study was conducted has, a teenage pregnancy rate of 11% (National Bureau of Statistics, 2008).

7.4.8 Lack of assets

Life stories revealed that people do believe that someone with access to assets such as fishing equipment, land, associating with economic groups is usually a better household than someone who did not. Besides realising the importance of assets in livelihood strategies, the practical experiences through asset endowment are extremely important to make any significant investments and the ability to accumulate. The link assets-livelihood enhancement is absent across some of the interviewed households; individuals only count on subsistence activities associated with very low returns for their life. The statements below show experience individuals interviewed have had themselves or with examples from their communities:

I have only ten hooks and two fishing lines. Our fishing areas have been severely affected by dynamite. Sometimes I work in farms to earn cash income but that is not enough even for my own needs. Alternatively, I gather marine products from intertidal areas on foot however, what I obtain after selling the products such as gastropods and shell fish is insufficient. (HH survey number 40, 17 May 2012)

Many people depend on the sea, but they almost don't have fishing vessels. [...] Even today, fishing vessels available are so primitive, very little skills to fish or preserve fish when the catch is abundant. As you see...road is bad for us to transport products to town [Mtwara]. So things like boats, good road network, and support for financial capital are extremely important for us.... If you walk across our village, you will easily notice that most people here lack these things as is expressed in their living condition such as the poor walls of houses, and when you enter the house they don't have food to feed you. (Key informant interview KKI28, 11 July 2012)

Let me give you an example of an elder son of my daughter who after his primary education here he was taken by his uncle to Arusha. When he returned to the village he was interested starting new activities, everything he learned there [in Arusha], he wanted to do. So I think there were many good things he learnt there, that influenced his ambition. [...] It was different here, he wanted to start printing and copying services, there was no electricity power and his financial capital was not enough to allow him buy a generator. Because the things he saw in Arusha taught him many good things as well, but there were no resources to support him here, he failed to develop this business and decided to sell the equipment he had brought with. What he had acquired was not applied at all and he was reabsorbed in the usual life here...his life is now worse. (HH survey number 257, 24 June 2012)

Moreover, even those who do have relatively better access to assets rarely incorporate them into their livelihood strategies. As it is common in their arguments, they do not have the ‘courage’ to promote innovative changes and pursue something that their parents did not do in the past or is currently done by their fellow villagers. On the other hand, they lack innovative capabilities. For instance, some stories indicated that very few households keep livestock such as cattle, goats and even traditional chickens in their properties. These livestock can be profitable and adaptable activities across the study villages. The main reason for not having them, that recurred during interviews, is that they were not born to take care of animals as Maasai people (pastoralist living in northern Tanzania), and that much dedication of time to livestock would mean abandoning fishing—they don’t want to abandon their fishing status.

Throughout interviews, a number of asset capitals were mentioned as valuable for enhancement of livelihoods. Among them, the most famous one was human capital—education—for appropriate life and entrepreneurship skills because it was perceived that lack of it has been extremely a set-back to guarantee better use of natural resources available for food and cash income. Similarly, lack of specific skills among the interviewed people is reported to push some of them into activities that are obsolete like chasing fish into fishing nets by beating the water with a long stick:

I think that we could have not been the way you see us today if we had attended school. Education is important and crucial to our life; many failures among our community are attributed to ignorance. Believe me, it is only recently when most of us started to cultivate maize as we didn’t know they could buffer us in food shortages after cassava was destroyed by disease and there was no assistance to solve the problem. Many people here, because of ignorance just thought that cultivating maize would mean losing our attachment with cassava. [...]. Go to the sea, fishers have not gone to school, what they know is that the sea never dries. It is alright for them to use any means to get fish like beating water with sticks to scare fish; destroying fish habitats is not of concern to them. What they don’t know is that anything beats water, the fish get scared and they run away and that does not necessarily mean they will go in their nets. The establishment of MBREMP has opened our eyes, as they started to sensitise us and oh we realise we have been abusing our own resources. [...] I would be happy if all my children will study hard and reach university as from there they will have different mind and can help to solve most of the nonsense we have been doing here. (Respondent R14, 9 December 2012).

Furthermore, the above respondent recognises the role of education as human capital in acquisition of new livelihood opportunities outside the traditional ones:

Going to school and getting better education prepare the person better to deal with challenges in life, to know how to venture into new activities and even improve tradition activities. Our main problem here is that we have been doing the same things in the same way everyday. [...]. This is what is going on with our sea weed project...You walk up in the morning with hooks in your hands and go to the sea. If you don't catch any fish you return home and think of going there during the night or the next day. No skills to assess whether there is fish there is just to go for different equipment, which sometimes you don't know how to operate it. It is shame, but this is how we are. (Respondent R14, 9 December 2012).

It is argued that lack of assets does contribute to limited livelihood opportunities. Concerning fisheries equipment that could be used in their activities, it was revealed that the capabilities to acquire them was relatively low as most of them did not have access to financial capital coupled with low returns from their routine activities. Moreover, sustainable exploitation of fisheries resources was not incorporated into people's livelihood strategies because they were driven on subsistence needs and the open access nature of resources.

7.5 Policy implications

In general, the degradation of reef fisheries has resulted in clear threats to livelihood security, from an ecological and economic efficiency and environmental impact perspective, in villages studied. Degradation, especially due to dynamite fishing and dragging nets (e.g. beach seines), together with other perceived drivers of socio-environmental change (e.g. population pressure, market access, climate variability, policy intervention and marine resources) has increased the vulnerability of poor households. In view of this, the daily coping practices of households revealed that fisheries dependent livelihoods are no longer dominant.

The relatively shallow penetration of non-fisheries livelihoods and the continuing prevalence of multifarious practices in the study villages show that fisheries livelihood systems are changing at both a system and within-system level. However, the poorest households are still poor and their conditions have only improved if they switch to petty trade, improved farming or if individuals have migrated for waged based jobs in peri-

urban and urban areas. At the same time some are still affected by the residual effects of policy in the country especially the villagisation programme where they attribute to the losses of investment previously made. The main livelihoods threat should be tackled first through adequate assessment of the complex socio-cultural political, economic and even historical factors that have shaped life style of communities in question.

There seems to be a high potential for socio-economic development in the villages studied due to on-going natural gas exploration activities and the long awaited Mtwara Development Corridor⁵³ (MtDC) Project. Following this and other opportunities related to coastal tourism development, many individuals have arrived from different areas and private investors are searching for land within the study site. Amidst this pressure, the majority of the villagers and local institutions (e.g. village governments) often do not have enough knowledge to make informed decisions when approving the transfer of land. Similarly, many villagers do not seem to be aware of their land rights; therefore, in cases where compensation is required, it is questionable if this will be carried out accordingly and whether promises by investors, such as the establishment of supporting social services, will be kept. The district is responsible for providing advice and support to the villagers when selling their land, but has not been active in this respect to solve land issues. Consequently, village governments are currently not equipped to support people who may be willing to sell portions or all of their land as a way to raise income for enhancing their livelihoods.

Despite this absence of institutional support, some households, especially in Msimbati village, have started to negotiate with potential investors for sale of their land. Their expectations are that after receiving a large sum of money they will settle somewhere and invest in fishing around Mnazi Bay and nearby areas, or they will settle in another area of Tanzania. Institutional support to help these households as they aspire to improve their livelihoods is desirable; otherwise they may become involved in deals that could impoverish them.

⁵³ The primary objectives of the Mtwara Development Corridor are to link the southern regions of Tanzania with Malawi and Zambia across Lake Nyasa and Mozambique. It is also anticipated to provide strategic access for Malawi to the port of Mtwara as well as to mobilise investment in support of the utilisation of the MtDC tremendously rich natural resource base (Mtegha et al., 2012:30).

Observations of fisheries-based livelihood system changes have revealed that livelihood trajectories are intertwined within both fisheries and non-fisheries economic activities. Since households in the study villages represent different stages in an ongoing refurbishment of poverty reduction and rural development policies in Tanzania (Research and Analysis Working Group, 2011) through the national wide campaign in poverty reduction and economic growth (MKUKUTA⁵⁴ II), it could be argued that this static view is not entirely justified, and that a clear separation between the vulnerability and drivers of change of coastal livelihoods would be more realistic. In contrast to other studies on livelihood trajectories, such as Baulch and Davis (2007) who used escaping poverty as an entry point, the current study has viewed a livelihood trajectory as a result of continued adaptation to existing and potential livelihood sources and policies or adoption of improved economic enterprises, which are only just becoming visible in Mtwara district and Tanzania at large.

Given this, the main reason why the indigent are seen to remain poor is attributed to the adverse disproportional impacts of series of different stress such as decline in resources, poor health condition and food shortages, which they are unable to cope with. The permanent depletion of assets is rare, but can only occur in the poorest households. However, the impact of such stress can last throughout an individual's life time if they are not exposed to any intervention like empowerment for entrepreneurship, education or formal training that could give them necessary skills for their livelihoods. Assistance is needed to help the poorest, who lack asset capitals, to improve their livelihood situations. The consistent request from fishers is for help getting access to boats and gears able to fish the deeper waters. Until these people can be identified and receive adequate assistance, unlike those previously assisted by MBREMP project through gear exchange programmes and fishing loan grants, any additional direct intervention at the village level will not succeed.

⁵⁴ Document found at: <http://www.international.gc.ca/development-developpement/assets/pdfs/countries-pays/NATIONAL-STRATEGY-FOR-GROWTH-AND-REDUCTION-OF-POVERTY-TANZANIA.PDF> [Accessed 13.08.2013]

7.6 Chapter summary

Clearly, there appear to be numerous, diverse, and evolving livelihood pathways among households interviewed for this study. Some are characterized by various attributes, such as wealth at the beginning, possessing basic business skills, and traditional fishing/farming knowledge, whereas other livelihoods typically require no background (qualifications) at entry. More interestingly, each of the paths followed seem to feature generic skills and an increasing need to “learn by doing.” The paths followed by households in the study village exhibit quite fluid systems of skill formation, characterized mostly by experience from the outcomes of a specific occupation but often supported by social networks.

Overall, this chapter has highlighted that although households in the study village practice diverse income-generating activities besides fishing, in practice, most derive very small and irregular returns from their activities and often struggle to survive. These households continue to cling to fishing activities in some manner, built around kinship-based transmission of fishing skills from one generation to the next. Fishing activities do not appear to be simply due to economic imperative, and the struggle to escape poverty, but are also a part of a deeply felt cultural commitment that could be described as the legacy of their ancestors.

