

**THE LAKE CHILWA FISHING HOUSEHOLD STRATEGIES IN  
RESPONSE TO WATER LEVEL CHANGES: MIGRATION,  
CONFLICTS AND CO-MANAGEMENT**

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of  
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**KEYWORDS**

Water level changes

Household strategies

Lake recession

Migration of fishers

Conflicts

Co-management

Diversified livelihoods

Participation

Accountability



## ABSTRACT

### THE LAKE CHILWA FISHING HOUSEHOLD STRATEGIES IN RESPONSE TO WATER LEVEL CHANGES: MIGRATION, CONFLICTS AND CO-MANAGEMENT

**Friday Jack Njaya**

**PhD Thesis, Faculty of Economic and Management Sciences, University of  
the Western Cape**

In this thesis, I examine household strategies in response to water level fluctuations of Lake Chilwa. I also analyse the frequency and patterns of migration of fishers, conflicts due to migration of fishers and co-management. The following are the key results:

First, the seasonal and periodic lake level changes affect livelihoods of the households. As a coping strategy, the households depend on fishing in pools of water located in influent rivers and hunt birds for income and food while others migrate to find work as casual labourers. When the lake rises during the rain season, inundated areas become suitable for production of maize and rice. However, when the floods recede in the dry season, farming of winter maize and vegetables is common.

Second, migration of fishers is common around Lake Chilwa. The pattern of migration varies according to the season and gear type. The northern marshes and floodplain where fishers land the highest catches composed mainly of *Barbus paludinosus*, attract more fishers operating different fishing gear types. Conflicts emerge due to the *Nkacha* seine operations, which require removal of aquatic vegetation. The local fishers believe that the aquatic vegetation is a source of food for fish. The conflicts are in

various forms including access to fishing grounds, authority to grant access to fishing areas and fish price competition between the local fishers and migrants.

Third, the household strategies towards recovery of the fishery after recessions are inherent within the households' traditional system. However, the introduction of co-management does not recognise key actors that include fishers and river-based fishing households that participated in the formulation of conservation strategies for remnant fish stocks in lagoon and rivers during the 1995 recession. Co-management is characterised by limited participation of the fishers especially those operating seines, district assemblies and non-governmental organisations. Similarly, there is low transparency especially with respect to how the key stakeholders, Department of Fisheries and traditional leaders, take decisions. In stark contrast, accountability among Beach Village Sub-Committees is growing; hence more fishing households now perceive these as representing the interests of Department of Fisheries.

Based on the above results, a diversified occupational change involving fishing, farming and trading is necessary. The co-management arrangement should be adaptive with consideration of the traditional customs and values of the participating households. Since these households are dependent on the availability of fisheries, it is thus imperative to promote maximum resource exploitation in between recessions and encourage a complete stop to fishing during recessions.

September 2009

## DECLARATION

I declare that *The Lake Chilwa fishing household strategies in response to water level changes: migration, conflicts and co-management* is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.



Friday Jack Njaya

September 2009

Signed:.....

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Third, I am grateful to Dr Mafaniso Hara and Dr Douglas Wilson for guiding me through the research and writing process. Dr Hara, who is a senior researcher at the Institute for Poverty Land and Agrarian Studies (PLAAS) of the UWC, helped me identify a supervisor with a background in the social sciences. This is how I met Dr Wilson - a senior researcher at the Innovative Fisheries Management (IFM) Denmark. Fortunately, Dr Wilson was willing to be my main supervisor with Dr Hara, as co-supervisor. In addition, both supervisors helped me secure funding for the study. I am deeply indebted to them.

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## ABBREVIATIONS AND ACRONYMS

AIDS	:	Acquired Immune Deficiency Syndrome
ANOVA	:	Analysis of Variance
BNC	:	Blantyre Netting Company
BVC	:	Beach Village Committee
BVSC	:	Beach Village Sub-Committee
CBNRM	:	Community-based Natural Resource Management
COMPASS	:	Community Partnerships for Sustainable Resource Management
CDD	:	Consultative Group of Donors
CPR	:	Common Pool Resource
DANIDA	:	Danish International Development Agency
DFID	:	Department for International Development
DoF	:	Department of Fisheries
EAD	:	Environmental Affairs Department
FAO	:	Food and Agriculture Organisation of the United Nations
FF	:	Fisheries Fund
FCMA	:	Fisheries Conservation and Management Act
FGD	:	Focused Group Discussion
GDP	:	Gross Domestic Product
GHV	:	Group Village Heads
GoM	:	Government of Malawi
GTZ	:	Germany through the Germany Technical Cooperation
HIV	:	Human Immunodeficiency Virus
ICLARM	:	International Centre for Living Aquatic Resource Management (now World Fish Centre)
IFM	:	Innovative Fisheries Management
IMF	:	International Monetary Fund
ITCZ	:	Inter Tropical Convergence Zone
LCWP	:	Lake Chilwa Wetland Project

LO-TEK	:	Local and Traditional Ecological Knowledge
MAGFAD	:	Malawi-Germany Fisheries and Aquaculture Development Project
MASAF	:	Malawi Social Action Fund
MDGs	:	Millennium Development Goals
MEGS	:	Malawi Economic Growth Strategy
MGDS	:	Malawi Growth and Development Strategy
MK	:	Malawi Kwacha currency
MSY	:	Maximum Sustainability Yield
NDP	:	National Development Policy
NEP	:	National Environmental Policy
NEPAD	:	New Partnership for Africa's Development
NFAP	:	National Fisheries and Aquaculture Policy
NGO	:	Non-Governmental Organisation
NSO	:	National Statistical Office
PAP	:	Poverty Alleviation Programme
PFM	:	Participatory Fisheries Management
PFMP	:	Participatory Fisheries Management Programme
PHNIP	:	Population, Health and Nutrition Information Project
PLAAS	:	Programme for Land and Agrarian Studies
RC	:	River Committees
RIR	:	Real Interest Rate
SADC	:	Southern African Development Community
SAP	:	Structural Adjustment Programme
SPSS	:	Statistical Package for the Social Sciences
SLP	:	Sustainable Livelihood Programme
Sq.	:	Square
UN	:	United Nations
UNDP	:	United Nations Development Programme
USAID	:	United States International Development Agency
UWC	:	University of the Western Cape
VH	:	Village Head

WFC : World Fish Centre



## **DEDICATION**

To my beloved parents (both deceased) whose kind support and encouragement towards my education and career I greatly cherish.



## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Fish contributes substantially to the food security and livelihood of millions of people in Malawi. With 24% of the surface area of the country covered by water (ICLARM, 1991), both large- and small-scale capture fisheries contribute to food security and the poverty reduction goal of the Government of Malawi (GoM) as highlighted in Malawi Growth and Development Strategy Framework (MGDS) (GoM, 2006). The fisheries resources contribute over 60% of animal protein<sup>1</sup> in the national diet of Malawians (Kent, 1987; Hara, 2001b). Townsley (1998) observes that the fisheries sector remains one of the few economic activities along the shores of Lake Malawi that generates surplus.

From the late 1960s to the 1980s, contribution of the fisheries sector to Malawi's Gross Domestic Product (GDP)<sup>2</sup> was 4%. During the same period, the *per caput* fish consumption for Malawi was 23kg in the late 1960s, peaked to 36kg in the 1970s and then dropped to 11kg in the 1980s with the current figure hovering around 5.8kg (FAO, 1966; UNDP, 1971; Landes & Otte, 1983; GoM, 1999). The declining *per caput* fish consumption undoubtedly affects the nutritional status of the Malawian population, the majority of who are dependent on fish as a cheap source of animal protein. It is necessary therefore, to formulate management strategies aimed at increasing and sustaining fish supply in the country.

An increased and sustainable fish supply to meet the growing demand in the country is a challenge. Key reasons include increased human population growth, limited employment opportunities, inappropriate management regimes, complex characteristics of the fisheries resources and limited application of traditional knowledge.

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<sup>1</sup> This figure is for the 1970s and no recent data are available.

<sup>2</sup> No latest figure for the fisheries sector contribution to GDP is available.

The 2008 Population and Housing Census (PHC) indicated that the total population of Malawi was 13.1 million in 2008, an increase of 32% from that of 1998. This increase represents a 2.8% growth rate during the period. Similarly, the population density grew from 85 people per sq. km in 1978 to 105 people per sq. km in 1998 and then increased further to 159 people per sq. km in 2008 (NSO, 2008). The population increase exerts pressure on natural resources including fish. Thus, annual catches declined from an average of 68,000 metric tonnes between 1976 and 1990 to an average of 55,000 metric tonnes between 1993 and 2003.

The limited or lack of alternative sources of income to fishing-related activities that include fishing, processing and trading compels rural people to turn to fishing to earn a living. Various options are available: one either directly engages in fishing, works as a crewmember on fishing boats or works as a fish processor. Similarly, fish trading has emerged as a major source of income for women. In poor farming seasons when crop yields slump, fishing becomes the chief source of income for lakeshore based rural households. In this context, fishing provides a safety net for the rural people due to intermittent failure of farming, their main economic activity.

In an open access regime, regulating entry becomes difficult. While Malawi's Department of Fisheries (DoF) attempts to regulate fishing through licensing of fishing gear, competition for resource exploitation is a threat to sustainability of the fish stocks. The overfishing phenomenon is mainly prevalent in shallow waters of Lake Malawi (Bulirani et al., 1999). Without formulation of an appropriate strategy, fish supply in the country will continue to decline against the increasing human population.

The multi-species nature of fisheries poses a challenge on the exploitation of the targeted fish species. Fishers use both traditional and introduced or modern gear types. While there are fishing regulations to protect specific breeding fish species, the catch composition also includes significant quantities of the non-targeted

ones. For example, mesh sizes of gillnets aim to protect the juvenile Chambo (*Oreochromis* species), but the catch may also include Utaka *Haplochromine* species. In another scenario, small-scale fishers commonly use gillnets during certain times of the year, usually from May to July. This is profitable as it targets Utaka and yet when operated in shallower waters of Lake Malawi juvenile Chambo becomes another target. Only the populations of the non-targeted species are under threat. Additionally, even if the appropriate rules were in place, enforcement is another challenge.

Rapidly evolving fishing technological advances among small-scale fishers challenge the formulation of appropriate policies and legislative frameworks necessary to govern sustainable exploitation of fisheries resources. Because of declining fish stocks over time, small-scale fishers have come up with new technologies to sustain their fishing business. Most of the fishing technologies are efficient although some are destructive. For example, while in the past, gill nets were static, they now operate as dynamic gear types akin to seines. Over the last decade, the fishers have developed *Kandwindwi*<sup>3</sup> on Lake Malawi while on Lake Chilwa a fishing method locally called *Usodzi wa Mululu*<sup>4</sup> has been in use since 2000.

Traditional and customary fishing practices that fishing communities used in the past in either direct or indirect control of natural resource exploitation in various parts of Africa are now rare (GTZ, 2001). Commercialisation of fisheries resources and the increase in human population are the key factors contributing to the erosion of tradition and custom. Consequently, there has been a declining trend of fish stocks in isolated fishing grounds of the country. In the past, fishing communities could declare sanctuary or closed areas by declaring them sacred places. In the closed areas, no fishing took place. For example, on Chisi Island (Lake Chilwa), fishers were barred from fishing in designated sacred places.

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<sup>3</sup> A seine net that looks like trawl net with long warps (over 2km) that a group of fishers operate to catch a combination of fish species located in shallow areas of Lake Malawi

<sup>4</sup> A fishing method that is common on Lake Chilwa since late 1990s. The fishing operation involves removal of aquatic weeds in the targeted fishing area before seining.

However, in recent times, there has been a paradigm change leading to the routine disregard of customary and traditional practices, which indirectly eased pressure on fish populations thereby sustaining resources.

The main fish sources in Malawi include Lakes Malawi, Malombe, Chilwa, Chiuta and the Shire River system. Lake Chilwa is one of the most productive lakes in Africa due to its physical and ecological features that make nutrient recycling more efficient (Chiotha, 1996; Kalk McLachlan & Howard-Williams, 1979). The lake is shallow and boasts an enclosed system with an estimated average catch of 13,000 tonnes per annum. In productive years, such as in 1979 and 1991, the estimated annual catch can reach 25,000 tonnes. Lake Chilwa is important for the supply of animal protein to the local population of nearly one million in the densely populated southern region (Landes & Otte, 1983; GoM, 1999). The lake also provides employment to around 8,000 fishers. An additional number of actors (currently not counted) derive their livelihoods through downstream industries such as fish processing, trading, boat building, net construction and other ancillary industries (GoM, 2002a).

Lake Chilwa goes through cyclic recessions due to persistent droughts that usually last for three to four years (Njaya et al., 1996). Records indicate eight occurrences of such recessions since 1879 (Kalk et al., 1979; Kabwazi & Wilson, 1996; Njaya, 1998). When the lake recedes, the fishery collapses but recovers within three to four years after water refilling. For example, after the 1995 recession, the estimated fish production on the lake in 1999 dropped to 12,500 tonnes (GoM, 2005).

Despite the water level fluctuations the DoF has since the 1970s, enforced fishing regulations including mesh size restrictions for gillnets, minimum allowable size of fish (*Oreochromis* species), licensing of gillnets and seine nets. In the aftermath of the 1995 recession, traditional leaders around Lake Chilwa reviewed fishing regulations and introduced a six-month closed season and prohibition of *Nkacha* seines. In 1997, the DoF introduced a co-management arrangement in

response to advocacy on popular community participation and decentralised natural resource management. This necessitated revision of the fisheries legislation and policy between 1997 and 1999.

While Lowore and Lowore (1999) support the Lake Chilwa co-management strategy, their argument centres on a partnership that involves the DoF and traditional leaders. However, Sarch & Allison (2000) argue against introduction of the Lake Chilwa co-management system. The researchers submit that insistence on co-management arrangements in small-scale fisheries mainly focuses on regulating access and restrict migration of fishers: This assertion needs further analysis and partly motivated this study.

Additionally, Kalk et al. (1979) and van Zwieten & Njaya (2003) argue that Lake Chilwa is resilient and will thus recover from any recession. Scholars and practitioners downplay the contribution of Lake Chilwa basin households (fishers and farmers) to the fishery's ability to recover after a recession. In addition, it is still unclear on which conflicts emerge between migrant and local fishers because of access restriction. The study will thus explore the linkage between responses of the Lake Chilwa households in terms of their household strategies to water level changes.

## **1.2 Study area**

### ***1.2.1 Geographical features of Malawi***

Malawi, which lies between 9°20' and 17°10'S and 35°50E in the eastern-central Africa, is land locked (Figure 1). The country has a surface area of 118,500 km<sup>2</sup> of which nearly 29,000 km<sup>2</sup> under are lakes and rivers. The north-south axis is 901 km long and the east-west axis varies from 80 to 161 km. The north (475 km) shares borders with the United Republic of Tanzania, the east, south and west (1,569 km) with the Republic of Mozambique and the north-west (837 km) with the Republic of Zambia (ICLARM, 1991).

The country lies in the Great Rift Valley that traverses from north to south. In the deep trough lies Lake Malawi, the third largest lake in Africa. The Shire River flows from the south end of the lake and joins the Zambezi River 400 km farther south in Mozambique. To the east and west of the Rift Valley, the land forms high plateaus, generally between 900 and 1,200 m above seas level. In the north, the Nyika uplands peak at 2,600 m; south of the lake is the Shire Highlands with an elevation of 600-1,600 m, rising to Zomba and Mulanje mountains, 2,130 and 3,048 m respectively.

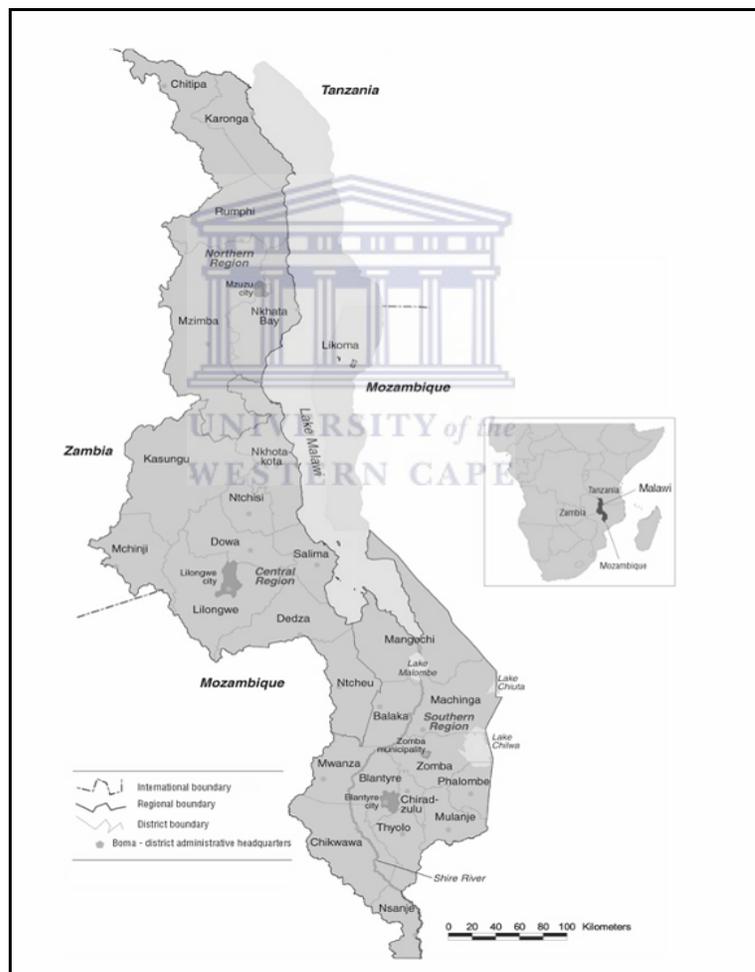


Figure 1: Map of Malawi showing major water bodies including the study area, Lake Chilwa on the south-eastern part of Africa

Source: NSO (2004)

For administrative purposes, Malawi has three regions, namely: South with 13 districts, Centre having 9 districts and North comprising 6 districts. The South contains one-third of the total land area of which 39% is arable land. The North constitutes 29% of the country's surface area of which 20% is arable while the Centre contains 32% of the total area of which 41% is arable land. Malawi is socially diverse with peaceful co-existence of various ethnic groups including Chewa, Nyanja, Yao, Tumbuka, Lomwe, Sena, Tonga, Ngoni and Nkhonde. In terms of religion, the country is multi-sectarian and is has Protestants, Roman Catholics, Muslims, and traditional indigenous believers.

### ***1.2.2 Socio-economic profile of Malawi***

Malawi is one of the poorest countries in the southern African sub region with an average income of \$132 per annum and over half of its population living below the poverty line (Mataya, Chulu, Khaila, Kumwenda, Machinjili & Mthindi, 1998). The 2008 population census shows that the country has an estimated population of 13 million people (NSO, 2008).

The country's economy is predominantly agro-based. The agricultural sector is the largest source of employment, with over 80% of the labour force employed in the smallholder sub-sector and approximately 11% employed in the estate sub-sector. Agricultural production accounts for 38.6% of the Gross Domestic Product (GDP) (GOM, 2003c). The smallholder sub-sector with the majority of the rural population contributes 65% to the agricultural GDP while the estate sub-sector contributes 35%. Crops account for 91% of agricultural output, livestock accounts for 7%, while fisheries and forestry contribute less than 1% (Mataya et al., 1998).

In the early 1990s, agriculture contributed 90% to foreign exchange earnings with tobacco accounting for more than 65% followed by tea (8%) and sugar (7%). However, agricultural output had declined to 82.7% by 2003. The major concern remains on the decline in the manufacturing industrial sector from 17% of GDP in 1994 to 11.6% in 2001 (GoM, 2003c).

The Government of Malawi (GoM) emphasises poverty reduction and has since initiated the Poverty Alleviation Programme (PAP), Vision 2020 and Millennium Development Goals (MDGs) as its main policy initiatives (*Ibid*). Within the poverty alleviation framework and the MDGs, the government has formulated policies on agriculture and livestock development, fisheries, forestry, environmental and natural resources.

The government intends to achieve the goal of reducing poverty through the promotion of a broad-based and rapid agricultural development plan while ensuring sustainable use of natural resources. The priority areas for the country's poverty reduction policy include promotion of growth-oriented policies, improving coverage and quality of basic social services, and establishing cost-effective safety nets as enshrined in the Malawi Economic Growth Strategy (MEGS) framework that emphasises the partnership between the GoM and private sector. The policies aim at improving food security and nutritional status, promotion of small agro-based businesses, diversification of exports of crops and livestock products and increase of farm incomes. Sustainable use of natural resources is one of the key contributory factors to achieving such objectives (GoM, 2007).

The government continues to initiate fresh economic public sector policy reforms that aim to improve service delivery. The Malawi Growth and Development Strategy (MGDS), a replacement of the Poverty Reduction Strategy Paper (PRSP), provides an overarching strategy for an integrated implementation process (*Ibid*). Presently, there is a need to align sectoral plans against the MGDS goals by focusing on the mandate, strategic outcome, outputs, strategic outputs and implementation plans.

The global change in the promotion of the rule of law has contributed to the transformation of the political and governance landscape of Malawi. After the end of the cold war, there was an increasing demand for African countries to

democratise and adopt Structural Adjustment Programmes (SAPs) from its western donors led by the World Bank and the International Monetary Fund (IMF). In the early 1990s, there was political transformation that affected Sub-Saharan Africa. Consequently, donors, including the Harare Declaration by the Commonwealth Heads on Good Governance, exerted more pressure on Malawi to democratise (Hara, 2001; Hara & Nielsen, 2003).

The Declaration explicitly linked provision of aid with the notion of good governance of which Malawi was a target. In response to slow progress registered on the implementation of the proposed governance reforms, the Consultative Group of Donors (CGDs) froze all non-humanitarian aid to Malawi in May 1992. Accordingly, the country experienced a depreciation of the Malawi Kwacha (MK) currency by 22%, which became a recipe for change (Mvula, 2002).

### ***1.2.3 Fisheries sector***

The capture fisheries sector comprises traditional or small-scale, mechanised and aquarium sectors. While at global level the small-scale fisheries sector accounts for about 25% of fish production (FAO, 1991), in Malawi this sector contributes 85-90% of the annual total landings (Bulirani et al., 1999). The sector directly employs about 60,000 people operating 15,303 fishing vessels of which 73% are dugout canoes, 23% boats without engines and the rest being powered boats (GoM, 2005).

In the past, the largest proportion of the catch from the small-scale fisheries sector was mainly for subsistence use until the 1970s when the trend changed for cash income. The common gear types in the small-scale fishery include fish traps, hook and line, fishing baskets, cast nets, seines (beach and open water) and gillnets. Planked boats with or without engines and dugout canoes are widely used within the small-scale fisheries sector.

The mechanised sector on the southern Lake Malawi lands between 10-15% of the annual total catch (GoM, 2004). Trawling, purse seining and lift netting are

common. Currently, the sector comprises 14 trawlers (five pair trawlers and nine stern trawlers). The aquarium trade involves catching and selling of cichlids, (*Mbuna*).

Fish production is mainly from Lakes Malawi (24,208 km<sup>2</sup>) Chilwa (approximately 2,000 km<sup>2</sup>), Malombe (390 km<sup>2</sup>), Chiuta (200 km<sup>2</sup>) and the Lower Shire River system. The Malawian fisheries have experienced a considerable decline especially from early 1990s. Figure 2 shows the annual catches declining from an average of 68,000 metric tonnes (1976-1990) to an average of 55,000 metric tonnes (1993-2003).

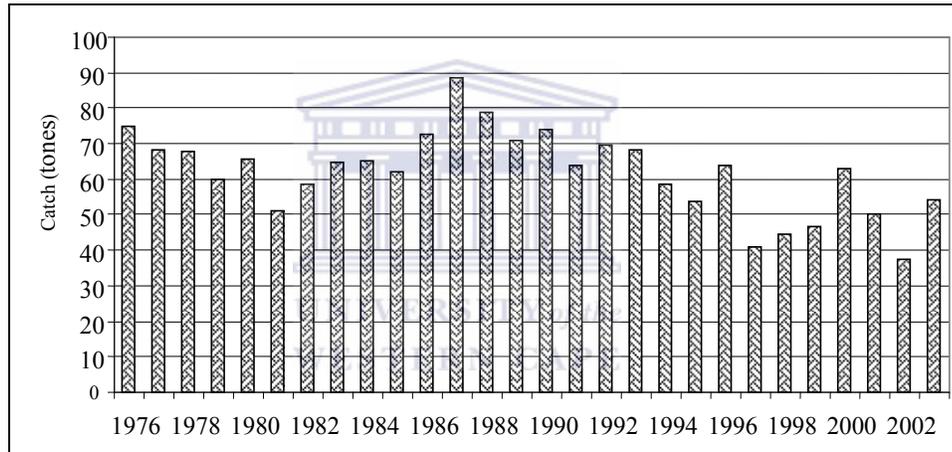


Figure 2: Estimated annual fish landings<sup>5</sup> (metric tonnes) from major water bodies in Malawi from 1976-2002

Source: GoM (2004)

A combination of complex factors contributed to the decline including localised overfishing in some inshore stocks of Lake Malawi, climatic influence that results in drying up of Lake Chilwa and weak capacity of DoF to enforce fisheries regulations. Conversely, in the last decade, the number of fishers,

<sup>5</sup> Problems associated with fish catch data estimates collection from Malawi's waters have been outlined previously (Weyl, Manase, Namoto. & Banda, 1999)

fishing gears and fishing crafts has increased by 27%, 124% and 30%, respectively.

#### **1.2.4 Fish marketing**

Fishing, processing and marketing constitute a principal occupation for the majority of fishing households in Malawi. There has been an increase in fishing and fish trading since the 1940s mainly due to the rapid increase of the population between 1945 and 1966 (Agnew & Chipeta, 1979). The introduction of nylon threads in 1958 by a Blantyre factory in place of fibres from local plants was a defining technological advancement in the history of the fishing industry in the country.

Processing of fish includes smoking, fresh and sun drying. The small-scale fishers use traditional open pits or in small smoking kilns made of bricks to smoke part of the catch. The smoking method is mainly for bigger fish like catfish (rolled *Mlamba*) and split *Oreochromis* species (*Chambo*). Traders can also sell *Chambo* in fresh form with the use of ice. Matiya (2005a) notes that fish prices vary according to fish species, preservation, weight and market type.

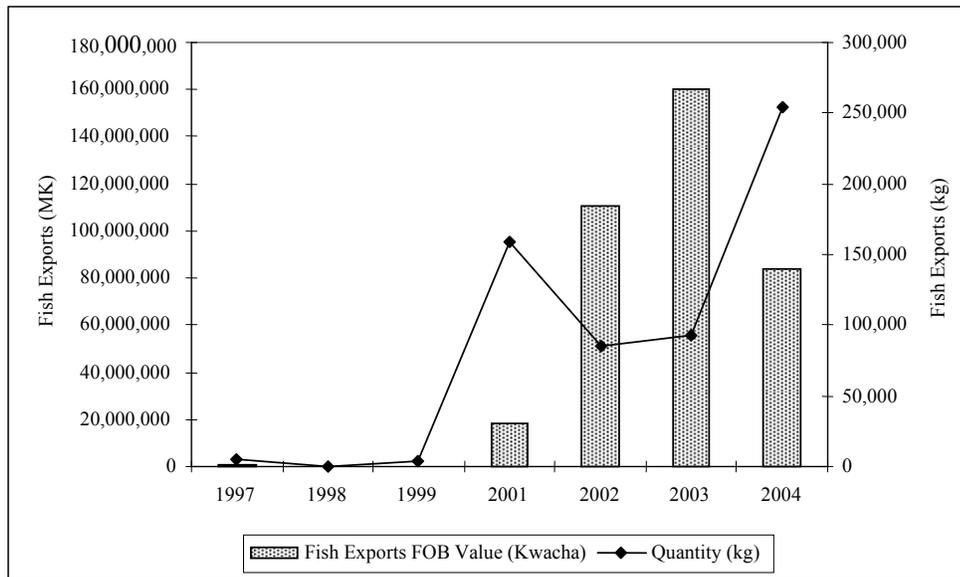


Figure 3: Graph showing fish exports (kg) and value (MK) for Malawi from 1997 to 2004

Source: NSO (2005); Njaya (2001)

From 1997 to 2005, annual fish exports ranged from 0.1 to 256 tonnes with an average of 86 tonnes. In 2005, the country exported its highest fish quantities to date (255 tonnes). On the other hand, fish imported into the country fluctuates between 560 tonnes recorded in 1997 to 2,808 tonnes in 1999 with an average volume of 1,416 tonnes (Figure 3). These figures show that both locally exploited and imported fish will not meet Malawi's fish needs estimated to grow to over 80,000 tonnes by 2010 (Njaya, 2002).

Generally, from 1997 to 2000 the values of fish exports were lower than those earned from imported fish products. However, since 2002 the trend has changed with the highest values of fish exports being higher than values of fish imports although quantity records show that fish exports are generally less than the fish imports (NSO, 2002).

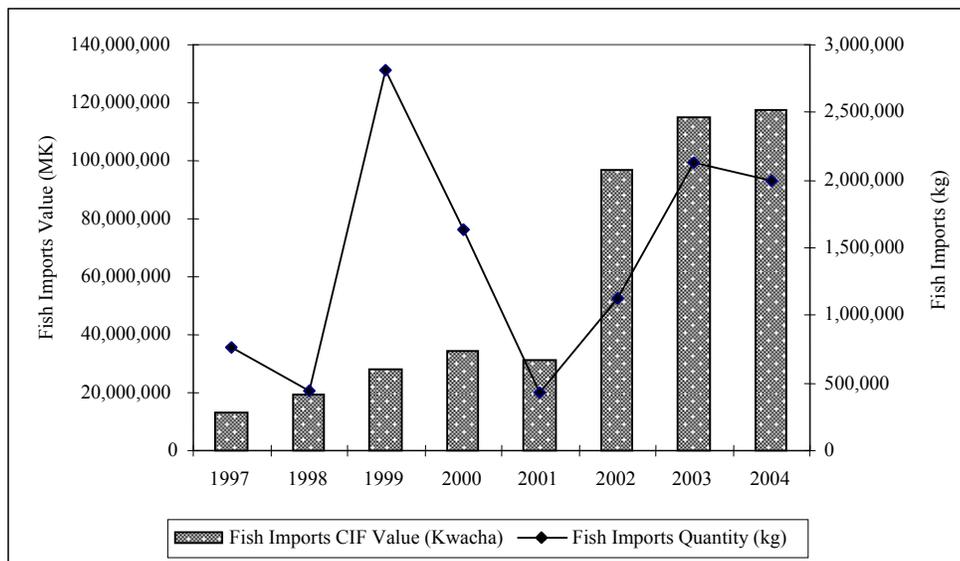


Figure 4: Graph illustrates the value (MK) and quantity (kg) of fish imports for Malawi from 1997 to 2004

Source: NSO (2005); Njaya (2001)

Figure 4 shows that from the same period (1997 to 2005), Malawi earned the highest fish export value of about MK 160 million (about US\$ 1.4 million<sup>6</sup>) in 2004. On the other hand, the value of fish imports has steadily increased with the highest value of MK 117 million (about US\$ 1 million) being recorded in 2005. Owing to the increased demand for fish in the country, the largest catch targets the domestic market with insignificant volumes destined for foreign markets.

The aquarium fish mainly targets Belgium, Denmark, France, Germany, Japan, Netherlands, Portugal, South Africa, Sweden, Switzerland, United Kingdom and the United States of America. Malawi exported 5,099 units of aquarium fish at a value of approximately MK 4 million in 1997 while in 1999 the fish exports amounted to 40,821 units at a value of MK 8 million. The country does not import aquarium fish but live fish for consumption. On imports, the country purchased 25,200 live units of fish in 1997 while records for 1999 show that 717

<sup>6</sup> Using exchange rate of approximately 1US\$ to MK114 that prevailed around 1999-2003

units of fish at a value of only MK 51,652 were in bound (NSO, 2002; Njaya, 2002).

### 1.3 Lake Chilwa fishery

#### 1.3.1 Location and size

Lake Chilwa lies at 624m above sea level between 35°45' E and 15°15' S in the centre of the low-lying Chilwa-Phalombe plain in the southern part of Malawi (FAO, 1966; Ratcliffe, 1971a). The lake is the second largest in Malawi and the twelfth in Africa (Banda, Bulirani, Kachinjika & Njaya, 1997). Lake Chilwa is shallow without any outlet and has a maximum depth of 6m at peak water level. Landes & Otte (1983) report that a reed belt of about 15km wide surrounds Lake Chilwa to the north and 1-2km wide on the north-eastern side (Figure 5).

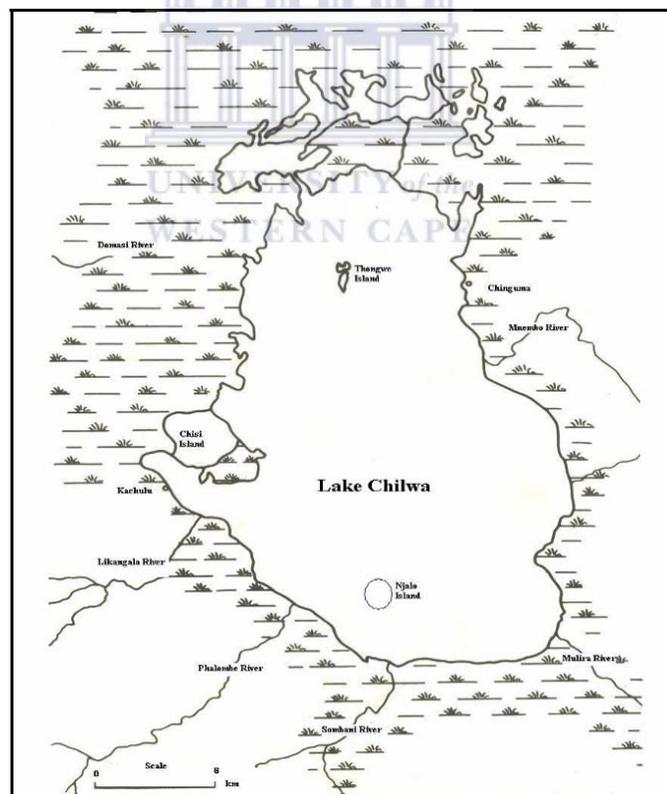


Figure 5: Lake Chilwa and its extensive associated marshes and floodplain  
*Source:* Kalk et al. (1979)

The size of the lake varies according to seasons but its maximum length is 38.5 km while its maximum width is 27 km (FAO, 1966). In years with high water levels, the open water increases to 1,054 km<sup>2</sup>, *Typha* swamp to 640 km<sup>2</sup>, marshy area of 163 km<sup>2</sup> and the flood plain grassland is around 220 km<sup>2</sup>. In low water level conditions the open water recedes to 678 km<sup>2</sup>, the *Typha* swamp is 699 km<sup>2</sup>, marshy area of 300 km<sup>2</sup> and the flood plain grassland of 430 km<sup>2</sup>, giving a total of 2,077 km<sup>2</sup> and 2,107 km<sup>2</sup> respectively. The cultivated area is approximately 233 km<sup>2</sup>, with 114 km<sup>2</sup> under cultivated rice, irrigated rice (29 km<sup>2</sup>) and *dimba* (90 km<sup>2</sup>). The Lake Chilwa catchment area is 8,349 km<sup>2</sup> with 5,669 km<sup>2</sup> (68%) lying on the Malawian side and about 2,680 km<sup>2</sup> (32%) on the Mozambican side (GoM, 1999; GoM, 2001).

### **1.3.2 Water level changes**

Figure 6 illustrates changes of water levels for Lake Chilwa. The water level changes take two forms: on a seasonal basis due to changes in water levels with when some parts of the lake dry up and on a periodic basis when the lake dries up completely after some years (approximately 6 years) of a minor recession and 25 years for a major one (Lancaster, 1979).

The Scottish explorer, David Livingstone, was the first to provide information through observations about Lake Chilwa water level changes (Table 1). Since 1879, Lake Chilwa has dried up completely on six occasions, partially dried up eight times and flooded six times.

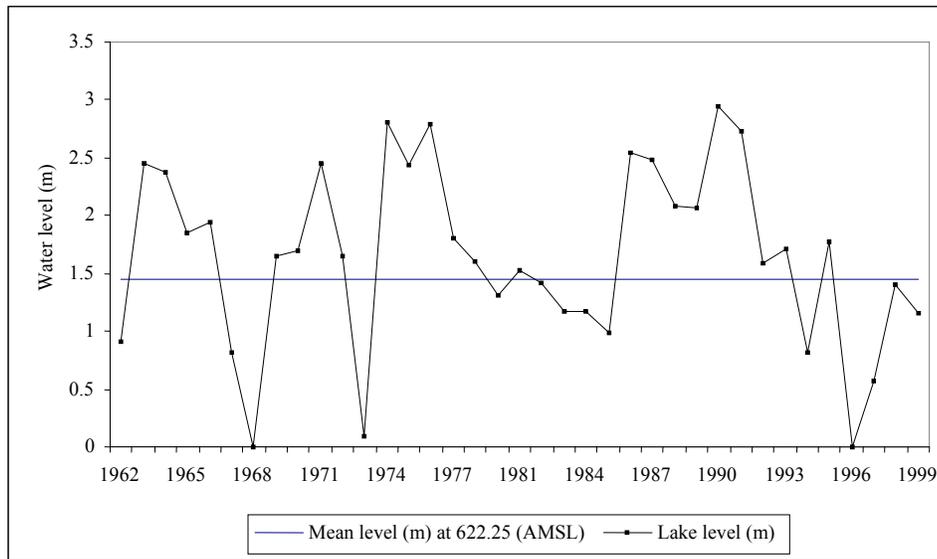


Figure 6: Recorded water level changes for Lake Chilwa from 1962 to 1999

Source: GoM (2000b)

Records show that reduced catches and fish mortalities occurred during the minor and moderate severe recessions of 1879, 1900, 1914-15, 1922, 1931-32, 1934, 1954, 1960-61, 1967, 1973 and 1995 (Kalk et al., 1979; Njaya et al., 1996; GoM, 2000b). A 25-year record of low lake levels occurs, giving a clearer picture of periodicity of the behaviour of the lake (Agnew & Chipeta, 1979).