At the same time, this chapter raises important questions regarding the expectations of livelihood diversification, and whether they can significantly contribute to poverty alleviation or long-term adaptation to environmental stress, let alone accumulation and increasing resilience of marine and coastal resources, taking into account the “local reality” and shift to non-fishing activities that are increasingly promoted as “alternatives.” It seems likely that much diversification is based on complimentary livelihoods, such as minor trade, fish trade and processing, that support the primary livelihoods of fishing and farming. In other words, these complimentary livelihoods are unlikely to halt degradation of reef fisheries but may enable a greater proportion of benefits to stay within the rural coastal households.

Chapter 8 Scenarios for the future of livelihoods in Mtwara district

8.1 Chapter overview

The previous chapter (on livelihood trajectories) has highlighted that, despite several efforts taken by households and individuals to cope with and adapt to multiple stress, their livelihood trajectories have increasingly remained rather impoverished. Degradation of marine fisheries, fluctuating market prices, and erratic weather events are among major stresses that shape livelihood vulnerability in the study villages. With environmental changes, climate change effects in particular, it is predicted that extreme weather events, such as strong winds, floods and drought will become more obvious in the future, exposing more people to drastic reduction in fish catch and crop yields. At the same time, a complex web of other factors, including a lack of institutional capacity, structural poverty, and few livelihood opportunities besides the traditional ones, may limit the adaptive capacity. Consequently, future status of household livelihoods is expected to be largely unreliable and can be further complicated by uncertainty.

Although communities and households may have developed knowledge of and responses to livelihood stressors (refer Chapter 6), changing climate patterns may expose people to new and unfamiliar conditions (Ziervogel and Taylor, 2008:34). Although traditional knowledge and practices may prove useful for understanding the potential of certain adaptation strategies (see e.g., Leonard et al., 2013:627–628; Moen and Morlon, 2014:167; Williams and Hardison, 2013:532–533), the likelihood for their success may increasingly become uncertain. While the role of experience and existing options could offer appropriate initial steps to predispose existing livelihoods into unprecedented future impacts (de Loë et al., 2001; Howden et al., 2007; Kopke and O’Mahony, 2011:801), it has been argued in several studies (Davidson et al., 2003; McDowell and Hess, 2012; Reed et al., 2013) that despite many uncertainties, many mechanisms to cope with the current adverse changes on livelihoods will not always operate as smoothly as idealised, or function as inclusive and adaptive to communities practices in future circumstances.

This chapter is built on the results of the stakeholders’ workshop organised to develop explorative scenarios on the future of household livelihoods in the Mtwara district. The aim of the chapter is to use scenario storylines to elucidate factors of high importance and

great uncertainties around issues, such as fisheries, food security, policy and governance, and climate change impacts in the context of the Mtwara district. The chapter proceeds as follows: The first section explores meteorological data to explain projected climatic changes that could adversely impact livelihoods in the study area. In the second section, scenario logic consisting of driving forces identified as critical elements of scenarios is presented. Next, scenario storylines to describe plausible future status of livelihoods based on perceptions and expectation of stakeholders are illustrated. This is followed by a discussion on the implications the scenarios developed have for policy-makers interested in the problem of implementing options to adapt livelihoods to the projected adverse impacts, including climate change impacts.

8.2 Information on the climate

While preparing the workshop, to develop explorative scenarios at the local level to examine key uncertainties for coastal livelihoods in the future, where impacts of climate change may be obvious, the main challenge encountered was how to present a comprehensive overview of past and future climate information as one of the agendas for the workshop. This was coupled by the fact that current knowledge of climate change and climate variability among communities and their potential effects in Tanzania is limited (Hepworth, 2010:52), and that there are few specific studies and little data available for different districts of the country as well as awareness raising programmes. In recent years, there have clearly been early signs in the national response to climate change, including the publication of the national climate change strategy in 2012 (URT, 2012a) and the plans to prepare climate change policy that are now underway (URT, 2012b). Nevertheless, the establishment and implementation of awareness programmes to sensitize the public on climate change impacts, as well as adaptation and mitigation options, have remained weak (Yanda et al., 2013:76). While Tanzania is known to have several multi-sectorial actors and institutions that focus directly and indirectly on addressing problems related to climate change (URT, 2007), their efforts are not well articulated, documented, shared, or adopted for the purpose of building synergies on development of climate change activities. This has apparently, resulted in a low level of awareness about climate change and its impact and limited capacity for adaptation (Rwambali et al., 2012:17).

Despite recognising changes in the weather, the majority of people, who answered the interview survey prior to the workshop, and who were also invited to participate in the workshop had a low awareness of the term and concept of climate change. In particular, there were vague explanations on climate change, and, in specific, most participants used the terms climate change and weather interchangeably, as illustrated in Table 8.1. This situation has led to considerable speculation to responses given about climate change.

Table 8.1 Responses to the question what do you know about climate change (multiple responses)

Response	Frequency (n=16)
A greater frequency of hot days and nights and fewer cold days or nights	13
Reduced agricultural and fisheries productivity	11
Floods are now experienced in areas where there was no flooding	10
Water shortage as water sources are drying up/salinity in ground water	8
Strong winds/storm surges affecting fishing, and destroy houses	7
Rainfall patterns have changed, less rainfall—every year has drought, longer droughts	7
No enough pasture for livestock	6
Women travel further distances to collect firewood	5
Pests and crop diseases have increased	4
Human and animal diseases have increased	3
Deforestation	3
Trees are desiccating	1

Source: Stakeholders' survey (2012/13)

In framing an understanding of workshop participants towards later discussions, presentation on climate information began with an explanation of the terms weather, climate, climate normals, climate variability and long-term climate change. The definitions were basically derived from the literature on climate science and explained, literally, in Swahili language. It was envisaged that once participants might be aware of the past years that have been affected by climate variability, they will have additional and valuable insight into how future climate change will affect their areas and livelihoods.

Weather is the set of meteorological conditions—wind, rain, snow, sunshine, temperature, etc.—at a particular time and place. The term “climate” describes the overall long-term

characteristics of the weather experienced at a place (IPCC, glossary of terms⁵⁵). For example, climate along the coastal regions of Tanzania: Pwani, Dar es Salaam, Lindi, Mtwara, and Tanga, and the off-shore Islands of Mafia, Pemba, and Unguja is tropical with relatively high humidity (Tadross and Johnston, 2012:24). The World Meteorological Organisation (WMO) defines climate normal as: period averages computed for a uniform and relatively long period comprising at least three consecutive 10-year periods (Hulme et al., 2009:199). Accordingly, normals are computed every decade by individual countries to keep up with any changes in climate that may take place, but a coordinated international effort to compile global standard normal is undertaken only once every 30 years (Hulmes et al. 2009:199).

Climate change is a long-term shift in the statistics of the weather, including its averages (IPCC, 2012; IPCC, 2007; Solomon et al., 2007). For example, it could show up as a change in climate normals (expected average values for temperature and precipitation) for a given place and time of year, from one decade to the next. Climate change is a normal part of the Earth's natural variability, which is related to interactions among the atmosphere, ocean, and land, as well as changes in the amount of solar radiation reaching the earth (Solomon et al. 2007). Climate variability relates to changes in temperatures and precipitation ranging from months to multi-decadal oscillations. The best known climate variability in Tanzania includes floods, drought and changes in seasonal rainfall. A recent report on climate change and vulnerability in Tanzania (Hepworth, 2010:21–22) indicates that some climate variability can be explained by large scale oscillations in atmospheric and ocean circulation—in particular the El-Niño Southern Oscillation (ENSO) and less well known events such as the Indian Ocean Dipole reversal. It was envisaged that once participants might be aware of the past years that have been affected by climate variability, they will have valuable insight into how future climate change will affect their area and livelihoods.

Using data from the Tanzania Meteorological Agency (TMA), long-term climate trends for the Mtwara district were presented. The trends show how climate has been changing in the district. However, the data are not conclusive due to anomalies such as missing data

⁵⁵ IPCC Fourth Assessment Report, Working Group I, Glossary of Terms: <https://www.ipcc.ch/pdf/glossary/ar4-wg1.pdf> [Accessed 16.06.2014]

and instrument defects. Despite that, they were relevant to stimulate participants' imagination on the role of climate as one effect affecting livelihoods. Despite that, some important trends could be discerned. Time series for the mean annual rainfall indicates that the mean rainy for each of the years recorded has been fluctuating slightly, but not dramatically, below the average (which is 92 mm) (Fig 8.1a). Similarly, the annual total rainfall shows variability for some years, which implies that some years received rainfall lower than the average (Fig 8.1b). Moreover, the mean monthly rainfall (Fig 8.2) indicates long rains between January and April, which is a common pattern to large parts of the country with single rainfall seasons. Although it is less emphasised, more fluctuation of rainfall has continuing effects on fisheries production.

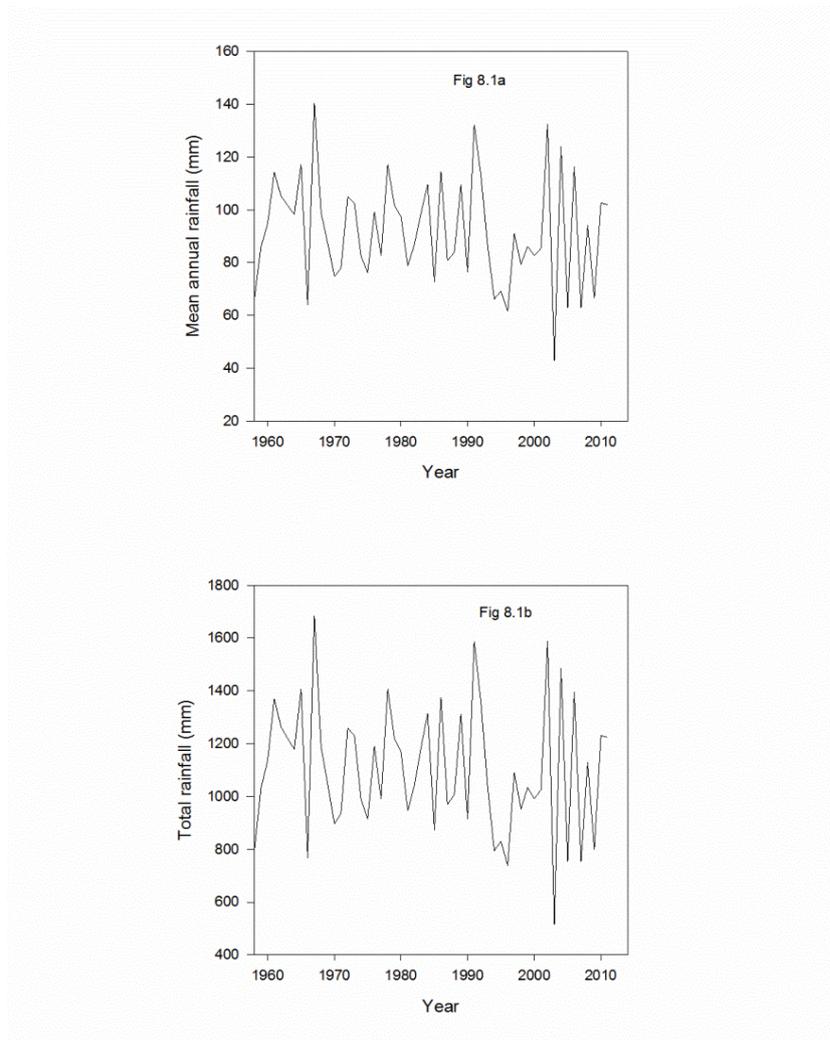


Figure 8.1 a) Mean annual rainfall, and b) total annual rainfall in mm, 1958–2011 for Mtwara district (Source: TMA, 2012)

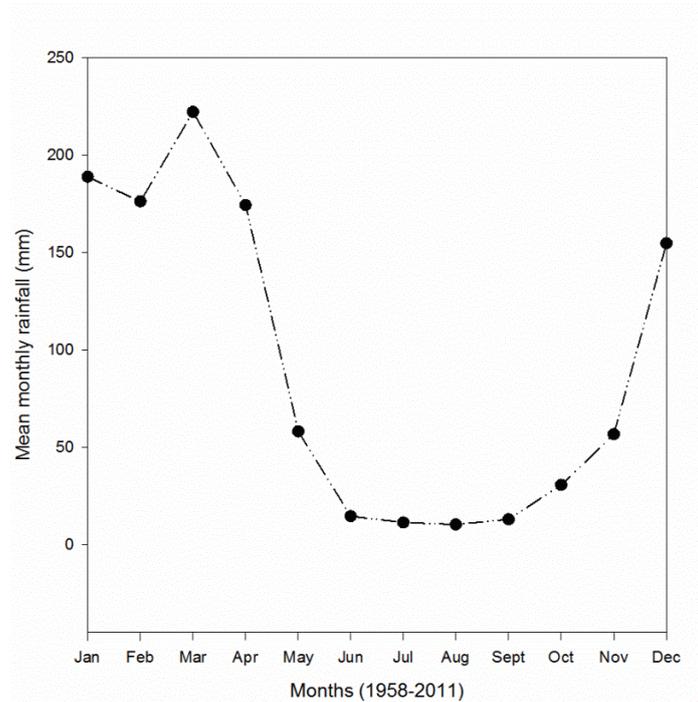


Figure 8.2 Mean monthly rainfall (mm), 1958–2011 in Mtwara district (Source: TMA, 2012)

Graphical presentation of temperature records gave at least a picture of some important trends. These trends were not analysed for their statistical significance. A positive trend was observed in the mean annual temperature from (Fig 8.3), and in the mean maximum and minimum temperatures (Fig 8.4)—indicating a rise in temperature over the years.

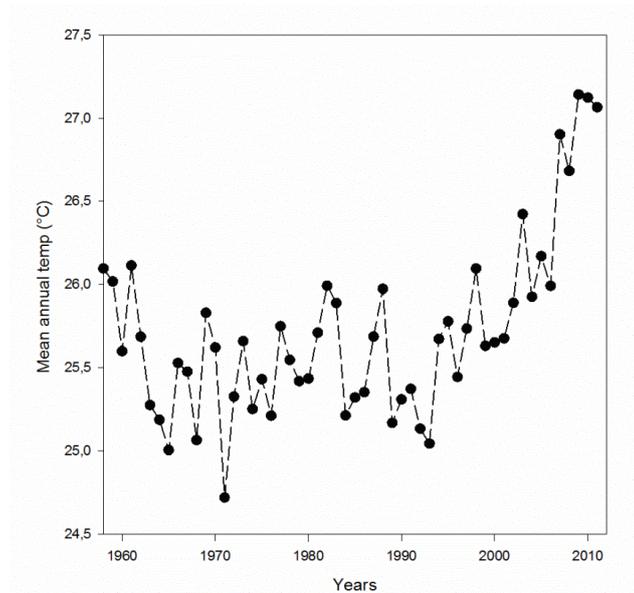


Figure 8.3 Mean annual temperature trend, 1958–2011 (Source: TMA, 2012)

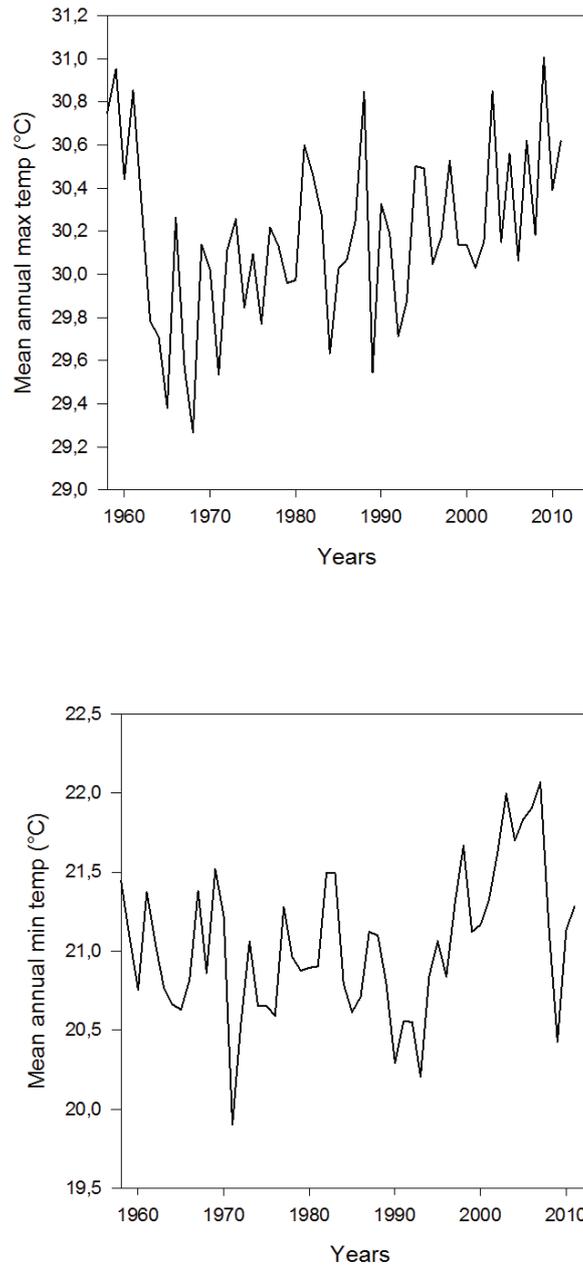


Figure 8.4 Mean annual maximum and minimum temperature trends as recorded in Mtwara district 1958 –2011 (Source: TMA, 2012)

Furthermore, temperature records provided by TMA show an anomaly⁵⁶ trend for both annual mean maximum (Fig 8.5) and minimum (Fig 8.6) temperatures recorded for the period 1958–2011 in Mtwara district. The anomaly values were calculated by taking the

⁵⁶ The temperature anomaly is the difference between the long-term average temperature (sometimes called a reference value) and the temperature that is actually occurring. A positive anomaly indicates that the observed temperature was warmer than the reference value, while a negative anomaly indicates that the observed temperature was cooler than the reference value (<http://www.ncdc.noaa.gov/monitoring-references/faq/anomalies.php> accessed 16.07.2014)

difference between the mean value of the expected temperature (reference values was 1972–1992) and that of what was happening. It should be stressed that graphical presentation of temperature anomalies was not aimed for detailed climatology analysis, but rather help workshop participants reflect on what was happening in the temperature of their area.

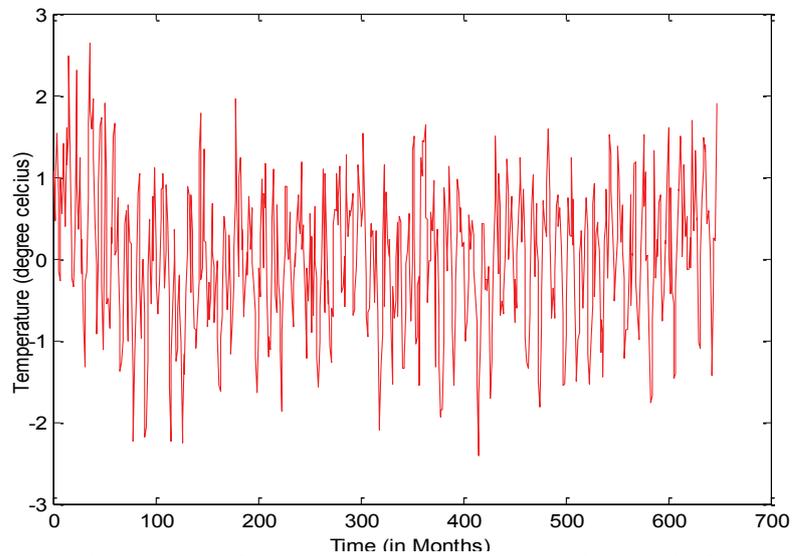


Figure 8.5 Annual mean maximum temperatures anomaly trends for Mtwara district, 1958–2011 (Source: TMA, 2012)

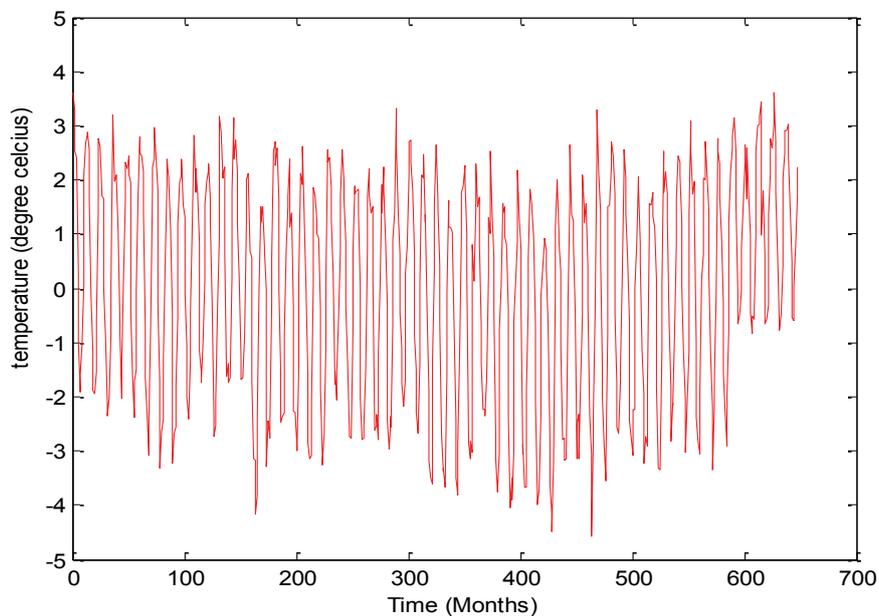


Figure 8.6 Annual mean minimum temperatures anomaly trends for Mtwara district, 1958–2011 (Source: TMA, 2012)

Due to a lack of expertise on Global Climate Models⁵⁷ (GCMs) and limited financial resources that could have allowed the hiring of an expert to elaborate on climate change issues, workshop participants were only briefly informed about projected changes in rainfall and temperature in Tanzania, synthesised from several published studies (e.g., Mwandosya et al., 1998; Tumbo et al., 2011). In general, participants were informed that scientific studies show that all climate models agree that there will be an increase in both minimum and maximum temperatures by the 21st mid-century, continuing the trend currently seen. Although not much emphasis was put on elaborating on climate change models, it was valuable to inform participants that the degree of change varies, depending on the model and level of emissions.