Table 1: Historical and observed water level changes in Lake Chilwa from 1859 to 1995

Year	High	Low	Very low (dry)
1859	Livingstone (observation)		
1860	O'Neill (1884)		
1870	Buchanan (1893)		
1879			Buchanan, 1893
1880		O'Neill 1884	
1888	Drummond, (1902)		
1900			Chipeta, (1972); Duff
1913-1915		-----	Chipeta, 1972 -----
1920-1922		-----	Garson and Campbell-Smith
Late 1930s	Burgess ( <i>pers. comm.</i> )		
1943		Chipeta (1972)	
1949		Chipeta (1972)	
1960-1961		Kalk (1979)	
1967-1968			Kalk (1979)
1973		Kalk (1979)	
1976	Kalk (1979)		
1995			Njaya (1996)

Source: Kalk et al. (1979) and Njaya (1996)

### 1.3.3 Temperature, evapotranspiration and humidity

With high temperature ranging from 20-39° C, there is water loss through evaporation (GoM, 1999). From 1985-1992, evaporation averaged 1,779 mm at Domasi Rice Scheme while Makoka Agricultural Research Station recorded 1,670 mm in 1999 (Figure 7). The two stations lie within the catchment area of Lake Chilwa. Water balance equation for Lake Chilwa basin shows an excessive loss of water resources through evapotranspiration processes as evidenced by the large value of the  $E_t$  parameter of 1,670 mm, which exceeds the total precipitation hence Chavula (2000:30) concludes:

It is not surprising that surface water bodies within the catchment area including Lake Chilwa itself are vulnerable to drying up during prolonged drought spells, as the rate of water loss is very high.

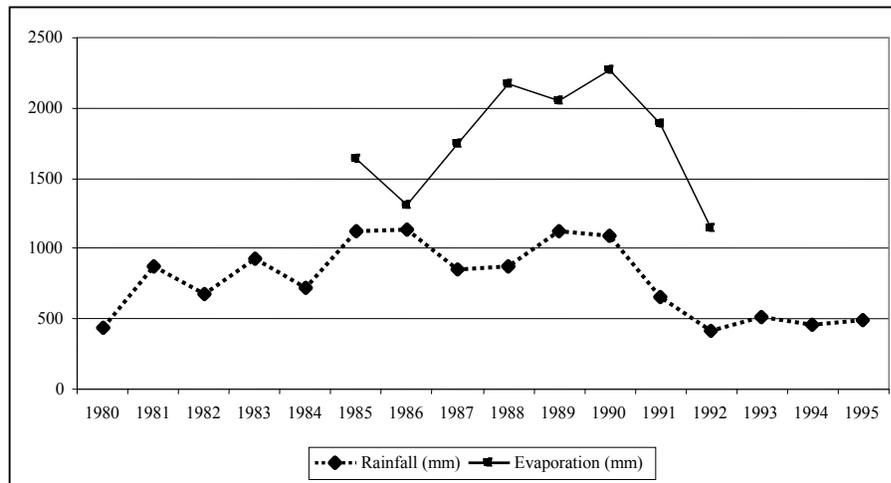


Figure 7: Rainfall (mm) and evaporation (mm) recorded at Domasi Rice Scheme from 1980 to 1995 and 1985 to 1992 respectively

Source: Njaya, Chiotha & Kabwazi (1996)

Humidity for the catchment area is 71% on average and has sunshine hours of an average of 7.1 while radiation is 4.4 mm per day on average and depending on seasons, wind speed of about 158 km/day on average (GoM, 1999). Its water budget depends on rainfall, water inflow from rivers and evaporation. The long-term cyclic changes of water levels of 2-3m result in a partial or complete drying up of the lake (Landes & Otte, 1983).

#### 1.3.4 Rainfall

The annual rainfall for the Lake Chilwa catchment is around 1,000 to 1,200 mm per year (Nicholson, 1998). The rainfall results from the Tropical Cyclones and Inter Tropical Convergence Zone (ITCZ), which normally occur between November and April. The Tropical Cyclones cause rainfall in the catchment area as they cross the Mozambique Channel into Malawi. When the cyclone crosses the channel and moves over land there is a widespread heavy rainfall over the Lake Chilwa catchment. Consequently, the catchment experiences heavy down pours that cause excessive flooding and disasters.

When both the ITCZ and Tropical Cyclones are concurrently overhead in the catchment area, flood disasters become a common occurrence because of the resultant heavy rainfall. The temperature regime is tropical continental and changes in its spatial and temporal distribution mainly due to highlands and nearness of Lake Malawi. The country's latitudinal location exposes it to the influence of extra-tropical systems that move eastwards around the southern African coast. This results in moist air influxes from the southern latitudes that periodically cause ground and air frost in the cold season from May-August (Chavula, 1999).

### **1.3.5 Demography**

The 2008 population census shows that the catchment area has approximately 1.6 million people with a density of 321 people km<sup>2</sup> registering an increase of approximately 50% from that of 1998. The catchment areas of Lake Chilwa recorded population of 593,167 for Zomba, 290,946 for Chiradzulu, 488,996 for Machinga and 313,227 for Phalombe (NSO, 2008). The population figures indicate that the Lake Chilwa catchment is one of the most densely populated areas of Malawi.

### **1.3.6 Description of dominant fish species**

Lake Chilwa harbours 27 fish species, but only three (the small minnow, *B. paludinosus*, the African catfish, *Clarias gariepinus*, and two tilapiine species, *O. chilwae* and *Tilapia rendalli*) are of commercial importance (Kalk et al., 1979). The valuable commercial species have high fecundity levels, reproducing at a relatively early age can persist in the swamp, lagoon and streams as well as in the open lake, have broad diets with considerable overlap and display opportunistic feeding behaviour (Moss, 1979).

The maximum size of *B. paludinosus* (*Matemba*) with high fecundity (average of 500 eggs per female) is 12 cm but they mature at 5cm (Banda et al., 1997). The highest spawning peak of the *Barbus* species is from September to December (Howard-Williams, Furse, Schulten-Senden, Bourn & Lenton, 1972). There is a

fall in catches of *B. paludinosus* from September to February in the open waters probably due to spawning that occurs in rivers (Furse, 1979).

The endemic cichlid subspecies of Lake Chilwa, *Oreochromis shiranus chilwae* (Makumba) grows to a maximum of 15 cm (Msiska, 1991). The fecundity of the cichlid is 200 eggs per female (Banda et al., 1997). The fish spawns in surrounding pools, springs, and lagoons and has an extended breeding season from September to May. *O. shiranus* prefers to breed in shallow waters Furse et al. (1979). The fish species have two main spawning periods in an extended breeding that are suitable for the fluctuating environment. *O. shiranus* is more associated with the open water than *Barbus* and *Clarias* species, which move into the swamps to breed. Moss (1979) observes that *O. shiranus chilwae* has relatively lower resistance as shown in the delayed recovery of its populations after recessions.

The Lake Chilwa catfish, *Clarias gariepinus* (Mlamba) is the only fish species that is smaller than other catfishes (Banda et al., 1997). Fecundity of *C. gariepinus* is high with 180,000 eggs per female for each breeding season. The unsexed *C. gariepinus* in Lake Chilwa matures earlier at 18.5 cm than the female ones from other lakes. The female *C. gariepinus* from Lake Kariba, Lake Tana and reservoirs in Burkina Faso matures at 34.0, 30.5cm and 37.5cm, respectively (Teugels, 1986). Spawning of *C. gariepinus* usually begins in September and continues during the rainy season in flooded delta areas and return to the river or the lake soon afterwards (Furse, Kirk, Morgan & Tweddle, 1979).

### 1.3.7 Changes in fishers, craft and gear types

#### 1.3.7.1 Fishers

The fishery is predominantly artisanal<sup>7</sup>. Commercial fishing operations using trawlers took place in the 1970s and 1980s. However, the fishing operations were unsuccessful mainly due to high unstable lake levels, poor infrastructure and lack of effective marketing strategies.

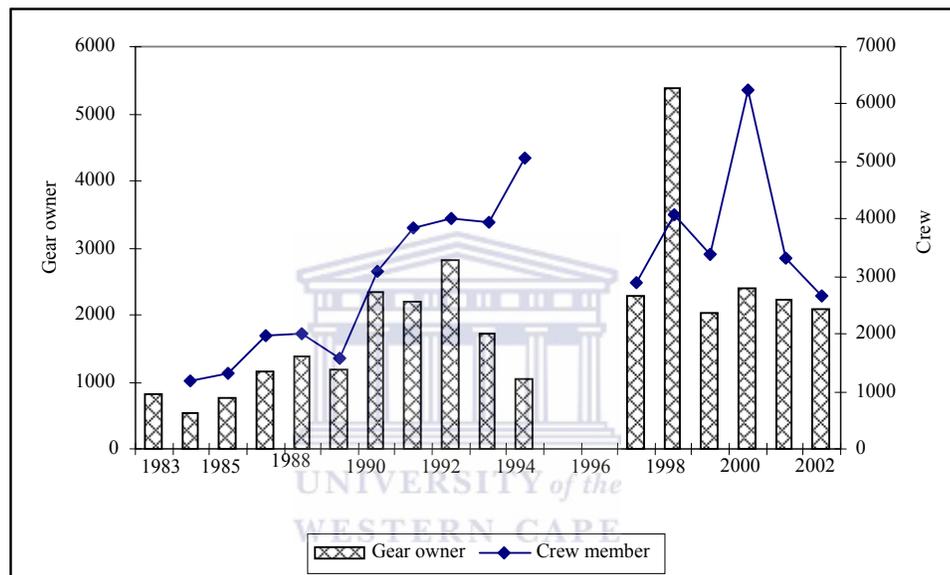


Figure 8: Trends in counts of fishers from 1983 to 2002

Source: GoM (2002a)

Since the 1995 recession, the highest recorded numbers of gear owners and crew were 2,406 and 6,250, respectively recorded in 1998 (Figure 8). However, the numbers decreased to about 2,400 crew and 2,700 gear owners in 2002 (GoM, 2005) mainly due to migration of fishers. Schuijt (1999) estimated that Lake

<sup>7</sup> In this study, I use the terms “artisanal” or “small-scale” fishery interchangeably by referring to the nature of the fishing gears and types of craft used. The definition may not apply to other lakes in Malawi or elsewhere. On fishing gears, fish trap, gillnet and long lines are artisanal in nature while *Matemba* seine nets, *Nkacha* and trawl nets are commercial. On craft type, dug out canoes are artisanal while plank boats are commercial.

Chilwa had 3,720 fish traders, 17 boat builders and a considerable number of people involved in other ancillary industries.

### 1.3.7.2 Craft

Transportation on the lake mainly involves use of polled dugout canoes and a few planked boats (Landes & Otte, 1983). The number of dugout and planked boats increased from 1990 with counts of 350 and 300 respectively (Figure 9). After the 1995 recession, the number of dugout canoes was about 4,600 while planked boats were 600 (GoM, 2005). The increase in craft was mainly due to increased number of fishers, migration of seine fishers from Lake Malombe, replacement of old dugout canoes, which became unsafe because of cracks that developed as a result of exposure to sun heat.

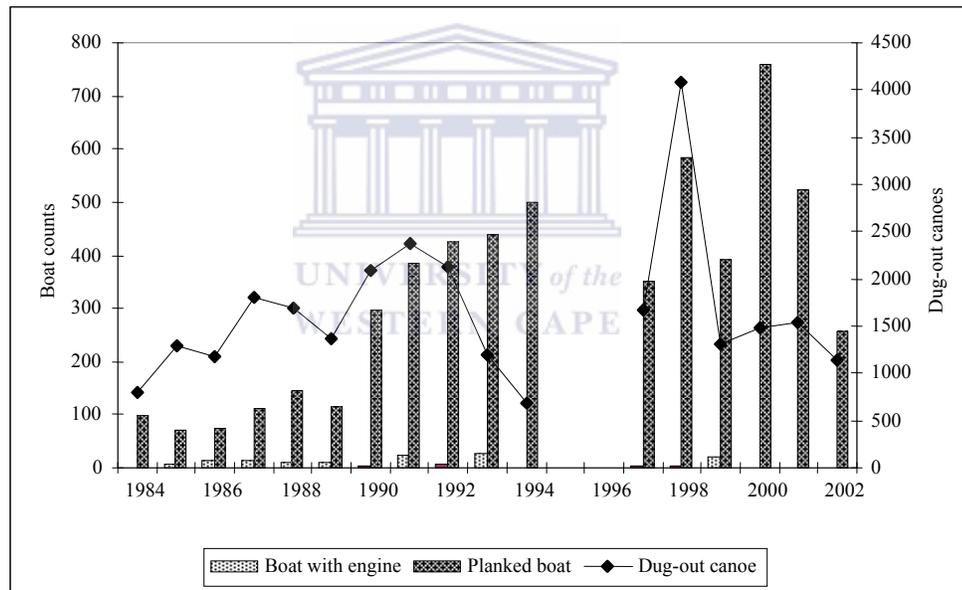


Figure 9: Trends in counts of craft from 1984 to 2002

By 2002, the numbers of dugout canoes and planked boats decreased to 1,100 and 1,950 respectively in response to declining catches attributed to the introduced *Usodzi wa Mululu* fishing method that involved use of introduced non-selective ‘gauze’ wire seines especially since early 2000s. The fishing method requires clearing of aquatic vegetation, thereby increasing vulnerability of the fish to exploitation. Of particular importance is the change in craft type from dugout to

planked boats, which reflects investment opportunities existing in the fishery especially in exploiting offshore resources and scarcity of suitable trees for dugout canoes due to deforestation within the Lake Chilwa catchment area.

#### 1.3.7.3 Fishing gear

Lake Chilwa fishers use fish traps, gillnets, seine nets and long lines. However, fish traps are common because they are less expensive as they are made of local materials compared to other gear types that need synthetic materials. Gillnets are also cheaper than seines. Two types of seines exist in Lake Chilwa. First, *Matemba* seines that local Lake Chilwa fishers use are adapted to the ecological conditions of the lake. Second, *Nkach*a seines that the Lake Malombe in-migrants operate in the lake. Fish traps and seines mainly catch *Matemba* while gillnets and long lines target large fish species such as *Makumba* and *Mlamba*.

Since 1983, the highest number of gillnets was about 9,000 counted in 1988, 2000 and 2002. The largest number of seines was 738 registered in 1998 after the 1995/96 recession while use of fish traps was highest (33,000) in 1992 before the recession. Fishers operating long lines are common in the southern part of the lake, which is deeper. Pair trawling experiments conducted between 1970 and 1971 (Ratcliffe, 1971b) indicate that there is great potential in exploitation of the fisheries resources in the lake but the challenge is on the variability of the lake levels.

### 1.3.8 Fish production

Between 1976 and 2003, the annual fish production of Lake Chilwa was 13,000 tonnes on average with production exceeding 25,000 tonnes in 1979 and 1990 (Figure 10). During the recession period (1995-96), fishing operations were suspended or reduced to a lower scale in river mouths.

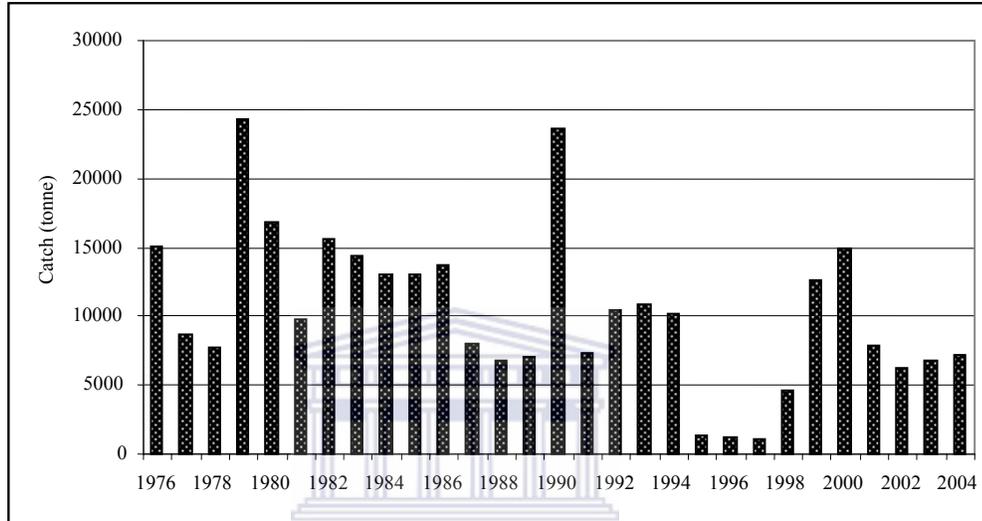


Figure 10: Estimated catch (tonnes) for Lake Chilwa from 1962 to 2004

Source: GoM (2005)

Contribution of fish landings from the lake to the national production levels varies on an annual basis with an average of 18% from 1993 to 2003 (excluding 1995 and 1996 when the lake dried up). After the previous recession, the highest contribution of fish supply recorded in 1999 was 27% (Figure 11).

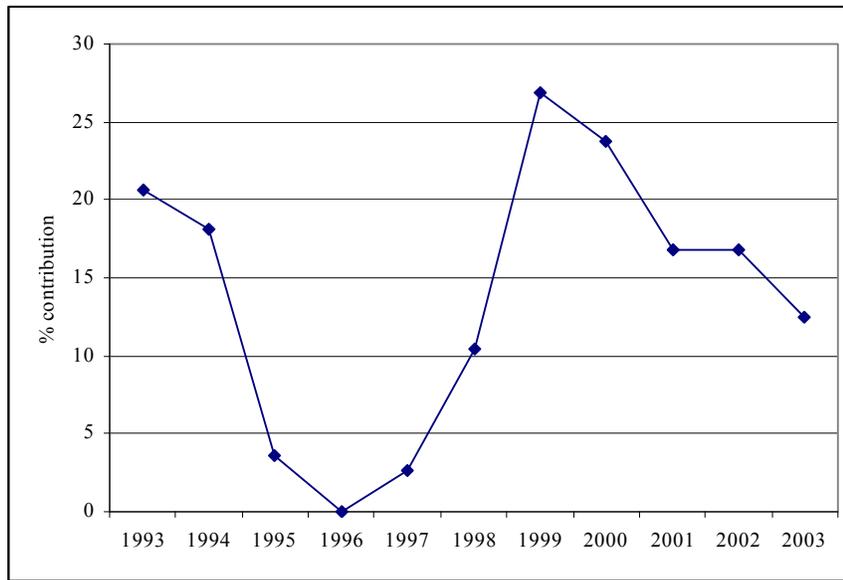


Figure 11: Estimated Lake Chilwa catch contribution to national fish production from 1993 to 2003

Source: GoM (2005)

Based on water level and fishery changes, Lake Chilwa fish production follows three distinct phases (Kalk et al., 1979; Njaya, 2002). Firstly, fish production in the *normal* fishing phase, which occurs in between two to three years before or after major recessions. During this time, water level changes are on a seasonal basis. Secondly, the *drying phase*, which is normally the period at least two years before a major recession. Thirdly, the *refilling phase* which takes place after two years from a major recession.

### 1.3.9 Institutional framework

The importance of Lake Chilwa as a commercial fishery dates back to the 1940s, although earlier reports show that fish products were traded under a barter system in the 1800s after the arrival of the Nyanja, Yao and Portuguese (GoM, 1962; Kalk et al., 1979; Vaughan, 1982). Malawi exported dried *Matemba*, to neighbouring Zimbabwe and Zambia in the 1980s although larger proportions targeted domestic markets (Salama & Jones, 1982). The other commercially

valuable fish species, Makumba and Mlamba, are usually destined for local markets.

In terms of the fishery value, Schuijt (1999) estimated an annual value of US\$ 17 million of fishing from Lake Chilwa while Njaya (2002) estimated a seine fishery<sup>8</sup> value of about US\$ 8 million per year during a 'normal' fishing year. The substantial value provides livelihoods of over 9,000 households (fishers and crew). With individuals along the chain, including fish processors and traders, the figure can double to over 1.4 million, which is about one-tenth of the population. Therefore, Lake Chilwa is important for sustaining the livelihoods of many people in Malawi, especially in between recessions.