More specifically, participants learned that for Tanzania, increases of 1–3°C are expected by the 2050s, but, at present, with current CO₂ emission rates, it is more likely to be near 3°C than 1°C (Watkiss et al., 2011:108). Although projections for rainfall are less clear than for temperature, participants were informed that climate models project increases in rainfall in the north, while there is more disagreement on whether increases or decreases will occur in the south of the region where Mtwara district is located (Noel, 2011:4–8). Similarly, a recent study for Tanzania as a whole (Jack, 2010) suggests increases in rainfall at the end of the *masika* (long rain season) rains. Despite possible increases in rainfall, droughts will continue to be a major hazard (EAC, 2011:46; Trujilo et al., 2013:5).

8.3 Scenario: Workshop results

8.3.1 Exploring stakeholders' perceptions on the drivers of livelihood change

Prior to the workshop, a series of semi-structured interviews (Appendix 1D) were held with a broad range of stakeholders. Interview participants were identified in consultation with the MBREMP authority and district fisheries office, and included stakeholders from local communities, district government officials, and NGOs focusing on natural resources, food security, community and economic development, and environmental

⁵⁷ IPCC (2007) defines Global Climate Models as representations of the climate based on its biological, chemical and physical properties and that are widely regarded as the best and most reliable tools to simulate future conditions

management. A total of 37 individuals were identified and asked for their interest in participating. A total of 16 (Table 8.2) took part in the interview process contributing to an overall response rate of about 43%. Although deliberate efforts were made to ensure a higher rate of participation in the survey, most potential participants, who did not take part in the survey, felt unable to contribute at this stage because they gave excuses by mostly reporting to have other pressing duties. Indeed, a small minority denounced their participation on the day of interview stating that their participation in typical surveys had become onerous.

Table 8.2 List of stakeholders interviewed

Stakeholder category	Number
District Council Officials	2
Representatives of NGOs	3
Society groups in villages	2
Local community members	7
Academics/researchers	2

Of greater importance, however, survey respondents were asked to identify up to 10 underlying and impacting factors (driving forces) that will set the pattern of events and determine the outcomes of how the socio-economic future of the Mtwara rural district will evolve over the next 30–40 years. When identifying drivers of change, participants were asked to consider importance and likelihood criteria developed by the researcher. The open-ended questions, lasting between 30 and 50 minutes focused on the respondent’s experience and views about the main drivers of change in local livelihoods for the end-point year 2050 that was proposed by the researcher as appropriate for scenario time lines. Interviews provided insights into individual’s perceptions of drivers of change. Interviews were not subjected to voice recording; notes were taken during and after the interview and summarised in a single document for coding and analysis.

Preliminary results of the survey were summarised by the researcher and fed back to respondents in the workshop to capture consensus about codes and to enable participants to alter or more fully develop their opinions (Chermack et al., 2006:769). Three of the survey respondents did not participate in the workshop. All data fed back from individuals were anonymised to maintain participant confidentiality. More specifically, participants were requested to rate the importance (using a 1–10 Likert scale) and

uncertainty (1–5 Likert scale) of each driver again, and consensus was established based on the Delphi approach. These were eventually plotted on the impact/uncertainty chart (Figure 8.6). This modified Delphi consensus approach, which has been used successfully implemented in previous research on priorities and scenario exercises (particularly in healthcare settings) (Grundy and Ghazi, 2009:242; More et al., 2010:200; Rushton and Moore, 2010:143) and more recently modified in many studies to meet organisational objectives (Austin et al., 2013:129), allowed participants, through a series of face-to-face meetings for discussion, to reach agreement and shared understanding of the issues at stake. Since understanding of the topic in question during the workshop was to be reached via the compilation, summary and analysis of the experience of a number of participants, the Delphi approach is well suited for establishing a deeper understanding of data in the research presented in this study (Diamond et al., 2014:401–402; von der Gracht, 2012:1527–1528).

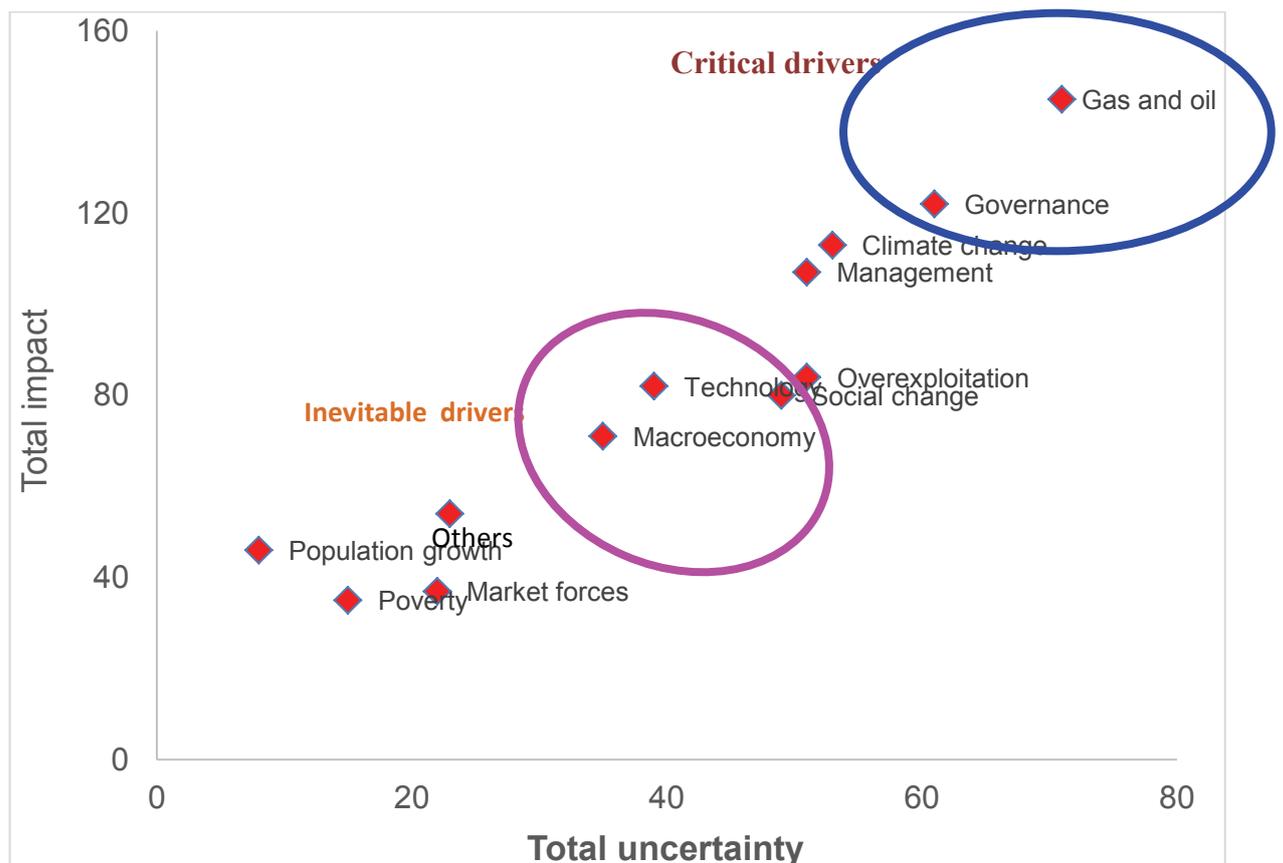


Figure 8.7 Drivers of change on livelihoods prioritised by workshop participants

The drivers with the highest level of uncertainties and impact (as shown in Figure 8.6) were issues related to the gas and oil activities, and governance. On the other hand, overexploitation, technological innovation, macro-economy and social change are those issues that incur a high impact, but more certainly, issues that workshop participants have more knowledge of present a more “known” element that yields the most relevant data.

8.3.2 Scenario development

The focus of this sub-section is on the output of the stakeholders’ workshop, rather than on the research process itself. Therefore, a detailed methodology employed will not be provided here but rather a succinct report of what was done. The scenario methodology workshop followed the steps given by Heemskerk (2003:940–942). It was intended to produce four scenarios, which are in line with the recommended number of scenarios of 3 ± 1 (Peterson et al., 2003:361). Workshop participants were divided into two break-out groups to begin the scenario-planning process, one having seven participants and the other with six participants. This was in line with the generally recommended number of 5–10 participants per scenario group (Mercer, 1995:83). Profile of workshop participants is given in appendix 2C.

The division of participants into break-out groups was intended to ensure that scenarios designed would include participants’ preferences and recommendations (Lippe et al., 2011; Tompkins et al., 2010). This is easily captured when there is the involvement of a variety of stakeholders discussing issues in a group setting. van Asselt Marjolein and Rijkens-Klomp (2002) argue that group settings enable stakeholders to create a common vision, whereas Heemskerk (2003) views it as the ideal setting for development of complex, multidisciplinary scenarios. The other advantage of a group setting for the scenario development process is that it might enable viewpoints that might not have been discovered in individual interviews (Mercer, 1995), which, in the case of this study, was practised during survey interviews. These advantages were relevant in adding valuable insight to the issues to be discussed among workshop participants. Although there is less disagreement about the length of a scenario workshop, which is influenced by time and budget constraints (Kok et al., 2006), this study opted for a workshop of one and a half (1.5) days, aiming at a total number of about 15 participants, to be divided into two scenario groups.

As commonly used in a scenario workshop methodology (e.g., Badjeck et al., 2010; Blass, 2003; Heemskerk, 2003; Hines, 2002; Kok et al., 2006), participants were asked to identify two critical drivers (with a high level of uncertainty and the potential importance of having broader effects) to create a scenario matrix (also known as ‘cross’), this framework defines the four possible futures with varying degrees of change (Reed et al., 2013:349). The participants identified opposite extremes for each of these two drivers, and they were then expressed as opposite extremes to provide the framework for a scenario axis. They continued to create four “stories of the future.” This was followed by a form of a backcasting exercise, where stakeholders in groups were asked to explore how a specified desired end-state might be reached. More specifically, participants were asked to imagine futures/trends for livelihoods in their area and to describe what contextual changes, either local or global (e.g., political, economic, institutional, cultural, etc.), would be necessary for such futures to materialize.

It is worth noting that most of the participants had never gone through the scenario-building process. Although the researcher had initially attempted to take all participants through a mock process of creating a scenario game board on the future of a fisher, who accessed a bank loan to intensify his fishing activities, one of the group break-outs was not successful in completing the creation and refining of their storylines. As a result, the plenary resumed discussing the findings of only one of the group break-outs. These are presented in this chapter.

8.3.3 Scenario storylines

In total, four scenario storylines in Swahili language were constructed by workshop participants of group one and subsequently translated into English by the researcher. A brief narrative for each of the four scenarios (Fig 8.8) is presented below. All storylines are extended towards 2050. It should be noted that the storylines are more extensive for the Mtwara district. Therefore, the national context is not necessarily considered, and results cannot be generalised.

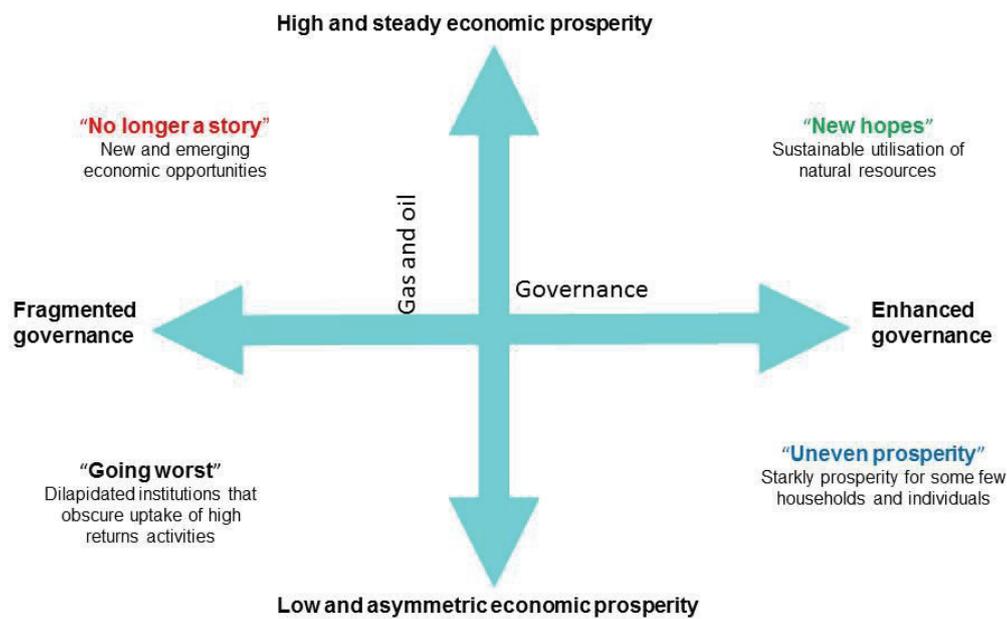


Figure 8.8 Mtwara’s livelihood scenarios with four plausible futures

8.3.3.1 Scenario: “Going worst”

The “going worst” scenario develops when institutions in the district are not able to implement important changes to improve the functioning and positioning of their economy, i.e., the containment of their lower human and financial capital and the ability to empower communities to venture into high-return economic activities. Critical infrastructure for fishing activities remains undeveloped; yields from farms and fisheries are reduced drastically, following extreme weather events; and inadequate technologies, food insecurity levels in villages are critically inadequate, as evidenced by the observed stunting and wasting of the majority of under-five-year-old children. Many young people are migrating to urban areas, as a result. Along with this, governmental and non-governmental institutions have shown that they are not prepared to intervene in livelihood stressors, such as market failure and bad weather conditions through policy and technical support. Lack of continuation of current government policies, even after changes have been made, will hamper implementation of plans already in place. Consequently, some households and individuals will develop livelihood patterns that, by continuous trial and

error, are finely adapted to enhance the productivity of individual livelihoods. The course of this change is characterised by existing options and experience to cope with livelihood insecurity—food shortages, in specific.

It is envisaged that many villagers will tend to diversify with rather inefficient activities, and the question of increased adaptive capacity will be overlooked due to irresponsible and non-reactive institutions. The diversification narrative will become irrelevant to safeguard households against increasing degradation of forests for fuel wood to meet the growing demand for energy. An outbreak of waterborne diseases, attributed to lack of access to clean drinking water, will become more obvious and will grossly exacerbate health problems that households have faced for many years. This scenario foresees a collapse in the already established alternative and fragile income-generating activities, and that households and individuals would revert to the traditional norm of a constant battle for already degraded natural resources. Moreover, fragmented governance regimes will contribute to mount social, political, economic and environmental challenges, which, under certain circumstances, might lead to an increased risk of certain forms of socially violent conflicts.

8.3.3.2 Scenario: “No longer a story”

This scenario envisages the vital role of the natural gas sector in the livelihood landscape of the Mtwara District as an underpinning enabler for social and ecological health that will provide jobs and support business opportunities without unduly contributing to economic and ecological risks and over-dependence on marine resources, especially fisheries and mangrove trees. This scenario develops when the presence of natural gas resource reserves, found in offshore areas of the Mtwara rural district, is linked to the local economy and attracts a broad spectrum of investors—from the large integrated, international majors such as British Gas and Wentworth, to the large and small independent exploration and production companies, as well as national oil companies from outside the country. Many economic opportunities will open up, including tourism, which will be supported by pristine beaches and abundant wealth, illustrating the history and culture of Mtwara, including the old town of Mikindani and the Mtwara Development Corridor Programme. Several companies will invest in the Mtwara Freeport Zone, which will develop into an oilfield supply base. Large manufacturing investments, such as

cement production plants and real estate development, will arise. Investors in the gas industry will start several projects targeting at empowering local communities, but it is possible that these will be captured by a few elites.

Efforts to address some of the major socio-economic problems, such as education, health and social security, will gain momentum, but government will often take a short-term view and accord higher priority to the development of an infrastructure that will support investors. However, poor governance, embedded in weak institutions and regulatory framework, will likely inhibit a strong effect on shared prosperity and empowering communities at the local level, potentially favouring overall national economic growth and a sharper appetite for risk created by a competitive landscape of investors. Although there could be a supply of natural gas to average homes, a limited local gas demand, apart from a few households in urban areas, this new enterprise would likely encourage the export of natural gas in the form of liquefied natural gas, principally for the booming market in China. There is also the possibility of resolving the long-standing electricity power shortage in the Mtwara district if government would support downstream gas infrastructure development that could include broader power generation and industrial development.

While acknowledging the potential for an economic boom, this scenario might also face hurdles due to strong lobbying from large investors and their associated experience in exploiting resources. Also, there is a lack of drivers or incentives for the natural gas sector to operate, while bringing benefits at the village level, amidst already grandiose plans, many of which are perceived as highly speculative. The underlying challenges might be deeply embedded, systematic and complex. They will be confronting a situation to address and, in fact, to require the culture of the country's micro-economy sectors, to be transformed at the individual, organisational and institutional scales. Nonetheless, development of a strategic programme for communicating a shared vision of the natural gas sector with the local economy might act as an instrument to orient, coordinate and secure a long-term commitment for enabling a scenario where the economy is booming, diversification results in high return activities, and communities reduce their dependence on natural resources, especially biomass fuel from mangrove trees by opting for consumption of natural gas for domestic purposes.

8.3.3.3 Scenario: “New hopes”

New hopes is a scenario that offers a desired functional outcome of the livelihood system with new policies and forms of cooperation between government and coastal households that lead to efficient and robust institutions that could bring the demise of overexploitation of marine resources, destructive fishing methods, and have positive impacts on economic growth pathways and ecological health. In this scenario, societal needs are identified to range from food security, stable income sources, ecological health, equity (through participation in the decision-making process, especially in the conservation of marine resources), equitable political power, and representation in governance and institutional structures. This scenario strongly focuses on collaboration and harmonisation of planning for rural development activities and management of marine resources, which have been sluggish in the past. An optimal set of policies would have two faces: sustainable utilisation of marine resources would be stimulated, and, at the same time, sustainable livelihoods would also be positively influenced without altering the natural resource base. The equilibrium that would be reached here would reflect a positive view of the livelihood systems in the Mtwara district, where utilisation of marine resources for livelihoods could be realised without compromising ecological sustainability, while presenting vast opportunities, not just for natural resources, but also for other activities in the local economy, such as the establishment of downstream businesses, following the booming of the natural gas industry, tourism and manufacturing industries.

Social safety nets will be improved, where fishers and farmers would be encouraged to join in registered Savings and Credit Co-operative Societies (SACCOS) to help them access loan facilities. People will switch to using natural gas instead of wood fuel. There would be jobs that pay enough, and government intervention would ensure that markets and market pricing will favour producers and not just the middlemen and other traders. The vision for sustainability of Mtwara district’s environment remains possible but would be challenged by concerns for food for consumption, energy demands, and income for other necessities. These would, in the best-case scenario, be addressed, as there would be good governance and a healthy, supporting environment for economic growth. Destructive fishing, which is a key constraint to ecological health (particularly for coral

reefs), will be banned, while villagers, who used to circumvent enforcement, will receive more attention from key players, including NGOs that would invest in awareness raising for environmental protection and extension services. The government, in collaboration with the private sector, will invest in risk management and reduction to ensure that communities are prepared to tackle the wide-spread impacts of climate variability.

In this scenario, the envisioned new life will be seen in increased participation of communities in management of their environment, through beach management units and closed areas. Indeed, households and individuals involved in fishing will receive training on post-harvest technologies that would help to reduce dependence on firewood for smoking fish. Similarly, farmers will see modern warehouses and get subsidies for agricultural implements. Well-functioning institutions and robust policies will boost an economy that does work for everyone, hence improving the long-term health, educational and political outcome of households and individuals.