Owing to the commercial importance of the Lake Chilwa fishery, the British Colonial Office formulated regulations to govern its exploitation levels in the 1930s. The Office introduced the first Ordinance for Wildlife and Tsetse. The Government of Malawi (GoM) established the Department of Fisheries (DoF) through an Act of parliament in 1964 to provide a mandate for proper development and management of the fisheries on the lake.

DoF has since the 1960s expanded in terms of functions from data collection and extension to policy and planning and adopted the participatory fisheries management in the 1990s. Currently, it has 322 technical and professional staff. However, the recent expansion of its activities to include fish farming in almost all districts of Malawi and a high staff turnover have negatively affected operations of the department in terms of its delivery of services.

The DoF revised the fisheries policy and legislation between 1997 and 2001. The National Fisheries and Aquaculture Policy (NFAP) that GoM approved in 2001, provides an integrated framework for fisheries and aquaculture development in Malawi. The policy goal aims at achieving optimal exploitation and utilisation of

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<sup>8</sup> On Lake Chilwa, seines include the traditional *Matemba* seines and the open water *nkacha* originally from Lake Malombe.

the fisheries of Malawi's water bodies and promotion of investment in both capture and culture fisheries. Its objective is to manage the fisheries resources for sustainable utilisation, protection, and conservation of aquatic biodiversity. The Malawi Growth and Development Strategy (MGDS) guide implementation of activities of the DoF. The outstanding feature lies on the sharing of responsibility for fish resource management between DoF and the resource users in a co-management or as popularly termed in Malawi, the participatory fisheries management (PFM) arrangement.

The Fisheries Conservation and Management Act (FCMA) of 1997 contains articles governing the management and utilisation of the fisheries resources. The Act has a section (Part III) on local community participation in fisheries conservation and management and provides penalties for any violation of the regulations.

#### **1.4 Significance of the study**

The thesis contributes to the understanding of the patterns and frequency of fisher migrations based on gear type use. It also examines the contribution of household strategies to the recovery and resilience of the fishery. Finally, the thesis establishes the dynamic nature of management systems associated with the water level changes and transformation of the political economy. The information will provide a meaningful basis for a proper policy review aimed at poverty reduction among the Chilwa basin households through optimal utilisation of the fisheries resources.

At national level, the thesis will provide a basis for a poverty reduction policy among lakeshore based communities. This will contribute to the implementation of the Malawi Growth and Development Strategy (MGDS) and the attainment of the United Nations Millennium Development Goals (MDGs) based on Goals 1, 4 and 7 that focus on eradication of poverty, hunger, reduced child mortality and environmental sustainability (Box 1).

**Box 1: Millennium Development Goals relevant to the thesis**

**Goal 1** focuses on eradication of extreme poverty and hunger.

Target 1: *Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.*

Target 2: *Halve, between 1990 and 2015, the proportion of people who suffer from hunger*

**Goal 4** provides information on reduced child mortality due to protein supply.

Target 5: *Reduce by two thirds, between 1990 and 2015, the under-five mortality rate*

**Goal 7** emphasises the need for environmental sustainability.

Target 9: *Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources*

Based on the background outlined above, the thesis contributes to the understanding of the impact of water level changes on fisher migration and co-management as household strategies within the Lake Chilwa basin. Of particular interest are the periodic and seasonal variations in water level changes that result in flooding and recessions thereby influencing changes in the household strategies.

Firstly, the thesis focuses on its contribution to the understanding of the frequency and patterns of fisher migrations within Lake Chilwa and between the lake and others. The current study specifically examines fisher migrations by gear type. Secondly, the thesis looks at the impact of water level changes on the co-management arrangement for Lake Chilwa. Being an ecosystem that exhibits floodplain and open waters the intriguing aspect is on the understanding of whether the type of co-management varies with any particular water level regime. Thirdly, by looking at the migration and co-management arrangement as household strategies, there is a need to identify conflicts that arise mainly in terms of resource access and power to authorise migrant fishers. With findings from this study, relevant authorities can develop a proper policy portfolio for improved livelihood strategies of the Lake Chilwa households.

## 1.5 Problem definition

Previous research studies conducted on Lake Chilwa were in most cases biologically oriented until recently when interest in social studies developed. The main research studies conducted on the lake started in the 1960s (Ratcliffe, 1971). The Department of Fisheries formerly called Department of Game, Fish and Tsetse fly Control funded a study on gillnet selectivity in 1960. The main findings of the research centred on 100 mm as the minimum size of *Makumba* (*Oreochromis shiranus chilwae*). Later on, the department conducted a trawling experiment to assess whether the fishery was biologically and economically viable for commercial exploitation. The experiment recommended trawling as a commercial fishing operation on the lake, but because of the variable nature of the ecosystem in terms of water level changes, the operations did not justify its economic sustainability.

Scientists from the University of Malawi conducted comprehensive research studies in the 1970s (Kalk et al., 1979). The research focused on biological and socio-economic dimensions of the fishery. A detailed publication of the results in 1979 by Margaret Kalk was one of the key deliverables of the research study. The major findings included the following: first, impacts of water level changes on the fish species and chemical and physical processes of the ecosystem. Second, biological aspects of the fisheries resources with Catfish (*Clarias gariepinus*) having biological characteristics that makes it to survive during recessions. Third, changes in the morphology of the lake, social change in terms of human settlement in relation to their dependence on fishing, trading and farming activities and lastly, fishery development programmes by indicating the need to allocate skilled fisheries extension agents around the lake and development of infrastructure like feeder roads for easy access to fishing areas.

The Department of Parks and Wildlife and the University of Malawi commissioned studies in 1996 that focused on social and biological issues. On the social issues, the study recommended involvement of the local community participation in natural resource management including birds and fish. The study

also found that the ecosystem harboured 153 species of resident and 30 species of palearctic (migratory) waterbirds, which led to the declaration of the Lake Chilwa wetland as a Ramsar<sup>9</sup> Site No 869 in 1997 (Ramsar Convention Bureau, 1999).

From 2001 to 2003, the World Fish Centre (WFC) and Innovative Fisheries Management (IFM) jointly coordinated a study on the Lake Chilwa co-management arrangement (Wilson, Ahmed, Delaney, Donda, Kapasa, Malasha, Muyangali, Njaya, Olesen, Poiosse & Raakjær-Nielsen, 2005). The study applied the institutional analysis framework that examined contextual variables and outcomes of the co-management arrangement. The key finding of the study was that the Lake Chilwa co-management was largely consultative.

As part of the Sustainable Livelihood Programme (SLP), the Department for International Development (DFID) funded studies on the diversification of livelihoods in two villages along Lake Chilwa (Allison & Mvula 2002). Migration of the fishers was one of the focused areas. The study highlighted importance of migration and that any regulatory mechanism that focused on migration of fishers was counterproductive to their livelihood.

None of the previous research work links the household strategies (migration and co-management) in response to water level changes by gear type. It is difficult to understand how the households adapt to the water level changes. While previous livelihood studies (Allison & Mvula, 2002) touched on vulnerability aspects, the results were just generalised.

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<sup>9</sup> The Convention on Wetlands of International Importance, which is referred to as the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention came into force for Malawi on 14 March 1997. Malawi presently has one site, Lake Chilwa designated as a Wetland of International Importance, with a surface area of 224,800 hectares. The lake supports internationally important numbers of 153 species of resident and 30 species of palearctic (migratory) waterbirds. Apart from human settlements, activities include fishing, agriculture (rice and dimba cultivation), and livestock grazing.

There is no documentation on the impact of changes in the management system of Lake Chilwa from pre-colonial rule to Malawi's independence and multiparty democratic era on the role of traditional leaders. Specifically, while previous qualitative studies have shown limited support of Traditional Authorities (TAs) towards Beach Village Committees (BVCs) or Beach Village Sub-Committees (BVSC)<sup>10</sup>, there has been limited quantitative assessment on the attitude of the households.

With support from Malawi Germany Fisheries and Aquaculture Development Project (MAGFAD) and Danish International Development Agency (DANIDA), local leaders formulated management measures for Lake Chilwa in a co-management arrangement. This triggered a debate by some researchers with arguments against the introduction of the co-management approach. Sarch & Allison (2000) argued that co-management could be a basis for establishment of user and access rights and hence restrict other resource users. This is mainly in cases where co-management focuses on restricting migration of certain fishers from other lakes to operate in Lake Chilwa or vice versa. The researchers consider migration as a livelihood strategy, and hence a need for government to support this.

Linked to the same issue of migration, Landes & Otte (1983:12) observe that migration has been common on Lake Chilwa including "at periods of stable water level". While this is the case, there has never been any empirical evidence on the magnitude of the migration, its pattern and in what context it occurs. It is difficult to know which fishers by gear type do migrate in terms of seasonality and periodicity. It is also important to have information on the role of other livelihood strategies within the Chilwa basin considering the lake level changes that at times result in exposing fertile land for crop farming.

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<sup>10</sup> A Beach Village Committee (BVC) is composed of people engaged in fishing-related activities (fishing, processing and trading) at a particular beach while a Beach Village Sub-Committee (BVSC) is the elected body of 10-12 members representing interests of the BVC. This is a definition from the Fisheries Conservation and Management Act (GoM 1997), which I use in the thesis.

Lowore & Lowore (1999) observe that there was lack of justifiable reasons for introducing management measures for Lake Chilwa within the fabric of co-management framework. Of particular criticism was the involvement of traditional leaders as key participants in the co-management process. The arguments centre on the fact the local leaders formulated the fishing rules without any scientific basis.

Based on the forgoing arguments and observations, the thesis aims at contributing to the understanding of changes in management systems, migration and co-management. Firstly, there is need to understand how Chilwa households adapt to changes in water levels in terms of the strategies they apply to sustain their livelihoods. Secondly, it is necessary to describe the nature of migration of fishers by gear type for proper policy formulation; and finally assess perception of fishers, BVCs and households how they view support from their Traditional Authorities and other partners in the co-management arrangement for their livelihood strategies.

## **1.6 Research objectives**

Following the issues highlighted above (Section 1.3), the primary objective of the research study is to investigate social and institutional responses of the fishing households to the water level fluctuations of Lake Chilwa. Its specific objectives are to:

- (a) study fishing-farming households strategies in response to the seasonal and periodic lake level variability
- (b) analyse magnitude and pattern of seasonal and periodic migration of fishers and associated conflicts
- (c) assess Lake Chilwa co-management arrangement in terms of participation, transparency and accountability.

## **1.7 Research questions**

Linked to the objectives above and the conceptual framework outlined in Chapter 3 (Figure 12), the following research questions form a basis of the thesis:

- (a) What is the impact of seasonal and periodic lake level changes on the livelihoods of the Lake Chilwa fishing households?
- (b) How do the Lake Chilwa basin households respond to the variable lake levels?
- (c) What is the extent and pattern of the fisher migrations in Lake Chilwa?
- (d) What is the nature of conflicts that exist between resident and in-migrant resource users?
- (e) Are key actors in the Lake Chilwa co-management transparent and accountable?
- (f) Do the BVCs get support from the Traditional Authorities?

Chapter 3 that outlines the conceptual and conceptual frameworks provides details of the research questions to guide the study.

## **1.8 Organisation of the thesis**

The thesis is composed of nine chapters. Chapter 1 presents background to the study. The chapter outlines the importance of the fisheries sector and industry to Malawi's economy. Additionally, it focuses on the socio-economic contribution that Lake Chilwa fisheries make to the local population and Malawi as a whole. Finally, the chapter describes the study site and outlines the research problem, objectives and rationale.

Chapter 2 contains a review of concepts and paradigms related to management of small-scale fisheries in a fluctuating environment. Specifically, it contains definitions and objectives of fisheries management and presents problems of managing small-scale fisheries. Finally, the chapter looks at application of traditional knowledge in fish resource management.

Chapter 3 describes the research design and methodology and a conceptual framework as a guiding tool for this study. The chapter also outlines data analysis and limitations of the methodology in relation to data collection and analysis.

Chapters 4-6 present results of the study based on the research objectives, questions and conceptual framework. In Chapter 4, the thesis presents findings on the responses of the Lake Chilwa basin households to seasonal and periodic water level changes. The chapter also contains results on the migration of fishers in form of frequency and patterns for both intra- and inter-lake migration types. It further gives detailed results on the migration of fishers in relation to seasonal and periodic water level changes. It also presents household strategies and adaptability.

Results on fisheries-related conflicts are in Chapter 5. The conflicts relate to cultural and ecological, technological and socio-economic contexts. It further outlines results on power and authority in terms of fishing gear ownership and operations.

Chapter 6 presents results on the assessment of the type of co-management practised on Lake Chilwa. The results are from the co-management attitude survey, which quantitatively analysed perceptions of support the local level community committees (BVCs), fishers and household heads get from the Traditional Authorities (TAs). It also looks at the support the District Assemblies (DAs) and non-governmental organisations (NGOs) and DoF give to the BVCs.

Chapter 7 discusses the results and draws key lessons from the study. Particular focus is on water level changes and livelihoods, migration in terms of frequency and patterns and tenure systems. The discussion also centres on the roles of traditional leaders in the co-management framework and the outcomes of co-management typology in form of partnership, transparency and accountability.

Finally, Chapter 8 concludes the study and presents proposed recommendations. It draws also issues on household strategies, migration, conflicts and co-management in terms of how effective the DoF and BVCs can formulate policies on the fluctuating Lake Chilwa ecosystem.



## CHAPTER 2

### A REVIEW OF LITERATURE ON FISHERIES MANAGEMENT

This Chapter reviews definitions and concepts of fisheries management. A major focus is on the objectives and problems of managing fisheries resources as common pool resources (CPRs), and then drawing attention to the theoretical basis of fisheries co-management and migration. The Chapter centres on the relationship between water level changes and household strategies that include migration, on one hand, and co-management on the other. It also reviews conflicts that emerge in the migration and co-management as shown in the conceptual framework outlined in Chapter 3.

There is a conceptual relationship between lake level changes and migration of fishers but without any empirical evidence. Therefore, a review of previous studies on migration and its linkage to lake level and fish stock changes is important. The review also centres on the applicability of conventional management measures in the fluctuating environments due to climatic influence that would lead to appropriate policy recommendations for optimal utilisation of the Lake Chilwa fisheries resources.

#### 2.1 Objectives of managing fisheries resources

Management of fisheries resources takes many forms and approaches depending on the type of fishery and its biological dimension and socio-economic importance. There is no clear and generally agreed definition of *fisheries management*. However, FAO (1997:7) adopted the following working definition:

The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives.

The most common elements of *fisheries management* include the setting of specific objectives to regulate the fishing effort and control use of the fisheries resources (Panayotou, 1982). A key function of a fisheries management institution is to formulate and implement rules and procedures whereby relevant authorities conduct the fishery in a sustainable manner to meet set objectives (FAO, 1997). In contrast to *fisheries management*, a *resource management regime* refers to “a structure of rights and duties characterizing the relationship of individuals to one another with respect to that particular environmental resource” (Bromley, 1991:22).

Over the past decades, there has been development of institutional arrangements that refer to the structure of rights and duties. The institutional arrangements aim to define a specific property regime that governs management of the commons. Bromley (1991) outlines institutional arrangements that include the state or centralised property regimes; private property regimes; common property regimes; and non-property regimes. Nevertheless, Ostrom (1990) argues that although management of the natural resources can be achieved through control by either a state or market, neither of the two can successfully lead to sustained long-term production levels of the natural resource. The argument implies that a combined control of the regimes is a commonly ideal situation.

Jentoft, McCay & Wilson (1997) observe that community-based natural resource governance regimes, to a greater or lesser extent, are associated with state property systems. As such, state actors set the margins for co-management regimes and define the level of participation of key partners, hence, the focus of this analysis on the state actors. It is also important to understand that in every co-management arrangement the level of participation and the characteristics of different partnerships are dynamic.

Regulation is the focus of many fisheries management regimes although biologists, economists and social scientists approach the issue from different perspectives. The biological proponents of regulating fishing effort indicate that

if the fisheries remained unregulated, over-fishing would occur (van der Burg, 2000). Successful management of fisheries resources demands a successful modelling. Waugh (1984) recommends the need to look at the abundance, size and age structure of the population, which determines the rate of growth of the population. The biological perspective is justified by looking at the harvesting of too many fish to allow adequate spawning, recruitment, and sustainability. However, from an economic perspective, the lack of property rights or other institutions are the main causes of over-fishing. The main element is the absence of exclusivity in the use of the resources (Winpenny, 1991).

Apart from the biological and economic perspectives, Wilson, Acheson, Metcalfe & Kleban (1994) regard fisheries management as a social problem. This is because decision-making processes need to be made at various levels including the resource users. Considering the open access nature of a fishery, there is a challenge to the achievement of an optimal level of resource exploitation (Hanna, 2003). Practically, it means that aspects of economic, social and biological orientation are significant for sustainable utilisation of the fisheries resources.

The basic objectives in managing a fishery are many and may include adequate supply of more food, improved living standards for a fisher and more employment opportunities (Bagenal, 1978). The management objectives are in three categories (Waugh, 1984). First, the maximum sustainable yield that focuses on sustainable yield in an equilibrium manner. Second, the maximum economic yield by measuring benefits in value terms and costs and finally, optimum yields whereby social issues are necessary.

Many developed and developing countries have been applying various management strategies since the 1950s. Ahmed & Delgado (2000: 227) states:

The dominance of open access prior to 1970s, combination of regulations with market-led --- incentives and stakeholder participation in fisheries management around 1980s and 1990s such as fishing rights systems that allocate private property limited entry including the introduction

of buy-back schemes and, lastly, modifications to rights of access --- have become popular in the developed countries.

In developing countries, fishing effort control through licensing has remained a key management strategy. For example, there is a requirement by law to license gear types (seines and gillnets) for the small-scale fishery sector and trawl nets for the commercial sector in Malawi. However, the licensing strategy seems to aim at revenue generation rather than resource management.

## **2.2 Fisheries management challenges**

With continued declining trends of capture fisheries resources in many water bodies across the globe, an array of reasons attribute to such a situation. The open-access nature of the fisheries resources has largely contributed to resource decline in many parts of the world. Nhantumbo, Norfolk & Pereira (2003) assert that the colonial introduction of property right systems in Africa that were incongruent with existing “traditional” arrangements, contributes to the current *de facto* open-access nature of the many resources. In addition, Berkes (1996) and Bromley (1991) for example, name the unclear institutional arrangements regarding property rights. Both scholars refer to the institutional arrangements as rules applied within a particular community to regulate access to the resources, amount allowed for exploitation, when this can take place and who has powers to enforce these rules.

Failure to exclude outsiders (people not belonging to community that claims to “own” the resource) from accessing a fishery is a continuous problem for local resource users. Jentoft, McCay & Wilson (1997) associate the problem of outsiders’ intrusion to the lack of clear property rights. The situation is aggravated when governments fail to support local communities to sanction illegal fishers. This can be due lack of resources. However, the people accessing the resources with destructive fishing methods are usually politically more powerful (Knox & Meinzen-Dick, 2001).

Different fisheries models need to regulate fishing effort, which exist in many countries. However, the models fail to recognize the variability nature of small-scale fisheries such as Lake Chilwa, which seasonally fluctuates and periodically dries up. Sarch & Allison, (2000) observe that many small-scale fisheries in Africa play a significant role in rural economies through creation of employment opportunities, food security and livelihoods. However, they argue that despite the variability nature of some of the ecosystems, central management authorities continue to apply the conventional measures that have little effect on the sustainability of the fisheries resources.

Winpenny (1991:10) points out that “fisheries are highly prone to natural variability in their environment, in ways which can be both complex and unpredictable, and may interact with human interventions to produce serious consequences”. However, the rapid responses of many fresh water fish stocks to fluctuating environmental conditions challenge the accurate assessments of the fish stocks. Breuil (1997) also states that the estimated fish production from several lakes in Africa is not reliable. The main reasons include varied physical environment; the unreliability of catch data methods; the high fishing levels in the major fisheries including large lakes and floodplains and the technology levels (Sverdrup-Jensen, 1999).

Fish stocks in many inland waters of Africa fluctuate considerably. The fish stock fluctuations are in most cases climate-driven and cannot be stabilised by any conventional measures. The situation is complicated in cases where among other factors, the ecological systems experience prolonged drought conditions (Lae, 1997; Sarch & Allison, 2000). Conway, Allison, Felstead & Goulden (2005) note that rainfall variability and trends in climate factors such as temperature and wind speed impact on farming systems, thereby affecting the livelihood strategies of producers, particularly farmers who live around the shores of the major lakes, wetlands and river flood plains. This means that the rural population that are dependent on both fishing and farming become vulnerable to climate changes.

There is even a school of thought that climate variability is a major factor in catch declines around the southern African region apart from overfishing, habitat degradation and others (Jul-Larsen et al., 2003). They recommend applying the conventional measures with caution mostly in lakes that exhibit high responses to climatic influences with multi-species fisheries, especially in shallow and enclosed ecosystems such as Lake Chilwa. They further argue that there is little scope for any biological explanation to recommend effort control. Landes & Otte (1983:15) support this observation:

[The] main problem for the fishery itself is the unpredictable nature of Lake Chilwa. The seasonal and long-term cyclic changes of Lake Chilwa with its major recessions and periodic drying out influence all environmental parameters of the lake. This instability does not allow development of an appropriate fishery management system based on the productivity of the maximum sustainability yield (MSY).

Kolding (1994) indicates that there are significant correlations between catch per unit effort and mean water levels in an artisanal offshore *Kapenta* experiment on Lake Kariba and *Matemba* on Lake Chilwa, respectively. Furse et al. (1979) also observe that yields and species compositions in Lake Chilwa varied with the lake levels. Based on the water level changes, they argue that due to the high regenerative capacity of Lake Chilwa, there is no justification in setting up management measures, as the fishery recovers naturally after a recession. Jul-Larsen, Kolding, Overå, Raakjær Nielsen & van Zwieten (2003), also caution against effort regulation in small and medium water bodies such as Lakes Chilwa, Malombe, Chiuta, Mweru and Kariba. With such research findings, management paradigms to regulate exploitation of the fisheries resources in water bodies need a concrete biological basis and other considerations.

Climatic influence has also been associated with fish catch fluctuations due to occurrence of flooding and recessions. Any increase in temperature due to climate change would result in an increase in 'the rate of evaporation, resulting in greater water loss from Lake Chilwa (GoM, 2001:12). Goulden (2005:1) also links climate change with sustainable livelihoods in fluctuating environments:

The impacts of climate variability can be particularly severe in communities that are highly dependent on natural resources for their livelihoods and also experience the impacts of extreme climate events such as floods and droughts as well as other sources of stress to their livelihoods such as disease, conflict and increased population pressure.

Sverdrup-Jensen (1999) observes that the rapid responses of many fresh water fish stocks to fluctuating environmental conditions obscure an accurate assessment of the resource situation. Sarch & Allison (2000) argue that fish stocks in many of Africa's inland waters fluctuate considerably, and that these fluctuations are climate driven and cannot be stabilized by conventional measures. Lae (1997) indicates that among other factors, the appearance of an extended drought period greatly affects African ecological systems.

The relationship between potential and actual production in Africa's inland waters was not sufficient as a basis for definite development policies mainly because of the following reasons: First, the unreliability of potential and actual fish production estimates in a varied and often changing physical environment. Second, the unreliability of the collected data on fish landings collected in various fishing areas. Third, the high fishing levels in the major fisheries (large lakes and floodplains), and lastly, the level of technology (Breuil, 1997). Therefore, it is necessary to keep records of water level changes and other parameters to correlate them with catch data in long-term data series for meaningful interpretation of the fluctuations.

### **2.3 Theoretical basis of fisheries co-management**

Since the 1990s, many scholars and practitioners have pursued a debate on institutional arrangements and governance reforms mainly sparked by the decline in small-scale fish resources (FAO, 1993; Bell & Donda, 1993; Sowman, Beaumont, Bergh, Maharaj & K. Salo, 1998; Hachongela, Jackson, Malasha I & Sen, 1998; Lopes, Pousse, Wilson, Kromer, Manuel, Cululo & Pinto, 1998; Geheb & Sarch, 2002). In the discussions, the open access and common property nature of the resources feature highly as reasons for the decline of the resources.

In response, governments and other agencies have introduced fisheries co-management arrangements in several African countries.

For example, Malawi's Department of Fisheries (DoF) initiated the participatory fisheries management programmes on Lakes Malombe, Chilwa, and Chiuta between 1993 and 1995 (Bell & Donda, 1993; Hara, 1996; Njaya, 2002). Other examples in the region include Zambia and Zimbabwe, where co-management arrangements have been in practice on Lake Kariba since the mid-1990s (Hachongela et al., 1998; Malasha, 2003), and Mozambique and South Africa in selected areas along the coast (Lopes et al., 1998; Sowman et al., 1998). Community participation in decision-making processes regarding resource monitoring and control through formulation and enforcement of fisheries regulations is a key element in these arrangements. Nonetheless, the state remains an important actor in the creation of an enabling environment for community participation.

In fisheries management, the social scientists consider community based or co-management arrangements as an alternative strategy due to failure of the centralised or conventional fisheries management regime. Jentoft & McCay (1995) note that fisheries managers pursue multiple goals, as a major focus cannot be only on biological terms but also on the resource users. This entails the resource users' organisational and rule-making arrangements. Berkes (1996) argues that the decline of fisheries in many cases is mainly because of the open-access nature of the fisheries, which in many cases the colonial masters or centralised authorities introduced. He recommends that there is need to consider traditional institutions and practices.

Many recommendations regarding sustainable common pool resource (CPR) governance include some allusion to dealing with the unclear property rights regime. Several of those dealing with CPR property rights regimes do so in direct or indirect reaction to Hardin (1968), who in his description and solution of the tragedy of the commons limited himself to either private or state property. The

view sidelines the capacity of the community to self-regulate the exploitation of the common pool resources (Jentoft, 2000; Ostrom, 1990).

The idea of active participation of local communities in development and management is not a new idea as it has been part of the development process in certain parts of the world since 1960s (Pomeroy, 2003a). Community participation refers to an active involvement of individuals or groups in an activity (Campbell & Townsley, 1996). If management is to succeed, fishers must support management efforts through formulation and enforcement of rules (Wilson & Dickie, 1995). However, the degree of user group involvement may differ from one country to another (Jentoft & McCay, 1995). The fisheries management ineffectiveness resulting in overexploitation of the stocks justifies the participatory management, as has been the case with Lake Malombe. In a situation where an elite group or politically powerful individuals attempt to access the resources, the local community should seek support from the government (Knox & Meinzen-Dick, 2001). The aim is to secure protection of the rights of the community or to institute sanctions to illegal fishers.

For an effective co-management, the user community should have *power* for them to make decisions. Miller, VeneKlasen, Reilly & Clark (2002) view *power* as an individual, collective and political force that can either undermine or empower citizens and their organizations. *Power* is a force that alternatively can facilitate, hasten or halt the process of change promoted through advocacy. *Power dynamics* exist within spaces in each place in various ways, with participatory activities relating to different aspects of empowerment. Participation can affect power relations in three ways including visible, hidden and invisible (VeneKlasen & Miller, 2002). This implies that in any co-management arrangement it is important to identify where power exist in terms of space and how the partners that mainly include the government and local community in the context of Malawi exercise their power.

Concepts that emerge from the debate about the problems with CPR governance include *co-management*, *governance*, and *decentralisation*. There is a relationship among the three concepts. Participation, transparency and accountability of key actors determine the type of co-management while power distribution among partners especially between government and user community is a dominant element in governance. In decentralisation, power transfer from centralised to local government structures is the main factor that shows how the user community are dependent on the government in its decision-making processes.

*Co-management* is a participatory form of fisheries management. It is an arrangement where user groups and government share the power and authority to manage a fisheries resource (Sen & Nielsen, 1996). Co-management is about the inclusive right to participate in making key decisions about how, when, where, how much, and by whom fishing will occur.

The concept of co-management focuses on the recognition that user groups have to be more actively involved in fisheries management if the regime is to be both effective and legitimate. It was one of the required conditions by donors in the 1990s natural resource management (Katerere & Moyo, 2001; Wolmer, 2003). Pomeroy (2003b) incorporates other stakeholders beside users and government, for example non-governmental organisations (NGOs) or civil society groups as well. The definition, of co-management, therefore becomes broader. Pinkerton (2003:73) asserts:

There is a tendency to talk about co-management as being an arrangement between the state and users or user groups. Users are sometimes conceptualised as individuals who may or may not be organized into fishing associations, and are sometimes spoken of as synonymous with civil society. Co-management is thus often seen in its broadest sense as a reform of promoting greater participatory democracy, against indirect electoral democracy. It is simply making things work more as they are ideally intended to work.

There has been a ‘traditional management’ of natural resources from time immemorial in Malawi. People have survived on farming, harvesting forestry

products and aquatic resources (MBERU, 2002). On Lake Chiuta the traditional fisheries management system successfully evolved into co-management in the 1990s (Dissi & Njaya, 1995). On central Lake Malawi (Mbenji Island) the traditional fisheries management is undergoing a similar evolution but its success may be different due to the nature of fishery. On the Island, the fishery is commercially oriented unlike on Lake Chiuta where it is largely small-scale.

A problem with the actual design and implementation of co-management arrangements is the fact that some users may get disproportionate power in decision-making process in the governance of the resources (Jentoft et al., 1997) Also, as with any form of collective action, 'free riding' may occur. This has led to the conceptualisation that smaller group sizes, and the relative homogeneity of communities are more conducive to collective action (Olson, 1965). In general, co-management seems to be more feasible for small-scale fisheries.

The core function of co-management should be a way for the state to use its authority and power to contain and channel fisheries conflicts in creative ways. This means using authority to make it possible for more open and culturally embedded communications to play an effective role in institutional decision-making processes. Co-management requires a clear commitment on the part of government to the sharing of power and authority with local government and community organizations (Wilson, 2003).

In many countries, government programmes and projects emphasise development of local organisations and autonomy to handle some aspects of fisheries management (Pomeroy & Viswanathan, 2003). Rarely, however, is adequate attention given to the establishment of administrative and policy structures that define the legal status, rights and authorities essential for the effective performance of local organisations. Many attempts at decentralisation have not delivered real sharing of resource management power.

Co-management builds on the active involvement in regulatory decision-making of those people whose livelihoods depend on the viability of the natural resource (Jentoft, Mikalsen & Hernes, 2003). However, they warn that attractive as they may appear, co-management arrangements are certainly no panacea to the many problems associated with the resource decline. The success of the community self-management will depend on many factors to the fisheries sector (Allison & Mvula 2002). The policy and legal frameworks, interests of donors, implementation strategy and dependence on the resource are necessary for sustainable management of the fisheries resources.

Co-management regimes are dynamic and various partnership arrangements are in practice. Decision-making powers can range from absolute state control to complete community autonomy (Sen & Nielsen, 1996). Important components of co-management are the sharing of responsibility, decision-making and authority (Mohamed, 2002). The formulation of local objectives and the inclusion of users in the decision-making process vary from case to case.

Based on the variation in roles and the level of power sharing between partners, there are five broad types of co-management (Sen & Nielsen, 1996), as summarised in Box 2. The *instructive* type of co-management involves a minimal exchange of information between government and fishers. This type of co-management is different from centralised management in the sense that there is a mechanism for dialogue with fishers, but in the end, the government imposes a management plan and just informs the fishers about them.

The *Consultative* co-management involves a government that consults more actively with the community. However, the government remains responsible for making final decisions. In the *cooperative* type of co-management, the government and fishers have equal powers in the decision-making processes.

In the *advisory* type, the fishers provide advice to government on appropriate decisions, which the government endorses.

The *informative* type involves the actual delegation of authority to fishers. In practice, it may not be a formal arrangement but a traditional form of fisheries management recognized by the government. Informative co-management can take the form of delegation in a formal arrangement or of a tradition in a customary set-up that exists in some African countries.

**Box 2: Typology of co-management**

*Instructive:* Where minimal exchange of information takes places between government and fishers as key partners.

*Consultative:* In this scenario, the partners consult, but the government makes final decisions.

*Cooperative:* This is where the government and fishers cooperate as equal partners in decision-making processes.

*Advisory:* In this case, the fishers advise the government but still seek government's approval of their own decisions.

*Informative:* At this level, the government delegates authority to make decisions to fisher committees that are responsible for informing the government of these decisions.

Many co-management initiatives in Malawi tend to lean towards government dominance in the decision-making processes. They are often of a consultative type. The Lakes Malombe and Chilwa participatory fisheries management programmes in Malawi are good examples of this tendency. In these cases, government representatives that show little or no consideration for traditional practices and local knowledge of the resource users still primarily do the setting of objectives for the co-management arrangements (Hara, Donda & Njaya, 1999; Hara Donda & Njaya, 2002; Mohamed, 2002). In Malawi, only Lake Chiuta, Mbenji Island on Lake Malawi, and Sinazongwe on Lake Kariba (bordering Zambia and Zimbabwe) demonstrate a shift towards cooperative co-management types.

There are varied outcomes in terms of co-management between or among lakes and even within lakes themselves. For example, in the early 1990s, involvement of a local leader who appointed members in one of the BVCs on the eastern Lake Malombe resulted in poor performance of such a committee unlike the one at Nasite on the north-western shoreline of the same lake (Mtika, 1996; Hara et al., 2002). Generally, the Lake Chiuta BVCs on the northern side were more active in terms of enforcement and conducting meetings than those on the southern side (Njaya, 2003).

Involvement of the Traditional Authorities (TA) in development work dates back to the colonial era when they were integrated into or even created by the British colonial administrative system known as “indirect rule” (Chirwa, 1996). The author also notes that the responsibility of the native chiefs mainly centred on collecting hut and poll taxes out of which they obtained a certain amount of money, which consolidated their allegiance to their colonial masters. The level of their accountability to the people they represent is often low as outlined in various decentralization research reports (Agrawal & Ribot, 1999; Ribot, 2002).

At independence, management of the fisheries resources usually shifted to central government while at local level the traditional leaders have continuously assumed their roles. The contestation for power between the traditional leaders and the local level committees has been common in fisheries co-management (Hara et al., 2002). Wilson et al. (2005) suggest the need for inclusiveness, accountability and transparency. This also applies in decentralised fisheries resource frameworks where governance becomes an issue. However, Ribot (2002) observes that most decentralisation reforms in resource management seem to manage downward accountability and rarely the opposite happens. This means that the local level committees are accountable to the Department of Fisheries and not the fishers.

The involvement of TAs in resource management could resolve the problems of co-management that is ‘top down’. While often well respected in their communities, there is also contestation of their authority and the relationship

between the TAs and the central governments is often strained. For example, in Mozambique despite efforts from politicians, the traditional institutions are *de facto* the most respected authorities in the community, much more so than are the formal government authorities (Lopes & Gervasio, 1999). This is evident on Lake Chiuta where villagers may not respect government officials or politicians in the same way as the *Rigulo* (chief). Outcomes of co-management that involve TAs vary from one site to another. In Zambia, for example, chiefs play a significant role in co-management activities especially in controlling access and enforcement.

The composition of the community-level organizations (BVCs) or Beach Executive Committee (BECs) as called in the Mangochi District Assembly (Njaya, Gomiwa & Kachala, 2006), has posed an institutional problem. The BVCs on Lake Malombe have a smaller proportion of members who are fishers (nearly 30%) while on Lake Chiuta the proportion of fishers is over 70 per cent (Njaya, Donda & Hara, 1999; Donda, 2001; Njaya, 2002). The key partners in these co-management programmes are the fisher representative committees with guidance from their local leaders on one hand, and the Department of Fisheries on the other hand.

However, Lake Chilwa co-management is different in the sense that the main partners include the Traditional Authorities (TAs) and the Department of Fisheries (Njaya, 1998; Lowore & Lowore, 1999; Njaya, 2002). The roles of the local leaders in co-management programmes are unclear as in some areas they demonstrate a supportive role while in others they tend to benefit from the co-management arrangement by supporting illegal seine fishers after getting financial inducements (*cha-kwa-mfumu*). In effect, the intended purpose of co-management in entrenching legitimacy of rules to sustain fish resources becomes unsuccessful.

The different organisational arrangements can result in varied outcomes, as various authorities at different levels determine decision-making processes,

establishment of institutions and the level of participation. There is need to vest the power with the fishers who have self-interest in the management of the resource, and not the chiefs (Lowore & Lowore, 1999). In contrast, on Lake Malombe, Hara (1996) and Donda (2001) proposed that the BVCs should have a large composition of fishers. Previous studies in evaluating various co-management programmes on Lakes Malombe, Chiuta and Chilwa in Malawi and in other African countries such as Lakes Kariba (Zambia and Zimbabwe), have shown mixed outcomes (Donda, Njaya & Hara, 1999; Hara & Nielsen, 2003).

A second concept that is gaining popularity in the literature, and that deserves attention in the thesis is *governance*. Governance refers to ‘how power and decision-making is shared among different components of society’ (Béné & Neiland, 2005:7). These components include individuals as well as community-groups and organizations. Specifically, governance arrangements include legal, social, economic and political issues applied to the management of fisheries resources. There is need to create an enabling political environment that allows various stakeholders to exercise their powers and authorities over the management of fisheries resources through decentralised systems. This takes into consideration the mechanisms of governance that include transparency, accountability and participation (Béné & Neiland, 2005). Fisheries governance involves objectives, knowledge base and implementation (Nielsen, Degnbol, Viswanathan, Ahmed, Hara & Abdulla, 2003).

*Decentralisation* is a third concept with relevance for the search for feasible, participatory CPR governance arrangements. It refers to any act in which a central government systematically transfers part of its powers, authority, and responsibilities to local government structures such as district assemblies and community level committees (Ribot, 2002; Béné & Neiland, 2005). Democratic decentralisation reforms offer an opportunity to legally supported forms of popular participation in the management of fisheries. This is dependent on the establishment of prerequisites for a fair and transparent system of electing fisher

representatives in committees, which is crucial for the legitimacy of such community level institutions.

*Devolution* is another term popular among community-based natural resource scholars. The concept refers to the transfer of rights and responsibilities to user groups at community level. The community-based organisations (CBOs) need to be accountable to the fishing community. In relation to devolution is the concept of *collective action*, which refers to a conscious working together in a group such as by investing in a resource or excluding non-members from utilising the resource (Knox & Meinzen-Dick, 2001). Misunderstandings of the terms associated with management of the commons bring a varying degree of evaluation frameworks, performance in terms of equity, efficiency and sustainability of the regimes.

In many parts of the world, local arrangements referred to as “traditional” exist for management of certain fisheries related activities (WHAT, 2000). It is apparent that the introduction of any governance regime should take into account the existence of such traditional arrangements at the community level. The role of traditional chiefs in co-management arrangements is controversial in the literature. Questions about the roles of chiefs in these arrangements abound, on the one hand, and important questions of democracy and accountability, on the other (Lowore & Lowore, 1999; Ribot, 2003).