8.3.3.4 Scenario: “Uneven prosperity”

In this scenario, it is envisaged that increased population growth and periods of extreme weather events, under effective institutions in the Mtwara district, would be associated with a two-fold overall increase in diversification of livelihood activities. However, this would be accompanied by a dramatic drop in climate-sensitive activities, such as crop farming, fishing, fish smoking, and production of charcoal from mangrove trees. There would be remarkable gains in access to improved social services, such as health and education, and the improved condition of houses. However, the progress would remain inequitable and insufficient. Fast economic prosperousness for some few households would become apparent and will co-exist with impoverishment and a persistence of inequalities for most villagers. This would potentially undermine equal access to social protection and broader sustainable livelihoods, by negatively affecting social, political, economic and environmental stability.

Rapid population growth will place stress on the local infrastructure that might become increasingly weak following prolonged periods of floods and erosion of the marine coast. Intervention and support from government and NGOs to various community programmes will not equal the demand from the booming natural gas population. Poverty and a lack of

reliable income sources for many households will result in the degradation or overexploitation of natural resources through activities like dynamite fishing and the sale of fuel wood. Some households will still be walking long distances to fetch water and to collect fuel wood. Unbalanced and exploitative development will weaken social bonds and widen the gaps between rich and poor. In some cases, resources will be exploited by outsiders, leaving villagers receiving few benefits, including only marginal investments in infrastructure and social services. Villagers will thus be locked, willy-nilly, into a set framework of livelihood development, which not only overlooks their multifarious needs but confines their livelihood options to a narrow range of activities. This would promote unsustainable use of natural resources—enhancing social and ecological vulnerabilities.

8.4 Discussion

Planning for sustainable livelihoods, in areas where existing livelihood options and experiences to cope with unprecedented circumstances attributed to environmental change have been weak, is difficult. The problem is not often that households and communities have no desire to transit to a relatively high adaptive capacity or cannot shift to a resilient livelihood status. A number of households and communities are known to have limited capacity to solve the underlying threats driving their livelihood vulnerabilities. Rather, even after all of the other threats and stresses on livelihoods are, at least, reduced, households still confront a unique set of institutional and policy problems that stem from the need to integrate two or more separate livelihood activities into a broad livelihood spectrum. For transitions to adapt to uncertainties, the plausible future of various livelihood activities should be imagined in the context of a changing social, technological, environmental, political and economic arena. This requires a complex process for imagining an acceptable and secure future, based on intuitive logic in which different assumptions about arrays of development pathways, under different drivers, lead to potentially different outcomes for a snapshot into the future. The more uncertainty and relevant perceived drivers of change by stakeholders are, for the wider consolidation of existing options, meant to reduce vulnerabilities. If there is intelligent regard for changes in the socio-political processes, the more likely this would buffer households from unprecedented and unpredictable future impacts, including rapid population growth and the effects of climate change.

In relation to what the future of livelihoods will hold, workshop results have provoked critical thinking among stakeholders and show that taking a longer-term perspective can give a different view of current priorities. The scenarios, when considered in unison, suggest that livelihoods in the Mtwara district are at a crossroads and face many possible futures. Facing such different paths, it is critical for policy makers and researchers in the district to understand what factors, which actors, and what strategies would lead to any of these scenarios, and which one would work best for the people, or which have to be avoided, at any cost. While acknowledging that a scenario does not describe future reality (van Vuuren et al., 2012), it does form a convenient way for creating a simplified image of the future that enables one to make more intelligent decisions about present action based on possible and desirable futures.

The scenario narratives, originating from the stakeholders workshop presented earlier, revealed that there were neither robust planning mechanisms nor adaptive governance systems with the capacity to put into place scenarios likely to deliver more sustainable livelihood regimes in the Mtwara district. It became evident that if each of the scenarios described were to unfold, they would call for different strategies and have different implications for how households and communities might enhance their livelihoods in unprecedented future circumstances. Moreover, the storylines suggest that whatever world might emerge, there are real choices to be made about several areas of potential improvement or modification to the current economic, social and environmental policies.

The “Going worst” scenario describes the business as usual scenario, in which the current fragmented governance regime prevails and restricts the healthy development of livelihoods. As the scenario “No longer a story” depicts, a transition to a world dominated by investors and liberalisation, with a small spill-over of benefits to local communities, the link between oil and gas activities and governance is critical to consider in arriving at a better understanding of how the local economy could be developed resulting in maximum availability of benefits to people in the Mtwara district. Undeniably, the growth of oil and gas activities will affect governance, and governance, in turn, will play a major role in determining what downstream economic activities are developed and to whom those activities are intended, and who is to benefit. In the “New hopes,” scenario, livelihood enhancement is highly envisaged but with the major share going to investors

and a few elites. The “Unequal prosperity” scenario presents different outcomes of unbalanced development initiatives that could widen the gap between rich and poor and increase social stratification among villagers.

Scenario analysis indicates that unless institutional barriers to livelihood development and social inequality are properly addressed, livelihood insecurity may increase within the next 40 years. Following this, measures for sustainable livelihoods will require different levels of intervention, possibly simultaneously including mobilisation for uptake of modern technologies for production activities and investments in the education and health sectors. In the scenarios “Going worst” and “Unequal prosperity,” community groups, such as fishers and farmers, face a set of obstacles in working with large institutions but may face a yet-unfolding set of opportunities to work with non-traditional partners—even the private sector. Besides that, lack of modern fishing tools, fish processing facilities, farming implements, access to financial services, and limited energy options could continually limit their adaptive capacity to changing circumstances. This is supported by the fact that the most consistent response from stakeholders, engaged in the scenario-planning workshop, referred to the need to improve governance, invest in technology, and empower communities to make effective use of emerging economic opportunities. Consequently, the organisation that is able to navigate between all these levels and stakeholders may be best positioned to drive success in future.

While the four scenarios narrated vary significantly from one another, they share one set of themes, that is, improvement of human and financial capital, policy reformulation, and mainstreaming toward economic plans and uses of technology. These concepts will play an active and integral part for sustainable livelihoods in the future. For instance, the changing nature of technologies could shape the characteristics of livelihood activities to be undertaken and the kinds of development interventions and support that are needed and in demand. In a future in which technologies are effectively adopted and adapted by poor people, on a broad scale, expectations about the provision of services could fundamentally shift. Developing a deeper understanding of the ways in which technology can impact livelihood development will better prepare everyone for the future and help all stakeholders drive their lives and those of their children in new and positive directions. Similarly, scenario storylines indicate that multiple, different livelihood interventions in

the same community have the potential to improve the livelihoods of a wider number of households than a single improvement alone.

Admittedly, it is unrealistic to say that the future will exactly resemble any of the scenarios narrated here. However, the coming years will undoubtedly contain parts of every scenario. Nonetheless, it should be emphasised here that the aim of this work was to provide information through suggestive alternatives to help inform and improve decision-making and enlighten the debate about the future of local livelihoods. Such information needs to be reinvigorating for the Mtwara district, like many other areas in Tanzania, currently struggling for improvement of livelihoods and the aftermath of profound economic uncertainty, huge social distress, and well intentioned, but ultimately ineffective, empowerment of local communities. Although scenario storylines can construct common visions, there is still much work to do in order to move from scientific-based studies to genuinely deliverable actions on the ground. This challenge occurs in a rural setting, such as the Mtwara rural district, which is supposed to be in the frontline, seeking a transition to sustainable livelihoods and healthy communities.

8.5 Chapter summary

This chapter has provided the outcome of the scenario planning process to explore the future of livelihood systems in the Mtwara district. Livelihood activities in this district, like in many other districts in Tanzania, are comprised of a complex system incapacitated by ineffectiveness and the numerous uncertainties that make most planning attempts for unprecedented adverse impacts futile. Given the high level of uncertainty, the scenario planning approach was chosen. The four scenarios generated by workshop participants are useful for stimulating decision-makers to consider changes they might otherwise ignore and provide more information on how to handle livelihood uncertainties. While several efforts and initiatives have been taken to mitigate livelihood threats in the study villages, the key finding this chapter emphasizes is that deployment of new solutions to predispose healthy livelihoods in new circumstances, most notably in a changing global climate, needs to be planned carefully, from the beginning. This could most easily be accomplished, using a scenario-planning methodology where local stakeholders could plan against a wide variety of plausible futures.

Chapter 9 Conclusion

9.1 Chapter overview

This final chapter reiterates the salient findings of the study regarding household livelihoods in coastal villages of the Mtwara district in southeast Tanzania. The purpose of the study was to explore the various livelihood strategies deployed by households under increasingly changing socio-ecological conditions. It was expected that an assessment of different strategies with which households have adapted over time to reduce livelihood stresses would provide good lessons for enhancing livelihoods in the face of unprecedented future threats attributed to environmental changes such as those caused by climate-change impacts. The study uncovered that while households are striving to pursue a portfolio of livelihood activities, their vulnerability is increased by a combination of both internal and extraneous factors. Absence of proper institutions and policy mechanism to address the inherent weakness of their livelihoods have, in turn, made households to resort to activities with low potential to improve their living standards. While numerous difficulties existed in attributing livelihood stresses mentioned by study respondents to the degradation of fisheries, specific livelihood stresses rooted in particular changes in village economy due to deteriorating benefits of fisheries were observed.

9.2 Summary and reflection on key findings

The analysis of the survey data in Chapter Five reveals that although the sampled households reside in an area with high marine biodiversity, the full potential of this natural capital is not yet realised in their livelihood portfolio. The majority of the people interviewed can be categorised as poor, with limited income to fulfil most of their basic needs. Their main productive activities—fishing and agriculture—are still rudimentary and are characterised by low technological applications rendering low productivity. Even when deliberate efforts are taken to intensify the main household activities, this occurs as a matter of necessity because fisheries resources are already dwindling and soils are infertile. This situation is further exacerbated by the fact that there appears little scope for

economic diversification beyond these low-return activities. Although study respondents articulated that their existing livelihood stresses were related to the rampant destructive fishing activities, the evidence base connecting this to the perceived ecological change was limited. Certainly, there has been an increase in dynamiting and other destructive fishing activities in recent years in the Mtwara district and this has contributed to environmental degradation and increased livelihood crisis. However; other factors, such as institutional failures and a lack of good governance, also need to be taken into account when considering the deterioration of livelihoods and the implication for the natural capital.

The results in Chapter Six showed that ineffective coping strategies employed to combat livelihood stresses was a major concern for the future and, indeed, have already been increasing livelihood vulnerability in some households. For the purpose of analysis of sustainable livelihoods and human—nature interactions at the local level, it is obvious that those coping strategies—such as cutting mangrove forests to begin farming milk fish, or getting poles to sell to the construction industry—have not necessarily made households sustainable. Seemingly, the strategies are adapted in an unplanned manner, and their resulting trends have decreased the amount of goods offered by the environment. However, it could be acknowledged that, from institutional and policy-intervention perspectives, such counterproductive actions can serve for consideration of planning for appropriate strategies and to mainstream them into rural development projects and processes.