#### **2.4 Traditional knowledge**

The fishing communities have developed knowledge systems, which they pass from one generation to another. The knowledge systems go by various terms. The most popular terms include “Traditional Ecological Knowledge” (TEK). The past decade has seen an emergence of an interest in Local and Traditional Ecological Knowledge (LO-TEK), mainly in response to failure of centralised fisheries resource management in maintaining sustainable levels of the resources, settling conflicts and inadequate budgets for management, research and enforcement of regulations.

Raufflet (2000) points out that failure of large-scale ecosystems have challenged natural resource management in both theory and practice. Despite the outlined shortfalls in sustaining utilisation of natural resources including fish, there seems to be a continued disregard for local knowledge. Hobson (1992) notes that western scientists often dismiss indigenous knowledge that they consider anecdotal, non-quantitative, unmethodical, and unscientific. However, he argues that what is important is to develop a system that provides traditional knowledge with a “scientific” framework and allows application of both local and scientific knowledge.

Hipwell (1998) observes that various studies have demonstrated that knowledge systems developed over generations by indigenous and non-indigenous local communities can provide useful data superior to that available through conventional scientific research methods. GTZ (2001:5) argues further by stating that:

---a better acknowledgement of traditional resources management and enhancement systems is an essential component of a more appropriate and effective approach to inland fisheries and aquaculture development.

## **2.5 Migration**

Migration rate is the proportional change in population size due to moving out of a given area over the previous year (Bunce & Pomeroy, 2003). Seasonal migration is a vital livelihood adaptation that fishing communities make in many parts of the world (Salagrama, 2005). Migration of fishers is common among various water bodies in Malawi. One of the short-term choices of fishers during Lake Chilwa recession period involves transfer of the fishers to nearby Lakes Chiuta, Malawi and Malombe (Agnew, 1979; Agnew & Chipeta, 1979). This periodic migration occurs during periodic recessions that normally takes place after 25 years (Kalk et al., 1979). Migration therefore, means movement of people across a specified boundary for establishing a new or semi-permanent residence or for a livelihood.

Migration takes different forms: migration within a lake (intra-lake migration) and between lakes (inter-lake migration). It can also be seasonal or periodic. A shift in occupation with or without corresponding change is another complex form of seasonal migration, which may or may not be dependent on geographical location (Salagrama, 2005). In some cases, long-term migrations both into fishing and into non-fishing activities occur. It may also involve migration of fishers from villages to towns or cities at particular times of the year either to sell fish or to settle and look for alternative livelihood activities when catches are poor (*Ibid*).

In coastal states and transboundary ecosystems, migration involves mobility of trawl fishers from one region or country to another. Kraan (2005) notes that migration in Ghana or West Africa has not only involved local fishers only, but also fishers from European and Asian countries. Migration of fishers in most countries has not yet received adequate research coverage. Knowledge of impacts of migration on fisheries management and household strategies is therefore necessary. Reasons for migration include ecological and economic nature including pull and push factors.

The ecological reason is fundamental as it links migration of fishers to seasonal upwelling of coastal waters, which attracts large schools of *Sardinella* (*Ibid*). These schools of fish move from the west to east of Cote d'Ivoire and proceed to the eastern part of Ghana and so do fishers that follow the migrating fish. The economic reason includes fishers migrating to earn more cash earnings, usually the case where fishers from one country migrate to earn money in another currency (*Ibid*).

## **2.6 Conflicts**

FAO (2000) defines natural resource conflicts as disagreements and disputes that occur due to access to, and control of appropriation. Tubtim (2006:147) argues that: "Community-based natural resource management [CBNRM] is not a process

in which people agree on everything.” Conflicts in the CBNRM arrangements are, therefore, inevitable.

Conflicts can emerge within common property regimes between resource users and can be either violent or non-violent (Pomeroy & Rivera-Guieb, 2005; Warner, 2000). Usually the conflicts arise because people have varying utilisation of the commons such as fisheries or want to manage them in various ways based on their objectives. Singh (2002:5) notes: “Conflicts and disturbances arise when there are varied interests of people in a particular resource.” The author adds that conflicts are natural and are avoidable and their frequency of occurrence is dependent on the demand for the resource.

Disagreements can also arise due to incompatible needs, or exclusion of priorities of some fishing communities in relation to the formulation of policies, programmes and projects. Such conflicts of interest are an inevitable feature of all societies (FAO, 2000). Therefore, conflict management should become an important element when considering co-management arrangements.

In the fisheries sector, the scope and magnitude of natural resource conflicts have increased and intensified mainly because of poverty, declining trends of the fish stocks and increasing population. Transboundary conflicts sometimes escalate into violence when user committees exclude certain gear types, for example, *Nkacha* seines (Njaya, 2002). Co-management can be one of the strategies to manage and resolve conflicts that occur within fisheries sectors (Hauck & Sowman, 2005). Given time and skills, however, conflicts can provide a basis for a stronger management regime.

## **2.7 Conclusion**

From the literature review, I draw key lessons on fisheries management, co-management and conflicts. Issues about fisheries management are complex. Management of fisheries resources takes many forms and approaches depending on the type of fishery and its biological dimension and socio-economic

importance. There has been development of institutional arrangements that refer to the structure of rights and duties over the past decades. The institutional arrangements aim to define a specific property regime that governs management of the commons. Nevertheless, there are observations that although management of the natural resources can be achieved through the control by either a state or market, neither of the two can successfully lead to sustained long-term production levels of the natural resource. The argument implies that a combined control of the regimes is a commonly ideal situation.

Climatic influence has also been associated with fish catch fluctuations due to occurrence of flooding and recessions. Any increase in temperature due to climate change would result in increasing the rate of evaporation, resulting in greater water loss from Lake Chilwa. The rapid responses of many fresh water fish stocks to fluctuating environmental conditions obscure an accurate assessment of the resource situation. Fish stocks in many of Africa's inland waters fluctuate considerably, and these fluctuations are climate driven and cannot be stabilized by conventional measures. Among other factors, the appearance of an extended drought period greatly affects African ecological systems.

The review also provides lessons on the problems of CPR governance mainly in relation to co-management arrangements. Many co-management initiatives tend to lean towards government dominance in decision-making processes. They are often of a consultative type. The Lakes Malombe and Chilwa participatory fisheries management programmes in Malawi are good examples of this tendency. In these cases, government representatives that show little or no consideration for traditional practices and local knowledge of the resource users still primarily set objectives for the co-management arrangements.

In the thesis, there is need to highlight the importance of fisheries co-management since issues of governance relate to partnership, accountability and transparency mechanisms. Furthermore, power distribution between the user

community and government is a linchpin to success of any co-management arrangement.

Issues about migration of fishers are common in fisheries management. Migration takes different forms: migration within a lake (intra-lake migration) and between lakes (inter-lake migration). It can also be seasonal or periodic. A shift in occupation with or without corresponding change is another complex form of seasonal migration, which may or may not be dependent on geographical location. In some cases, long-term migrations both into fishing and into non-fishing activities occur. It may also involve migration of fishers from villages to towns or cities at particular times of the year either to sell fish or to settle and look for alternative livelihoods when catches are poor.

Finally, conflicts feature highly in fisheries management regimes. Conflicts can emerge within common property regimes between resource users and can be either violent or non-violent. Usually the conflicts arise because people have varying utilisation of the commons such as fisheries or want to manage them in various ways based on their objectives. Disagreements can arise due to incompatible needs, or exclusion of priorities of some fishing communities in relation to the formulation of policies, programmes and projects. Such conflicts of interest are an inevitable feature of all societies. Therefore, conflict management should become an important element when considering co-management arrangements. In the fisheries sector, the scope and magnitude of natural resource conflicts have increased and intensified mainly because of poverty, declining trends of the fish stocks and increasing population. Given time and skills, however, conflicts can provide a basis for a stronger management regime.

In this thesis, I will focus on the impact of the water level changes on the household strategies that include migration and co-management. The migration of the fishers centres on the number of transfers that they make within Lake Chilwa or from or to other lakes mainly Lake Malombe. There is also a need to

look at reasons for the migration and relate to the review. The pattern of migration by season in form of direction the migrants take within the lake or across to other lakes is another dimension.

I highlight conflicts that emerge due to migration of the fishers and co-management. The conflicts are fisheries-related and to a certain extent I present land issues since fishing and farming are the main income sources for Lake Chilwa basin households. I also relate the conflicts that emerge due to rules with the local knowledge of the households in the management of fisheries resources. Therefore, I apply the concept of traditional knowledge to examine the conflicts between Department of Fisheries (DoF) and fishing households. Migration in forms of geographic and occupational is responsive to Lake Chilwa ecosystem condition based on the traditional knowledge systems that exist within the local fishing-farming households. A study on the livelihood strategies among the Lake Chilwa households needs to consider issues of migration patterns as grounded within their traditions and values.

Finally, the thesis will centre on the fisheries co-management mainly on the roles of the traditional leaders. I determine the Lake Chilwa co-management arrangement in relation to the typology of co-management outlined in the review (Box 2). The typology is for the whole lake but also by fishing zone that fall under respective Traditional Authorities.

## CHAPTER 3

### RESEARCH DESIGN AND METHODOLOGY

#### 3.1 Conceptual framework

The conceptual framework (Figure 12) provides a basis for the study. I used secondary sources through literature reviews and collected primary data through surveys. Field data collection involved a combination of research techniques and tools including key informant interviews and focus group discussions (Krueger & Casey, 2001; Kirsch, 2001). In addition, the study draws results from migration and co-management attitude surveys.

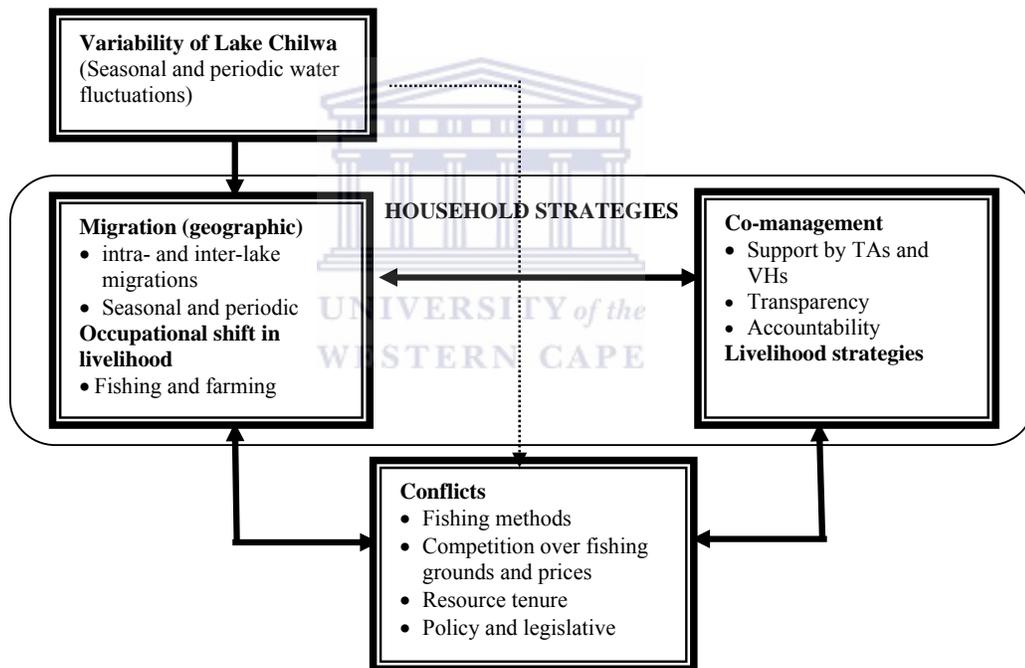


Figure 12: Conceptualised relationship on the impact of water level changes on migration of fishers and co-management

For institutional analysis, I also apply the theoretical co-management framework developed by IFM (1998) specifically by focusing on the patterns of interactions among the patterns and the co-management outputs. The study will examine linkages of water level changes and their impact on the migration of fishers as

their livelihood strategy. I also study linkages between co-management as a response to dynamic nature of the ecosystem and migration mainly in relation to resource access, and emergence of conflicts in such situations.

The migration survey focused on collecting data related to migration of the fishers by analysing frequency and patterns by gear type, fishing zone according to shallowness of the area and season. In the survey, I also collected additional data on conflicts, socio-cultural profiles, life histories, timeline of events, calendar of events, and collective action.

Data collection involved use of structured questions that I administered to individual fishers found on selected beaches followed by in-depth interviews with key informants. There were also Focus Group Discussions (FGDs) in each of the fishing zones in the northern, central and southern parts of Lake Chilwa. Frame survey data and field reports from DoF provided secondary data sources for the study.

The co-management attitude survey had three specific aims. First, to assess the attitude of the respondents towards the support that TAs give to Beach Village Sub-Committees (BVCs) in the Lake Chilwa co-management arrangement. For comparative purposes, the assessment included support given by the DoF, District Assemblies (DAs), TAs and Village Heads (VHs). The data collection tools involved structured interviews followed by in-depth interviews with key informants to get further clarification on certain questions.

Second, the survey aimed to examine how transparent and accountable the BVCs were in the eyes of the respondents. Transparency focused on how the authorities (DoF, TAs, BVCs, DAs, and traditional leaders made decisions on fish resource management measures. The questions centred on whether the co-management partners made decisions publicly, whether meetings they conducted were open and how the authorities reported on the use of funds. This idea was to determine whether the BVCs were accountable to their fishers (downward accountability) or

local leaders, DoF and district assembly (upward accountability).

Finally, the aim of the survey was to determine attitudes of respondents towards the work of the user committees (BVCs) by looking at whether the respondents thought there was more fish now because of the work of the BVCs. Another question was on whether the households thought that the village was better off because of the user committees and how regular the respondents attended BVCs meetings in their villages.

The following sections provide a detailed research technique and data collection in the selected sites.

## **3.2 Primary data collection**

Collection of primary data in the migration and co-management attitude studies involved both qualitative and quantitative research methods. The following details the research methods in both studies.

### **3.2.1 Migration survey**

I conducted the migration survey from June 2003 to May 2004 in selected beaches around Lake Chilwa. Data gathered during the survey included frequency and pattern of migration of the fishers based on gear type and seasons. The survey applied a combination of data collection tools including interviews with individual fishers, in-depth interviews with selected 24 key informants, 9 focus group discussions (FGDs) as shown in Annexes 4a and 4b and field observations.

#### **3.2.1.1 Individual interviews**

A migration survey form (Annex 2) targeted fishers operating various gear types including gillnet, long lines, fish traps and seines. The survey covered 9 beaches around the lake (Table 2). I applied purposive selection technique when choosing the respondents in three randomly selected beaches. There were three beaches in each of the fishing zones of the northern, central and southern Lake Chilwa. I

interviewed the fishers that were operating on the beaches from June to July 2004. The survey questions centred on whether there had been any changes in fishing beaches over the past five years (1999 to 2004). I considered three years long enough to influence migration. While historical data may always not be reliable, it was interesting to note that most of them could recall where they were since the 1960s.

In the northern fishing zone, mostly a floodplain and marshy area, I interviewed a total sample of 354 fishers at the following locations: Chipakwe, Ntila and Mposa beaches in the northern flood plain, Mchenga, Kachulu and Phimbi in the central (1.5-2m) and Malagani, Swang’oma and Thanga fishing zone in the southern fishing zone (over 2m deep on average). The sampled number of 354 fishers represented about 12% of all fishers in Lake Chilwa.

Table 2: Distribution of respondents (N=354) by fishing zone interviewed on selected beaches during the migration survey in 2004

Fishing zone	Beaches	Number of Respondents	Percent
North (Floodplain area)	Mposa Chipakwe Ntila	167	47
Centre (1.5-2m deep)	Kachulu Phimbi Mchenga	144	41
South (>2m deep)	Swang’oma Malagani Thanga	43	12
Total		354	100

The survey process included a day of inspection of the beaches by observing what took place and another day for the survey. On the first day, I arranged with a village head and a Beach Village Sub-Committee (BVSC) chair so that they could inform all fishers about the survey and where possible have their beach

registers<sup>11</sup> ready. In addition, the village head arranged an appropriate day and time of the meeting with fishers, and in most cases, it was a day when some fishers come out of their *zimbowera* (temporary shelters constructed around the lake) to sell their dry fish on beaches.

On the day of the survey, I checked their beach registers. The only problem, however, was that beach registers were first used between 1998 and 2000 while the survey targeted transfers that the fishers had made from 1994 to 2004. The main question centred on whether the fishers had ever migrated to other water bodies such as Lakes Chiuta, Malombe or Malawi.

#### 3.2.1.2 Focus group discussions

From May to November 2004, I conducted 7 Focused Group Discussions (FGDs) and in August 2006, I had 2 FGDs (Annexes 4a and 4b) to collect data on conflicts, socio-cultural profiles, timeline of events, calendar of events, collective action. I had one FGD for each of the fishing zones. I also had in-depth interviews with key informants that I purposively selected during the FGDs. I based my selection of the key informants on their experience in fishing. I interviewed all the fishers I found on the selected beaches but during analysis, I only analysed data captured from those that had fished for more than five years. The questions centred on collective action, livelihood diversity, adaptive capacity, and coping mechanisms particularly during recessions. In both FGDs and individual interviews, I used a guiding question sheet in the Chichewa language, for consistency (Annex 3). The questions were open-ended.

Other issues I tackled during the FGDs and key informant interviews included the timeline of events starting from 1960 before the 1968 recession, their life histories and calendar of activities. Over half of the number of respondents recalled what had happened in late 1940s when the lake dried up. I asked them

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<sup>11</sup> Some BVCs had beach registers in which they recorded transfer of fishers. However, that system started in 1998 in the co-management arrangement, but prior to that, the fishers could recall beaches they had been to while fishing between 1994 and 2004

how they coped with the intermittent recessions so that I could learn more on their livelihood diversity, adaptability and coping mechanisms.

On the calendar of events, the idea was to find out whether fishers (by gear type such as seine, fish trap and long lines) were able to combine fishing with other economic activities such as farming and trading. Additionally, it was also important to find out at precisely when during the year or years the economic activities occur.

I also looked at questions on their activities during recessions. This was limited to fishers only who are either resident in lakeshore villages or migrant fishers. In terms of socio-cultural issues, I inquired on their traditions and customs, collective action as to whether they come together to tackle developmental issues or problems and whether the practices interfere with or support resource management.

Before the survey, I trained four researchers based at Zomba Fisheries Office. The training session, which covered interviewing techniques and FGDs, was for three days. At the training, we agreed to have the FGDs during village meetings called by traditional leaders. After the training session, the research team conducted the survey in 7 Traditional Authorities including Kawinga and Mposa (floodplain area), Kumtumanji and Mwambo (with depth between 1.5 and 2m), and Mkumbira, Mkhumba and Chiwalo (over 2m depth).

The research team arranged a day and venue of the community meeting with the TA or his/her sub-TA or Group Village Head. The team asked the local leader to organise the meeting to entice all fishers to attend and participate as the traditional leaders wield more influence than the researchers did. All invited fishers and other households participated in the meetings whose objective was on the state of the fisheries resources from the past (over 20-30 years ago) to the present.

At the meeting a selected facilitator briefed the participants on the objectives of the meeting and then asked the participants to form three or four groups based on gender, status (whether one is a local leader or not) and occupation (fishing, farming or any other business). Apart from the local leaders who were mainly one to two, each group had at least 10-12 participants as normally recommended in rapid appraisals (Grenier 1998; Krueger & Casey 2001).

The participants in groups because in most African societies women and the youth tend to be quiet when men are present: Hence, the decision to separate the participants according to gender and age. When local leaders are present, subordinates tend to be reserved during discussions as a mark of respect. We distributed flip charts and markers to the groups and asked them to choose a note taker. The discussions were based on the guiding questions we provided (Annex 3). The group discussions lasted 1-2 hours after which one member of the group made a presentation on behalf of his/her members. The research team and other participants sought clarifications and comments.

#### 3.2.1.3 Key informant interviews

Collection of the data from key informants involved use of a question guide (Annex 3) that was in Chichewa/Nyanja, the local language for easy communication. I selected three beaches (one in each fishing zone) for the in-depth interviews with purposely-selected four fishers and a village head. Annex 4 shows a list of the key informants. The main issues centred on the impact of Lake Chilwa water level changes on the livelihoods of the fishing community, historical information about differences of the two previous recessions in 1995 and 1968 in relation to degree of lakebed dryness. The interviews also focused on the life histories in terms of their settlement: when they started fishing and the strategies, they apply in response to the lake level changes. In this context, the unit of measurement included individual, beach or village level, and fishing zone levels.

The process started with the selection of key informants during the FGDs and

village meetings. I identified people who were over 50 years old and had experienced the two previous Lake Chilwa recessions in 1968 and 1995 for the interviews. I chose a day for the interview. Analysis of the recorded interviews and arrangement into theme patterns took two months between January and February 2005.

#### 3.2.1.4 Field observations

In terms of seasonal variations, I observed the drying pattern from the north to south in August 2003 to July 2004. Key features included the dry period of the northern floodplain area between October and early December in 2003 through the flooding period between February and March in 2005. This means that I observed the pattern for the whole year covering both rain and hot dry seasons. I also had focus group discussions and in-depth interviews with selected fishers to supplement my observations.

#### 3.2.1 *Co-management survey*

I conducted the co-management attitude survey in 2003 to collect data on support that BVCs get from the co-management partners as shown in the conceptual framework (Figure 12). The selected sites included the three fishing zones in Traditional Authorities Kawinga and Mlomba (floodplain area), Kumtumanji and Mposa (with depth between 1.5 and 2m), and Mkumbira and Chiwalo (over 2m depth) as shown in Table 3 and Annex 6. Annex 7 shows operationalisation of the survey. I concentrated on the demography, external and institutional organisational arrangements and conflicts.

Table 3: Distribution of respondents (N=166) by fishing zone and Traditional Authority in the co-management attitude survey

Fishing zone	Traditional Authority	Number of Respondents
North (Floodplain area)	TA Kawinga	47
	TA Mlomba	
Centre (1.5-2m deep)	TA Mposa	43
	TA Kuntumanji	
South (>2m deep)	TA Mkumbira	76
	TA Chiwalo	
Total		166

I assessed the strength of the co-management arrangement by examining demography, that is, fisher population changes on beaches and lake, as the main attribute and then the conflicts that arise due to the demographic changes. Attitude of the respondents towards the Lake Chilwa co-management arrangement was the focus of the study. Further qualitative in-depth interviews with key informants mainly composed of three traditional leaders, three Beach Village Sub-Committee members and three groups of fishers located in each of the three fishing zones provided further clarification on points that were unclear from the analysed data.

I used scale questions (three- or six-step ladders) as shown in Annex 8 to assess the co-management strength (as a dependent variable) by analysing perception of the BVCs, fishers and households. Independent variables included the level of participation of the stakeholders in the co-management arrangement specifically by looking at how the stakeholders (local leaders, district assemblies and non-governmental organization) support the co-management institutions.

Finally, I compared the socio-economic profile of both migrant and non-migrant fishers in the co-management attitude survey. I focused on the age, ethnicity and

education levels between the migrants and non-migrants. The co-management survey involved interviews with 166 respondents out of which 110 were fishers.

For analysis of the data, I worked out migration and wealth scales (Annex 12) based on the co-management attitude survey. The main reason was to examine how migrants differ from the rest of the population based on age, education and wealth. Annex 5 contains the questions.

#### 3.2.2.2 Field data collection

The survey targeted three groups, namely BVCs, fishers and households, which in this study they refer to people eating together. I identified a six-member research team (same one that I involved in the migration survey) composed of field-based technical fisheries staff. The team went through a one week-training session in conducting interviews and sampling of the villages. We randomly selected the BVCs by using playing cards. This was to reduce the danger of getting biased results.

I assigned two researchers to conduct the interviews in two villages randomly selected from one Traditional Authority (TA) in which they took a maximum of one week conducting 32 interviews. This meant doing 16 interviews in each village as follows: four BVC member interviews; eight fisher interviews and four household heads interviews. I conducted 166 interviews in 13 villages around Lake Chilwa.

#### 3.2.2.3 Variables

To assess support from the TAs to BVCs, I focused on survey questions outlined in Section 6 of the question schedule (Annex 6). The survey questions that were both qualitative and quantitative in nature centred on the following types variables.

(a) Demography

I collected demographic data that included number of fishers, fishing gear and craft to estimate size of the Lake Chilwa fishery. I conducted documentary research and thorough observations over five years (2003-2008). The level of operation of the demography variable was a fishing zone and in terms of operationalisation, I estimated the population of the fishers by gear and craft type located on a beach or village.

(b) Support for co-management by stakeholders

I applied primary sources and conducted in-depth qualitative interviews using guiding questions as shown in Annex 3. I had in-depth interviews with key informants to determine the level of support that Traditional Authorities give to BVCs. The point was that since the TAs seemed to be key partners in the co-management of Lake Chilwa there was a need to assess the support that BVCs get from the traditional leaders.

(c) Process variables

I looked at the age of the co-management, relations with TAs, representation, NGO participation, District Assembly (DA) participation, relations with other community-based organisations (CBOs). Other variables included transparency, accountability and ladder of co-management activity as process variables. In all the process variables, I made my observations at individual, village and TA and fishing zone levels. I had in-depth qualitative interviews with key informants and applied secondary sources.

To operationalise the age variable, I looked at when the Lake Chilwa co-management started. Consequently, I developed a timeline of events for the co-management arrangement.

On the support for local co-management, I posed a question on whether in the eyes of the respondents DoF supports the BVCs with more than just talking. The

support might include legal and material support. Similarly, I asked the respondents about the District Assembly (DA), non-governmental organisations and (NGOs) and village heads (VHs).

On the transparency of co-management, questions included the following:

- (i) Do authorities make decisions publicly?
- (ii) Are meetings open?
- (iii) Do authorities report about use of funds publicly?

I determined the typology of Lake Chilwa co-management by looking at where the project fell in terms of the ladder from instructive to informative as detailed in the literature review (Chapter 2).

#### (d) Conflicts

To identify conflicts, I focused on class or power structures, gear types, theft, marketing, and issues on multiple users of fishing grounds and locals against outsiders as the main variables. I asked the questions as outlined in Annex 3 and in the co-management survey (Annex 5, Section 2) by looking at whether the in-migrants and local fishers operate their gear types in the same area. The questions were the same as those outlined in (a) above, that is, the demography section.

I did variable measurements at individual, village and fishing zone and used documentation, in-depth interviews, made observations and survey questions. The aim was to assess the degree to which conflicts of the various types were salient within the fisheries of interest.

Based on the migration scale I created in the co-management attitude survey, I did the Analysis of Variance (ANOVA) to determine whether there were any significant differences between non-migrant and migrant fishers due to age, ethnicity, education levels and wealth. The questions are in Annex 5, Sections 4 and 5.

### **3.3 Fishing-farming household incomes**

I applied secondary data on frame survey (Annex 9) conducted in 2001 to assess value of Lake Chilwa fishery as a whole and by gear type. First, this aimed at assessing the importance of the gear types in terms of value of landed catch. Second, the test aimed to examine the impact of recessions on the local economy and how it, in turn, affects livelihoods of the fishing households. During the survey that involved the BVCs, I estimated weekly income earnings from fish sales through interviews.

### **3.4 Additional data**

Secondary data collection involved review of literature, published reports and data on water levels, fisheries, evaporation, value of the fishery and rainfall to assess variability of the Lake Chilwa ecosystem. In particular, the data sets included water levels, fish catch, value, frame survey, demography and socio-economic aspects of the area. I got the reports from the Departments of Fisheries, Water, Parks and Wildlife and Fisheries, National Statistical Office, University of Malawi, and libraries at PLAAS and IFM. I also used internet websites to search for certain information about Lake Chilwa.

### **3.5 Data analysis**

I used the Statistical Package for Social Scientists (SPSS) Version 12 and Microsoft Excel for data entry, cleaning and analysis. I worked out frequencies and mean comparisons about mean perceptions to assess strength of the co-management institutions in selected study sites of Lake Chilwa. I produced trends as shown in tables and graphs for water levels, catch data, evaporation and frame survey. Illustrations by drawing graphs involved use of SPSS and Excel Worksheets to calculate proportions (percentage) of fishers moving out against those coming in or just settled by year and gear type, and to show differences in opinions and frequency of migration of the fishers and analysing the data through statistical tests including Analysis of Variance (ANOVA). This aimed to compare means and variability of data on the perceptions, frequency of migrations by season, area and gear type and water level or depth.

### **3.5.1 Proportion of migrants**

Using data from the migration survey, I analysed the percentages of migrants by gear type and fishing area or landing beach. I made a further analysis to determine the number of transfers made, that is, transfer frequencies by fisher category in terms of gear operated. This took into account any fisher that had been operating from 1994 to 2004. This was to establish which fishers by gear type migrated more frequently within the lake.

Another dimension on migration was to make comparisons of transfer frequencies between resident fishers and in-migrant fishers especially those from Lake Malombe who use *Nkacha* seines. This was to examine the pattern of migration in terms of when they seasonally and periodically migrate to Lake Chilwa and reasons behind that. I gathered such information by use of percentages to examine whether migration is a livelihood strategy and if it was, for which fishers between resident and in-migrant fishers.

### **3.5.2 Impacts of migration on co-management and livelihoods**

I used Excel and SPSS to analyse data from the qualitative interviews from individual and group interviews to assess impact of migrations on the co-management. In specific terms, this referred to conflicts associated with fishing grounds between resident and migrant fishers and strategies that the local fishing-farming households applied to manage such conflicts. The assumption was that if there were problems associated with migrations then that could influence livelihoods of Lake Chilwa fishers through their impacts on co-management.

Additionally, I analysed the data to examine whether conflicts influenced collective action within the co-management framework in relation to property rights. The assumption was that conflicts that occur due to exclusion of in-migrant seine fishers from Lake Chilwa could be a basis for analysis of resource tenure. A further analysis of co-management strength focused on the support by TAs to the BVCs. I did the analysis in relation to an assumption that the influence of TAs in co-management is necessary for resilience of the co-management

institutions. With data from the co-management survey, I used the SPSS programme to determine the mean level of perceptions of the respondents by graphical presentations and Analysis of Variance (ANOVA) by testing any statistical differences in perceptions by fishing zone within Lake Chilwa.

Further data analysis on the livelihood strategies that the Lake Chilwa fishing-farming households apply focused on both seasonal and periodic bases. This was mainly to assess the importance of fishing to the local community. On seasonal terms, questions on their calendar of activities could determine what they do when the lake is in flood during the rain season. I also needed to find out whether the fishers still operate their gear types in other areas when the water recedes in the northern marshy areas. Annex 3 shows the guiding questions.

I used the Microsoft Excel to analyse the data by sorting out the answers based on thematic areas based on the study sites in terms of fishing water depth as differences in occupations would occur. The main reasons could be land ownership, soil type for farming, access to markets and other infrastructural development. I also investigated the types of migration that exist in the lake.

### **3.6 Problems in data collection and analysis**

The main problems I encountered during the surveys included access to fishing beaches, time taken to conduct the interview and unreliability of data based on memory and perceptions. Access to fishing areas especially those near the border with Mozambique proved difficult. Neither a vessel nor vehicle could easily make it to the areas at a time when water levels were low. Therefore, in some cases the research team asked third parties to conduct the interviews thus increasing chances of changes in meaning of some questions occurring.

Time taken to conduct the co-management attitude interview with one respondent ranged from 45 minutes to over one hour. This was too long and invariably affected the concentration levels of both the researcher and the respondent. This

means that some information gathered towards the end of such an interview might be unreliable.

The migration survey involved asking fishers where they had been fishing from 1995 to 2004. While most respondents recalled the beaches on which they had landed their catches since they started fishing, a few could not. However, use of the frame survey data validated a trend of the number of fisher counts during the same period.

Nonetheless, use of scale questions as a research technique to analyse individual perceptions is that answers can be subjective depending on various factors like number of years one has been in the village and fishing business, dependency of household income on fishing and gear type. However, due to the number of the respondents (166) a pattern of answers emerged which provided some reliability of the survey results. Additionally, the key in-depth qualitative interviews I had with key informants can provide further information and clarification.

Furthermore, some fishers especially when they were about to go for fishing were reluctant to fully respond to questions. At times, they just nonchalantly replied, “I do not know” which increased gaps and missing cases during data analysis.

Finally, the number of cases for the co-management survey dropped to 92 from a possible 166 for the whole lake. The reason was that the researchers terminated interviews with respondents who were unfamiliar with the work of the BVCs. The ultimate aim was to get information from people who were knowledgeable about BVCs or those who were involved in the activities of the committees. The fewer cases posed a challenge on conducting a statistical analysis mainly on means tests as in each fishing zone I ended up having less than 30 observed cases. However, I continued with the analysis mainly by comparing the mean perception levels by fishing zone.

## CHAPTER 4

### RESPONSES TO WATER LEVEL CHANGES

This chapter presents the study results related to the research question on the impact of water level changes on the livelihood of the Lake Chilwa basin households. First, I used data from both the co-management attitude and migration surveys to examine the socio-economic profile of the 166 respondents (BVCs, fishers and households). Specifically, I compared age, education, wealth and ethnicity of the migrants and non-migrant respondents.

Second, I analysed migration frequency of the fishers in response to water fluctuations both on seasonal and periodic basis by using the migration survey data with 396 respondents. The migration frequencies refer to the number of times that a particular fisher had shifted from his/her fishing village or beach to another from 1994 to 2004. I also present the impact of the water level changes on household income from fishing.

#### **4.1 Socio-economic profile of the respondents**

In this section, I present a socio-economic profile of both migrant and non-migrant fishers in the co-management survey. I focus on the age, ethnicity and education levels between the migrants and non-migrants. The co-management survey involved interviews with 166 fishers. To determine migration by gear types, I administered the migration survey with 396 fishers operating seines, gillnets, fish traps, long lines and mosquito nets. The survey examined migration frequency and patterns based on completed migration survey forms (Annex 2) and qualitative interviews with key informants and focus group discussions conducted in the three fishing zones.

##### ***4.1.1 Distribution of respondents by migration status***

On migration status, the respondents were in 4 categories (Annex 5, Section 5, Question 12) including those from within the village that the interview was

taking place, from nearby villages, from another village within the district of interview and from outside the district (Table 4). For the non-migrants the majority (77%) were from villages in which the interviews took place and the rest from nearby villages. On the other hand, the majority of the migrants were from another village within the district.

Table 4: Percentage distribution of respondents based on migration status and places they came from. Excluded cases (3) were due to failure to record the responses. All numerals are in percentages except the Ns in the far right column

Place of origin	Non-migrants	Migrants	Total
Within village	77	0	69
Nearby village	23	1	22
Another village within the district	0	51	37
Outside the district	0	48	35
Total	100	100	163

Source: Co-management survey (2003)

#### 4.1.2 Age of respondents

The age of the interviewed fisher households (N=166) ranged from 19 to 98 (Table 5). By category, the age of the non-migrants ranged from 19 to 64 with a mean of 39 while the migrants aged from 22-98 with a mean of 43. An age group of 31-40 years was dominant in both non-migrants and migrants. The Analysis of Variance (ANOVA) showed no significant differences between the migrant and non-migrant at  $F(1,5)=1.51, p>0.05$  due to the age ranges.

On the other hand, the mean scores of the age ranges were significantly different,  $F(5,1) = 37.14, p<0.05$ . Majority, 38% and 30% of the non-migrants and migrants respectively aged between 31 and 40. One non-migrant was less than 20 years old. On the other hand, 7% constituted the migrants above the age of 60 years while for non-migrants they scored 3% only.

Table 5: Table showing age ranges between non-migrant and migrants fishers (N=166) out of which 163 respondents provided answers while 3 did not know when they were born. All numerals are in percentages except the Ns in the far right column

	Non-migrants	Migrants	Total
Age range	(%)	(%)	(N)
<20	1	0	1
21-30	19	19	31
31-40	38	30	56
41-50	28	30	47
51-60	11	14	20
>60	3	7	8
Total	100	100	163

#### 4.1.3 Ethnicity

The Lomwe people dominated the fisher respondents for both migrants and non-migrants. Nearly 58% and 61% of the non-migrants and migrants respectively were Lomwe as shown in Table 6. The Nyanja were second in both categories. There were no significant differences at  $F(1,4)=0.23$ ,  $p>0.05$  between migrants and non-migrants due to ethnicity. However, the main effect of migration on ethnicity yielded an  $F$  ratio of  $F(1,4) = 171.39$ ,  $p<0.05$ , indicating a significant difference.

For the non-migrants, majority (58%) were Lomwe followed by the Nyanja (22%). Yao scored 17% while the least were the Chewa. There was a similar pattern among migrants; the Lomwe represented the biggest number (61%) seconded by Nyanja (18%) and the Yao (14%). The Chewa and Sena were in minority constituting 4% and 3%, respectively.

Table 6: Table showing ethnic composition of the respondents between non-migrants and migrants (N=166) out of which 110 responded while 56 were excluded cases due to failure to record responses. All numerals are in percentages except the Ns in the far right column

Ethnic origin	Non-migrants (Percentage)	Migrants (Percentage)	Total (N)
Chewa	3	4	3
Lomwe	58	61	65
Nyanja	22	18	22
Sena	0	3	3
Yao	17	14	17
Total	100	100	110

Source: Co-management attitude survey (2003)

#### 4.1.4 Education level

The results showed that 23% of the respondents had never been to school. Majority of both non-migrants and migrants were primary school (junior and senior classes) leavers registering 72% and 64% respectively as Table 7 shows. The illiterate respondents, that is, those who had never been to school constituted 23% in both the non-migrant and migrant groups. Nearly 13% of the migrants attained junior secondary school education while only 5% was for the non-migrants. Only 1% of the non-migrants attained senior secondary school education. There were no significant differences between the non-migrants and migrants as regards education level,  $F(1,4) = 1.92, p > 0.05$ . However, the mean scores of education levels yielded an  $F$  ratio of  $F(4,1)=19.53, p < 0.05$ , indicating significant differences.

Table 7: Table showing education levels of the respondents between non-migrants and migrants (N=166) of which 9 did not respond. All numerals are in percentages except the Ns in the far right column

Education level	Non-migrant (Percentage)	Migrant (Percentage)	Total (N)
Never been to school	23	23	36
Junior Primary School (Std 1-5)	47	45	72
Senior Primary school (Std 6-8)	25	19	35
Junior Secondary school	4	13	13
Senior Secondary school	1	0	1
Total	100	100	157

#### 4.1.5 Household income

Data from the co-management survey (Figure 13) shows that fishing is an important livelihood strategy for Lake Chilwa basin households. Over 60% of household income is from fishing and other fishing-related businesses such as fish processing and trading.