The livelihood trajectories developed based on life stories demonstrate that access to high-return activities is likely to be a pre-requisite for successful accumulation in the local economy, and notions of promoting only certain activities (e.g. offshore fishing) should be discouraged. This suggests that interventions that can reduce short- and long-term livelihood stresses should focus on higher return activities and more reliable forms of diversified activities. Despite an increasing number of household members currently pursuing diversified activities, most of which are unrelated to natural resources, the majority have not proved to reduce risk exposure or increase expected income for households.

Scenario planning and the resulting storylines showed that households in the Mtwara district are eager to acquire new diversification strategies that can reduce their livelihood stresses in the face of increasing socio-ecological challenges. Livelihood scenarios should not only include environmental change scenarios, but also scenarios for population growth, changes in land use, and management of natural resources. Greater investment in local livelihood systems such as improved fisheries operation activities and the promotion of efficient use of land for crop production are needed. More specifically, in all four scenarios developed, it can be ascertained that building awareness of the range of economic opportunities can be a crucial step in assisting coastal households to understand ways to improve their livelihoods and mitigate the impact of climate change.

9.3 Implications

Livelihoods in coastal socio-ecological systems are complex and diverse. An interdisciplinary approach is needed for a better understanding of their dynamics and adaptive strategies. The sustainable livelihood approach was used to examine the changing composition of asset portfolios of households in villages prone to destructive fishing activities in the Mtwara rural district. Ideas of political ecology were used to understand the influence of history, struggles for resources and local knowledge on the changes in the natural-resource base and their implications for the deteriorating livelihood status in coastal villages. Scenario planning was useful for considering the ultimate status of livelihoods in the future under the current conditions. With such a combination, this study adds to a growing body of scholarly works wherein topics that would otherwise follow single-discipline boundaries are examined through multiple theoretical approaches.

A number of policy implications can be drawn from the findings of this study and help to improve the capacity of coastal households to enhance their livelihoods. The livelihood system in the studied villages can be enhanced in various ways. Government and NGOs should play a lead role in assisting households to reduce vulnerabilities, take advantage of new opportunities – such as those explored in the scenarios developed – and realise their aspirations. Impediments to assets, especially structural poverty and institutional failures, should be minimised. This should entail the formulation of policies that aim at broader

sectorial interventions that strengthen human and financial capital, as these would be effective in building adaptive capacity in coastal villages. Small-scale farming, which supplies food crops, should be supported through the provision of good varieties of seeds that are resistant to pests, diseases and harsh weathers. Other important measures to support transformation of rural livelihoods such as agriculture and fishing extension services and training and information dissemination on appropriate technologies, should be provided to increase productivity from those activities. Deliberate efforts should be taken to empower fishers with modern fishing tools and raise their awareness of the ecological impacts of destructive fishing activities. This, in turn, will help to protect resources, especially coral reefs and open opportunities for coastal-based tourism – SCUBA diving in particular – and hence offer more income opportunities for communities.

9.4 Future research

Like several other livelihood studies, the current study was not exhaustive and has limitations. It is worth mentioning here that the limitations of this study can be considered when designing future research work that may supplement the current work.

Firstly, given the lack of empirical studies on coastal fishing communities and livelihoods associated with fisheries, this study did not explore empirical evidence on the historical and contemporary livelihood dynamics in coastal villages. Ideally, this would be plausible using longitudinal data, unlike a case study (as was used for the current study), to reveal how these communities have succeeded, or failed to succeed, in enhancing their livelihoods over time. In particular, it is important to understand how their socio-cultural relationships are transformed—expanding or shrinking—under changing socio-ecological conditions. Furthermore, it would be indispensable to identify vulnerable groups and ascertain which type of interventions (and with what timing) would be instrumental in assisting their adjustment when opting for new activities. It is therefore recommended that future research should also focus on evidence of transformation in coastal households so as to produce a clear view of the impact of recent changing socio-ecological conditions. This should go hand in hand in increasing research evidence on vulnerability, livelihoods and resilience in the coastal households of Tanzania.

Secondly, this study did not look at the role of emerging opportunities, such as the current establishment of the natural gas industry in the Mtwara district, in the social transformation of coastal livelihoods. It is particularly important for future research to examine how these emerging opportunities will shape livelihood strategies and the cultural identity of coastal households. This should also involve an exploration of the role of traditions and cultural preferences in the adoption of emerging opportunities. For example, there are a number of cultural and social factors common amongst coastal communities that have historically been limited to local, shallow waters. These include a (sometimes healthy) fear of the open ocean, particularly at night; though this can also be linked to fears of adulterous behaviour back at home in their absence. Future research should also explore how these will have overall impacts in the taking up of new opportunities.

Thirdly, although the current study was able to grasp the idea of how households in the villages conceptualise their livelihood trajectories, some questions remain unanswered and require further investigation. To better assess the implications of assets endowment on livelihood pathways, it would be beneficial to examine more closely how people use different economic opportunities, where they access certain opportunities outside their villages and how degradation of natural resources is proceeding. This would give a better picture of the complex livelihood strategies people have in the villages and the linkage between livelihoods and the degradation of natural resources, including change in land use. While interviews can provide some understanding on these issues, participatory methods can bring more in-depth knowledge. Along with, important questions such as what do more resilience livelihoods and livelihood trajectories look like particularly for fishing systems, in coastal areas of Tanzania, need a special research attention.

Finally, concern has been expressed by study respondents that a number of national policies and laws are not supportive of the development of coastal households. While this may be a constraint, it should not hold back institutional development at the community level, where local legitimacy is often a more powerful tool than formal legality. This study, however, did not delve into examining particular policy issues identified that weaken community access to resources and rights. This is another theme for future research, as it will provide information useful for policymakers to change those policies

for the benefit of coastal development. More specifically, future studies should use political ecology approach to examine how coastal households may use identity politics against unequal power relations they face.

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Appendix 1 Interviews tools

Appendix 1A Household survey

Date: Name of household head: _____ Male ₁ Female ₂
 Who is interviewed? Head ₁, Wife ₂, Son ₃, Daughter ₄, Others ₅...
 Village: _____ Interviewer _____

Section A: Household profile

A1 Age of the head of the household _____

A2 Education level of the head of the household

Madrasa	No formal schooling	Primary school level	Secondary school level	Vocation/technical school level	College or university	Other, specify
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇

A3 How many people belong to this household (who share food and income)?

A4 Number of household members who earn income in your family _____

Section B: Living conditions and assets

B1 Could you show me the house(s) your household lives in. What are the main building materials that have been used for the construction of the roof, walls, and floor?

	Clay/mud	Wood/trees	Leaves/thatch	Cement	Iron/Tin	Other
a. Walls	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
b. Floor	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
c. Roof	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

B2 What is the main source of drinking water for members in your household?

1. Spring/river/stream/pond	<input type="checkbox"/> ₁
2. Public tap or well	<input type="checkbox"/> ₂
3. Private well in household residence	<input type="checkbox"/> ₃
4. Private <i>simtank</i>	<input type="checkbox"/> ₄
5. Tap water in household residence	<input type="checkbox"/> ₅
6. Other, specify	<input type="checkbox"/> ₆

B3 How do you often save? Daily ₁ Weekly ₂ Monthly ₃ None ₄

B4 Are you able to access the credit? Yes ₁ No ₂

Appendix

B5 If yes where? Bank ₁ Money lenders ₂ Friends/Relatives ₃ SACCOS ₄
Other specify ₅

B6 If now why? _____

B7 Which social associations do you belong? Religious ₁ Civil ₂ Others (specify) ₃ None ₄

B8 Do you own land for cultivation of various crops? Yes ₁ No ₂

B9 How much livestock does your household own now

Livestock	Goat	Cow	Sheep	Donkey	Chickens	Duck	Bees (no of beehives)
Number							

B10 Do you (or any other member in your household) own:

Transport	Yes	No	Communication	Yes	No
Bicycle	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	Radio	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Motorbike	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	Mobile phone	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Cart	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	TV	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Car	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	Satellite dish	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

Section C: Livelihood activities and income sources

C1 What kind of activity do you do most of the time to earn income (the main occupation of the head of the household) _____

C2 What other occupations do you engage yourself in different seasons? _____

C3 If the answer in C1 relates to marine resources and fisheries, how are you primarily involved in fisheries activities?

Fisher	Fish trade	Fish processing	Shell collection	Sea weed farmer	Mariculture	Boat/net repair	Food vendor	Other
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇	<input type="checkbox"/> ₈	<input type="checkbox"/> ₉

C4 Main expenditure for your cash income (tick the most appropriate)

Food/necessities	Fuel	Clothes	Education/health fees	Luxury	Transport	Others, specify
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇

Section D: Marine resources and fisheries

I would like to know how familiar you are with status of reef fisheries and livelihood they derive

D1 How many years have you been fishing? _____

D2 Do you fish in reef areas or involved in reef related activities all year round?

Regularly ₁ Occasionally ₂ No ₃

D3 Are there any days, weeks, months that you (or fishers in this household) do not fish in or around the reefs?

Yes ₁ No ₂ Don't know ₃

D4 If yes:

i. How many and which days of the weeks they don't go fishing? _____ Why? _____

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ii. How many and which months they don't go fishing? _____

Why? _____

D5 Which fishing gear do you use regularly for fishing in the reefs (tick the ones used from the list)

Hook and line	Gill nets	Spear gun	Scuba	Purse seine	<i>Dema</i>	Other, specify
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇

D6 a. Do fishers in this house use fishing vessels? Yes ₁ No ₂

b. If yes:

	Vessel type	How many	How many with engines
Use rich man's vessel			
Rent vessels			
Own with others			
Own individually			

D7 How likely is it that you (or fishers in your household) will mostly sell larger portion of fish they catch from reef areas?

Very likely	Likely	Neither likely nor unlikely	Unlikely	Very unlikely
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

D8

Does reef fishing contribute to over a half of your monthly income?

Yes ₁ No ₂ Don't know ₃ Not sure ₄

D9 Overall, how would you rate the status of the reef based resources (fish, octopus, sea cucumber etc) in your village in 2006-2011 as compared to 10-20 years ago?

Much better	A little better	The same	A little worse	Much worse	Don't know
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

D11 How would you score the following at present, in the past 10 years and in the next 10 years? (From reefs)

	At present			In the past 10 years			In the next 10 years		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Overall size of your fish catch	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Average size of individual fish	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

D12 How would you rate the condition of the reefs during present time, in the past 10 years and in the next 10 years?

	Non	Moderate	Good	High	Don't know
--	-----	----------	------	------	------------

Appendix

	productive	productive	productivity	productivity	
In the past 10 years	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₆
At present	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₆
In the next 10 years	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₆

D13 And how would you rate the performance of the reef associated livelihoods in your village in 2006-2011 as compared to 10-20 years ago??

Much better	A little better	The same	A little worse	Much worse
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

D14 In your view, what is the most important key cause for degradation of reef resources in your village?

Over-developm ent of coastal area	Over use of reef resourc es	Migrati on to coastal area	Polluti on	Destructi ve fishing	Overfishi ng	Increase in sea temperat ure	Populati on growth	Increas ed tourism	Othe rs
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇	<input type="checkbox"/> ₈	<input type="checkbox"/> ₉	<input type="checkbox"/> ₁₀

Section E: Coping with livelihood stresses and shocks

E1 What kind(s) of livelihood stresses you faced in the last 12 months? (Multiple answers possible)

E2 How did you tackle/cope? (Multiple answers possible)

E3 Are you supported by any organization, government, groups or individual to cope with those stresses?

E4 Over the past ten years or so, have you changed your livelihood strategies because of changes in reef resources because you think that the change may be helpful for the environment?

Yes	No	Not sure
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

E5 If yes, what are the main change(s) you have made? (Multiple responses possible)

E6 If the respondent has identified any changes in question above, who do you think have influenced you to make that change or those changes? (Multiple answers possible)

Section F: Extreme weather events, climate variability and livelihood strategies

- F1 Have you noticed any change in the weather from year to year in your life span?
Yes ₁ No ₂ Don't know ₃
- F2 If yes, what is/are the changes? _____? (Multiple response possible)
- F3 What do you think are the causes for the changes you have seen? _____
- F4 Have you changed your fishing practices/agriculture/business etc. because of those changes? Yes ₁ No ₂ Don't know ₃
- F5 Who would you say has been most affected by the change in weather between now and 20 years ago? Men ₁ Women ₂ Children ₃ Elderly ₄ Entire family affected the same ₅ Do not know ₆ No response ₇
- F6 How the fishers/non-fishers lives today different as compared to the past 20 years because of the changes in weather? (Multiple response possible) _____
- F7 Do you think that the available coping strategies can be useful to prepare for adaptation to other impacts such as those of extreme weather events and climate variability? Yes ₁ No ₂ I do not know ₃ No response ₄
- F8 If yes, how will they lead to transformation? What will trigger transformation?

Thank you for participating in the survey

Appendix 1B Guide Questions for Key informant Interview

1. What is the benefit flows from reef-based resources and fisheries to the livelihoods of coastal households? What are the different livelihood strategies? Are they changing? If so why? What is the impact of new/emerging livelihood strategies? Who benefit and why?
2. What is the status of livelihood in these villages? Can you give any indicator across different groups? Wealth ranking? Social differentiation? Livelihood pathways?
3. Based on your view or knowledge, what factors make coastal household or individual more vulnerable to the changes (particularly negative ones) happening in reef fisheries? What role do assets endowment, village development deficits play in maintaining vulnerability and reducing adaptive capacity?
4. What has been people's experience of changes in coastal livelihoods to date and what coping strategies have they taken? What is the main cause and actors?
 - a) Are the changes putting further demand on those coping strategies?
 - b) Which of these coping strategies worked, which did not, and why?
 - c) What are the necessary conditions for the effective coping to occur (institutions, policy etc.)
5. Based on your experience on how people were coping/are coping with dramatic changes in coastal livelihoods, what can you say on how do different groups and local institutions and organizations select various response measures (coping) and pathways?
 - a) Do they use any criteria? What are those criteria?
 - b) Are there any variations in the preferred features for the desired responses and implementation mechanisms among groups?
 - c) What institutional support is needed for planning and implementation to other anticipated changes such as climate change impacts on coastal livelihoods?
6. What capacity does the community/household have to address problems they face? How can these be used to work on the anticipated impacts by climate change?
7. Is there any link for planning adaptation to climate change with national policies within the degradation of marine resources arena? Is there any possibility of transferring knowledge and information across socio-spatial scale for climate change adaptation in coastal areas?
8. What has been people's experience of power relations, local knowledge and conflicts on resource use?

Appendix 1C

Guide questions for Focus Group Discussion

1. What are the different activities that households in the community use to support their livelihoods? What are the defining characteristics of these activities/strategies? Which are reef-based? Which are not?
2. Who is involved in those livelihood activities (men/women, children, different social and economic groups) and how many people and households depend on them? When do these activities take place (time of the day/month/seasons) and where?
3. What have been the main fisheries problems in your village over the past 10 or 20 years? What is the current status of reef-associated fishery? Do you notice any change (positive or negative) in reef fisheries over the last 10, 20 years? Other fisheries? etc. Both production and marketing problems can be discussed here. How has this affected livelihood?
4. When you have low fish catches or no fish at all, how do you ensure food security at household level? If you migrate which are the places where you migrate? Who decide where to migrate? What resources support/limit a household ability to respond to different circumstances-loss of income, job, food shortage, hurricane events etc.?
5. What formal organizations and associations are there in the community? What sources of information exist on fishing practices especially for reef resources? Who provide advice on what to do in fisheries activities? (Other activities such as agriculture, petty trade, casual jobs etc. should be discussed here)
6. What rules, regulations and customs are in place for the reef fisheries? Who is affected by them and how? If they are not respected why? (Constraints for the people to respect them).
7. How have those institutions changed in response to demographic, economic and environmental change?
8. Which factors in the social and institutional environment that inhibit household from taking advantage of livelihood opportunities or creating new opportunities for themselves?
9. Who takes the decision about household livelihoods? On what basis are the decisions made? How the alternative courses of action are created to reduce vulnerability of coastal livelihoods in the gradient of resource degradation due to various drivers such as overexploitation, population growth and climate change?
10. How do you see your livelihood status? Who is in good status/bad (wealth ranking exercise)

Appendix 1D Simplified version of survey questions for scenario planning workshop

1. What change have you experienced in the livelihoods and the climate in this district?
2. How do you understand and respond to those changes?
3. List 10 drivers you think would have the most significant impact (positive and negative) on livelihoods of Mtwara district over the next 40 years (they can be very likely or very unlikely).
4. For each of these drivers you have identified, please rank:
 - a. Its importance, i.e. which drivers will have the greatest impact on the sector. Please rank the drivers in order of impact from 1 to 10, where 1= the lowest impact and 10= the highest. Please use the rank only once.
 - b. Its negative or positive impact. '+' denotes a positive impact while '-' denotes a negative impact.
 - c. Its likelihood, i.e. how certain are you that it will occur (start to have an impact) in 2050. Use a scale of 1 to 5 (where 1= Nearly impossible, 2=Unlikely, 3=Even chance, 4= Likely, and 5=Highly likely)

Appendix 2 List of interviewees

Appendix 2A Key informants

Code	Name (Anonym)	Village/Organisation
KII1		Nalingu
KII2		Mngoji
KII3		Msangamkuu
KII4		MBREMP
KII5		Mngoji
KII6		Councillor (Diwani)/Ziwani
KII7		Councillor (Diwani)/Madimba
KII8		Mkubiru
KII9		Msimbati
KII10		Mnazi/Nalingu
KII11		Division (Tarafa) Secretary/Ziwani
KII12		District Fisheries Office
KII13		Nalingu
KII14		Msimbati
KII15		Msangamkuu
KII16		Nalingu
KII17		Msimbati
KII18		Mngoji
KII19		Mkubiru
KII20		Regional Secretariat (Natural resources)
KII21		Mnete
KII22		Msimbati
KII23		Nalingu
KII24		Mnete
KII25		District Fisheries Office
KII26		Mngoji
KII27		Mnete
KII28		Msimbati (Village Environment Committee member)
KII29		District Fisheries Office
KII30		Mngoji
KII31		Nalingu
KII32		SHIRIKISHO/NGO
KII33		Nalingu (Village Environment Committee member)
KII34		Mkubiru
KII35		Mkubiru (Village Environment Committee member)
KII36		Msimbati
KII37		Mnete
KII38		MBREMP
KII39		Mngoji (Village Environment Committee member)
KII40		District Fisheries Office
KII41		Mnete (Village Environment Committee member)
KII42		Msimbati
KII43		MBREMP
KII44		MBREMP
KII45		Regional Secretariat (Community development)
KII46		Academic/Research (University of Dar es salaam)

Appendix 2B Participants in life story interviews

Code	Name and village (Anonym)	Date of interview
R1		28/11/2012
R2		11/01/2013
R3		10/12/2012
R4		08/12/2012
R5		03/12/2012
R6		26/11/2013
R7		04/12/2012
R8		07/01/2013
R9		25/11/2012
R10		30/11/2012
R11		11/11/2012
R12		23/11/2012
R13		05/01/2013
R14		09/12/2012
R15		09/01/2013

Appendix 2C Overview of participants in the scenario planning workshop

Gender	Education	Area of expertise	Affiliation
Male	Local knowledge	Marine environment/fisheries	Msimbati village
Male	Local knowledge	Crop production/fisheries	Mnete village
Male	Fisheries and aquatic marine conservation	Water quality and coral reef health	NGO
Female	Community development	Livelihood	Mtwara district council
Female	Environmental Sciences	Environmental impact assessment	Mtwara region secretariat
Male	Local knowledge	Fisheries	Mngoji village
Male	Local knowledge	Agriculture and fishing	Nalingu village
Male	Forestry	Forest and range ecology	Mtwara district council
Male	Fisheries	Reef ecology	MBREMP
Male	Economist	Valuation of natural resources	Mtwara district council
Female	Meteorologist	Weather events reconstruction and forecasts	Tanzania Meteorological Agency
Male	Development Studies	poverty reduction	Sokoine University
Female	Local knowledge	Fish trade and crop production	Mkubiru village

Appendix 3 Photo illustrations



House with a thatched roof



House roofed with iron sheets



Selling and buying fish at a fish landing site



Fishers in a boat propelled by sail



Dugout canoe (*mtumbwi*)



Private water source (a well)



Collecting shells and invertebrates



Fish pond



Cashew nuts farm-major cash crop



Coral reefs



Reef fish



Monofilament nets



Fish carried on a bicycle



Interviews during field work



Livestock keeping



Pristine beach at Ruvula

Declaration

According to the Art. 6(5) Promotionsordnung

I hereby declare that I have written this thesis without any unauthorized assistance. No other sources than those stated in the list of references were used. Those sections that are quoted or referenced from other pieces of work are clearly marked.

01.10.2014



Bremen

Robert Eliakim Katikiro