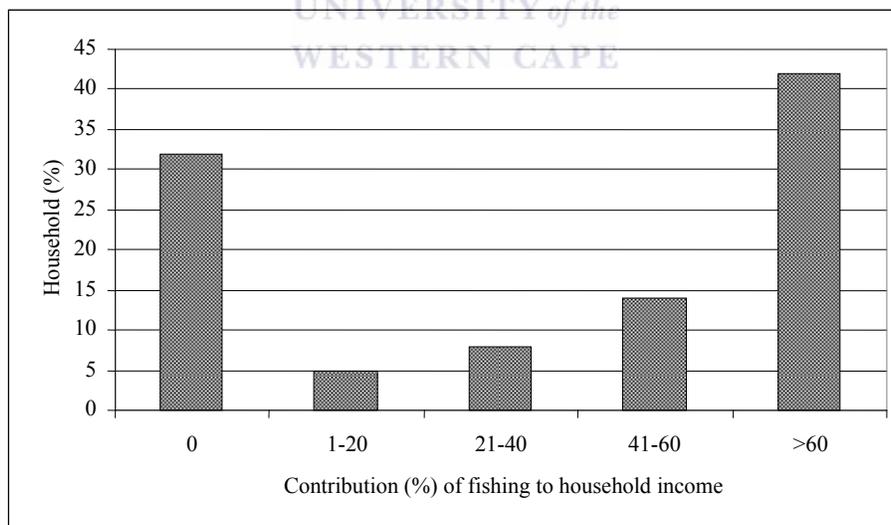


Figure 13: Proportion of household income (N= 166) earned from fishing activities with 113 valid cases, 24 not responding and 29 not knowing

Source: Co-management survey

With such importance of the fishery, it means that any intervention that disregards the fishing community's dependence on the resource may result in entrenching poverty with increased vulnerability of the communities to food insecurity. By interview type, 33% of the fishers earned their income from fishing. In contrast, many BVC members and household heads showed that they earn their incomes from other occupations mainly farming (Table 8). The results showed no significant difference<sup>12</sup> due to both interview type,  $F(2,4) = 0.52$ ,  $p > 0.05$  and effect of proportion of income from fishing,  $F(4,2) = 0.72$ ,  $p > 0.05$ .

Table 8: Proportion of household income from fishing by respondent type (BVC members, fishers and households) with N=166. There were 113 valid cases, 24 respondents did not respond while 29 indicated that they did not know

Household income % from fishing	Respondent type (%)			Total
	BVC member	Fisher	Household	
0	10	1	21	32
1-20	2	2	1	5
21-40	2	5	0	8
41-60	3	9	2	14
>60	4	33	0	41
Total	21	50	24	100

Source: Co-management survey (2003)

The analysed 2001 frame survey data demonstrates economic importance of the Lake Chilwa fishery by looking at gear types operating in Lake Chilwa. Table 9 shows estimated weekly gross income from fishing by gear type. The survey covered all landing beaches with involvement of the BVCs by asking fishers their estimated weekly average revenue from fish sales within the month of September 2001. While it was difficult to give the exact 'average' amount by just recalling many fishers just gave figures from the previous week's sales.

<sup>12</sup> In this thesis 0.05 was the alpha level of significance

The estimated mean weekly gross income from fish sales per fisher (gear owner) from Lake Chilwa was MK1,070.63 (Table 9). The seine nets registered the highest weekly cash earnings for the whole lake seconded by long lines. There were significant differences due to fishing gear,  $F(4,2) = 24.23$ ,  $p < 0.05$ . By fishing area, the Lake Chilwa South recorded the highest weekly cash incomes while the Lake Chilwa Central was the least. However, there was no effect of the gear type on fishing area,  $F(2,4) = 1.29$ ,  $p > 0.05$ .

Table 9: Mean weekly gross income from fish sales (MK) by fishing gear and fishing zone recorded in 2001 Frame Survey with gear owners (N=2,354)

Fishing gear	Northern Lake Chilwa	Central Lake Chilwa	Southern Lake Chilwa	Average
Seine net	3755	2241.5	4189	3395.17
Gill net	684	530.5	576.5	597
Fish trap	402	282	358.5	347.50
Long line	447	724	686.5	619.17
Hand line	609	237.5	336.5	394.33
Average	1179.4	803.1	1229.4	1070.63

Source: GoM (2001)

The annual catch estimates show that the northern marshy and floodplain areas are seasonally highly productive in terms of *Matemba* catches mainly during the rain season and catches decline during dry seasons when the water level drops (GoM 1999). The most productive gear type is the seine net used for catching *Matemba*. Walter (1988) found similar results with estimated 167 seines in Lake Chilwa of which 54% concentrated in the northern and north-western beaches with only 20% operating on a full-time basis. He also found that the same beaches had the highest number of fish traps (about 10,000). Therefore, Namanja (the floodplain and marshy area in the northern Lake Chilwa) is the highly productive fishing area.

#### 4.1.6 Asset ownership and income earnings

In the thesis, creation of the wealth scale involved asset ownership, cash savings, house type and regular remuneration from other sources as detailed in Annex 12. The results (Table 10) showed that the majority of the non-migrants were dominant in all the three wealth categories as compared to the migrants registering 61%, 57% and 61% of the poor, rich and very rich non-migrants respectively. Although the study failed to specify the fishers in terms of gear ownership or crew status, it is most likely that most of the poor were the fishers that owned fish traps, long lines and gillnets because the gear types land less catches than seines. Additionally the crew members remain poor due to the nature of the remuneration system that involves equal sharing between crew and gear owner (*chikomani*).

Table 10: Wealth status of respondents (N=166) with 14 respondents failing to indicate their assets. All numerals are in percentages except the Ns in the far right column

Migration status	Wealth category			Total (N)
	Poor (Percentage)	Rich (Percentage)	Very rich (Percentage)	
Non-migrants	61	57	61	85
Migrants	39	43	39	57
Total	100	100	100	142

The wealth categorisation was not similar to that of the households' perspective reported during the village meetings. In this thesis, wealth of the households is in three categories: poor, rich and very rich. The participants in a focus group discussions at Chinguma and Mposa similarly categorised wealth into the same groups, namely poor (*wosauka*), rich (*wopezako bwino*) and very rich (*wolemera*). On asset holding, the participants included other attributes mainly type of gear and craft owned. The villagers claimed that someone with a seine net

was very rich while someone with a gill net can be just a rich person and someone with a fish trap being poor and without any gear as a very poor person. Similarly, ownership of a plank boat with or without engine symbolises wealth while a canoe shows poverty. The co-management survey excluded the fishing assets, which is different from what the households describe as their wealth status.

It was surprising to find a few people not regarding land as being a very important asset. They rather perceive someone with a large harvest or owning livestock like cattle as being rich or very rich. The households argued that many people had pieces of land but did not use it for farming due to limited capital or failing to acquire farming inputs mainly chemical fertilizer. Therefore, limitation on the analysis of the data was on the exclusion of fishing asset ownership mainly for gear and craft.

#### ***4.1.7 Occupation***

About 58% of the respondents indicated that they stayed at the beaches from their original homes because of fishing while 17% reported that they were involved in fish processing and trading. The rest stated that they were located in those villages for farming and running small-scale businesses. This shows that nearly 75% of the respondents were involved in fish-related businesses including fishing, processing and trading. Fishing is, therefore, their main occupation.

#### ***4.1.8 Vulnerability aspects***

I assessed vulnerability of the households during particular times of the year and recession. The assessment examined availability of household cash savings, access to farming land, livestock ownership and availability of lending institutions in relation to seasonal and periodic recessions. The four economic factors are necessary for survival of the vulnerable households during recessions. The results showed that the majority (91%) of the household heads had no cash savings, which they could use in case of an emergency (Table 11).

Despite the high economic potential of Lake Chilwa to surrounding districts, the households are highly vulnerable to food insecurity and poverty. This implies that majority of Lake Chilwa households are vulnerable to food insecurity during closed seasons (November to March) in which no seining operations take place and during droughts or recessions.

Table 11: Distribution of households with cash savings in the co-management attitude survey with N=166 (162 valid cases and 3 missing cases due to respondents not answering the question

Cash savings	Frequency	Percent
Not available	148	91
Available	14	9
Total	162	100

Over half of the households with cash savings indicated that they could not depend on the savings for more than a year. This implies that during recession periods, which take around 5-6 years, the majority of the households remain poor. Only 4% of the households receive money from their relatives. Most of the households just depend on incomes they get from fishing, farming and other self-employed activities.

## 4.2 Adaptive measures

### 4.2.1 Responses to seasonal water level changes

The responses of the fishing households mainly relate to seasonal drying up of the floodplain areas of the lake. Additionally, the response also refers to periodic recessions that occur after 20-25 years as Lancaster (1979) predicted. The common feature of the seasonal drying up is prevalent in the northern marshy and floodplain areas. When the lake is in flood by March-April, majority of fishers with gillnets, seines, fish traps and long line operate their gears in the northern part of Lake Chilwa.

The results show that fishing-farming households have the ability to adapt to alternative occupations for their livelihoods. Subsequently, change in occupation occurs on seasonal, periodic basis and area (part of the lake depending on farming potential and water depth) basis. There are coping strategies during particular times of the year especially from October to December. The strategies mainly include farming, securing temporary work and doing small-scale businesses.

Seasonally, farming is the main occupation for the fishers that stop fishing in the northern floodplain area. The northern floodplain fishers irrigate their crops during the dry season in addition to the rain-fed crops they grow during the rainy season. One fisher stated:

Seasonally, we the gill net and fish trap fishers grow vegetables, maize and rice. This happens when we see that fishing grounds are far away from here. A few of us migrate to Mulanje and Thyolo where we work in tea estates. Sometime we are picked by tobacco estate owners from central region [of Malawi] to work in tobacco estates. In general, we find farming being more profitable especially nowadays when the prices of rice and other crops have gone up. When our fishing ground is flooded we come back to start fishing.

Findings from the study show that during recessions, most fishers stop fishing. They become farmers in the wetland area. A group of fishers and fish traders at Mchenga stated:

During recession like the one that occurred in 1995, our livelihoods become threatened. We rely on handouts from the government, churches and non-governmental organisations. Some of us migrate to Mozambique to work in farms to earn money, which we use to support our families. The main problem is that during recession, the boats develop cracks due to heat of the sun. For the crew, some migrate to central region where they work in tobacco estates. The fortunate ones especially the seine owners are able to go to South Africa where they work in mines and come back to invest in fishing after recovery of the lake. For women that trade in fish, it really becomes difficult for them to go to other lakes since they are used to come here in Lake Chilwa. There can be additional cost if we decide to go to Lakes Malawi and Malombe. Moreover, the fish traders seem to be specialised in the fish species they deal with.

Additionally, a group of fishers at Ntila indicated:

For economic reason, there is no justification for us, gillnet and fish traps fishers to travel long distance (over 100km) to Lake Malombe during recessions to fish for cash. Even within Lake Chilwa we usually operate gillnet and fish traps on part-time basis, as we also depend on farming for our livelihoods. When water level drops, one-third of the north-based seine fishers also stop seining mainly from September to December and venture into farming crops including rice, maize and vegetables. It is only the full-time fishers, both resident and in-migrants, that continue fishing while dwelling in *zimbowera*. Very few of us do small-scale businesses including selling wares, weaving baskets or baking especially our wives.

The explanation above shows that there are inherent occupational changes that mainly involve fishing, farming and working in estates. To sustain their livelihoods the fishing-farming households demand policy interventions that would promote farming as their main occupation and supplement the income with fishing. Lake Chilwa is highly variable in terms of water level changes and periodically recedes. Therefore, farming is one of the main occupations. Although land ownership is small, (about 0.8ha) due to the increased population, with use of fertilizer the households can harvest enough for sale and consumption. The current input subsidy programme that the government launched in 2004 should continue to support livelihoods of the most vulnerable groups.

On a seasonal variation, the respondents reported that the northern marshes become active in terms of fishing during rainy season, mainly from February to April. All gear types operate there when water is available but after April, the area progressively dries up taking the southward direction. By September, many fishers operating fish traps and gillnets stop fishing as it becomes unprofitable. The fishers stated that the main reason was on difficulties to access fishing areas especially during the drying periods. For example, a seine fisher from northern Lake Chilwa outlined the costs (Table 12) that he incurred during the drying period of 2004. This involves a five-crew fishing unit.

Table 12: Analysis of costs and revenue from fishing when northern marshes receded (September-December, 2004)

<b>Costs</b>	<b>Amount (MK)</b>	<b>Revenue</b>	<b>Amount (MK)</b>
Advance payment ( <i>ya ndege</i> )	5000	Fish sales	5000
Flour	500		
Salt	100		
Firewood	200		
<b>Total Costs</b>	<b>5800</b>	<b>Total Revenue</b>	<b>5000</b>
<b>Gross Profit</b>	<b>-800</b>		

Source: Field data from a seine fisher interviewed at Ntila, (northern floodplain of Lake Chilwa) on 17 October 2004

Furthermore, the *chikomani*<sup>13</sup> system exacerbates the situation. The gear owner and the fishing crew share equally the daily fish revenue after subtracting all costs apart from *ya ndege*<sup>14</sup>. In Table 16 above, it means the gear owner made a loss during that fishing day. In contrast, during the rain season fishing becomes profitable as demonstrated in Table 13 with data provided by one seine fisher at Ntila.

In this context, fisher migration in the northern marshy areas is common to operators whose livelihoods largely depend on fishing. To avoid the losses that fishers incurred from fishing especially from September to December 2007, the fishers stopped fishing. Instead, they were growing vegetables, maize and rice. Those who continued fishing were mostly the seine fishers who were in most cases landing on the western shore and not the northern areas due to distance.

<sup>13</sup> Sharing of fish catches between gear owners and fishing crew as payment and has been common since 1990s

<sup>14</sup> Advance money that the gear owner gives to crew before fishing for meals

Table 13: Analysis of daily costs and revenue from fishing when the northern marshes are flooded (January to April, 2007)

<b>Costs</b>	<b>Amount MK)</b>	<b>Revenue</b>	<b>Amount MK)</b>
Advance payment ( <i>ya ndege</i> )	5000	Fish sales	10000
Flour	500		
Salt	100		
Firewood	200		
<b>Total Costs</b>	<b>5800</b>	<b>Total Revenue</b>	10000
<b>Gross Profit</b>	<b>4200</b>		

Source: Field data from a seine fisher interviewed at Ntila, northern floodplain of Lake Chilwa on 9 April 2007

During interviews in February 2004, one resident fisher in the floodplain area described the fishing operations in terms of the fish species that the fishers target:

This is the time [rain season] for good catches of Matemba after their breeding season in rivers when they migrate to swampy shallow areas for growth. Mlamba [*Clarias gariepinus*] and Makumba [*Oreochromis shiranus*] are also in breeding season and hence plenty of immature ones are vulnerable to exploitation during this particular time of the year. At this time, more seine fishers including those from within and outside the lake, mainly Lake Malombe migrate to this area mainly for the lucrative Matemba [*Barbus paludinosus*] fishery.

As the northern floodplain recedes from June to July, the distance to fishing grounds becomes so long that fishers from the area start shifting to land near their catches on the western part. The full-time<sup>15</sup> fishers who are mainly from Lake Malombe and a few from Lake Chilwa also start using the western beaches for landings. The fishers begin to stay in offshore temporary shelters (*zimbowera*) for more than two weeks while fishing and processing their catches. During market

<sup>15</sup> In this study full-time fishers are defined as those that spend over 8 months fishing in a year (Landes & Otte, 1983)

days, the fishers come out of the lake to sell their dry fish at the western beach (Mposa).

By September, the majority of the fishers in the northern part, mainly those who operate gillnets and fish traps and long lines, abandon fishing and start *dimba* farming for rice, green maize and vegetables. During group focus discussion at Namanja in the northern floodplain area, the fishers explained:

...at this time farming becomes more profitable than fishing since we, the gillnet fishers, progressively spend longer time to reach fishing waters and most of the times we catch less from which we cannot realise adequate cash for buying food.

This means that fishing becomes a part-time business to majority of the fishers operating traditional gear types (gillnets, fish traps and long lines) by this time. Owing to the occupational combination, the resident households are fishers and farmers. However, in the southern part where water is available throughout the year, the traditional fishers continue to operate their gears, but they combine fishing with agricultural activities. The only difference is that they do not abandon fishing as the fishers in the northern part. As Table 14 shows, farming is one of the main occupations for income for the households.

Table 4 presents a calendar of activities for the fishing households from focus group discussions (FGDs) conducted at Chinguza, (Lake Chilwa north). The fishing households conduct several activities in a year, some of which follow a seasonal pattern such as irrigated maize farming during dry season and rain-fed maize and rice growing during rainy season. In terms of fishing, setting gillnets and fish traps are common during floods while fish poisoning in rivers is prevalent during dry season.

Table 14: Annual calendar of activities obtained from Swang'oma households (Lake Chilwa south) in May 2004

Month	Activity
January	Gillnet fishing in open waters of LakeChilwa and Mnembo River Fish trap fishing in flooded areas Rice and maize farming
February	Rice and maize farming Gill net fishing in open waters of LakeChilwa and Mnembo River
March	Rice and maize farming Gillnet fishing in open waters of LakeChilwa and Mnembo River Picking and curing tobacco leaf
April	Harvesting rice, maize and pulses (pegieon peas and beans) Harvesting crops (maize and rice) Grading tobacco Gillnet fishing in open waters of LakeChilwa and Mnembo River
May	Harvesting rice, maize and pulses (pegieon peas and beans) Clearing gardens in dambo areas Gillnet and seine fishing in LakeChilwa
June	Gillnet, fish trap and seine fishing Harvesting rice Selling tobacco
July	Gillnet and seine fishing Clearing gardens Preparing tobacco nursery beds
August	Seine fishing Clearing gardens
September	Seine fishing
October	Seine fishing
November	Seine fishing Planting seeds Transplanting tobacco seedlings
December	Farming – weeding gardens and fertiliser application Seine fishing

Source: Migration survey (2004)

During periodic flooding regimes, I observed changes in settlement patterns during the 2004/05 fishing season. The fishing-farming households relocate to

upland areas within the Lake Chilwa plain. In a community with dominance of vulnerable households that do not have adequate savings to support their household members (Table 7), the flooding situation threatens their survival strategies.

The coping strategies include resettlement in upland areas, asking for food handouts from the government and non-governmental organisations (NGOs) and relatives and seeking piecework in towns and other villages. Crop production becomes low due to the floods that wash away maize and rice. Consequently, the households become food insecure and vulnerable to diseases related to malnutrition, for example, kwashiorkor, as observed in under-five children.

The problems are characteristic of Lake Chilwa fishing households, which can experience both extremes in terms of wealth and poverty. The lake has potential to secure cash for the households but in terms of catastrophes like drought and flooding, this can also bring about severe suffering.

Women process and sell fish during the rain season when fishing in the northern marsh is more active. Seasonal recessions affect their businesses and hence confine them to the southern fishing areas where they can buy fresh fish from beaches. Being women there are some restrictions on their presence in the *zimbowera* where men usually camp and fish. A certain woman fish trader at Kachulu stated: “we fear men who are in those *zimbowera*, as they can rape us”. The fear just confines them to buy fresh *Matemba* fish and dry it on landing beaches.

However, in modern times, a few women fish traders are able to go to the *zimbowera* to buy and process fish for a few days before going to markets, as one fisher at Mposa stated: “Nowadays women can go and buy fish but they come back within the same day.” This is easier for women who reside with their fisher husbands but social problems can occur if a woman stayed in a man’s

*chimbowera*<sup>16</sup> where there is no relationship between the two. A certain woman fish trader at Kachulu explained:

I fear to go to *chimbowera* to buy fish alone as it seems like I will be offering myself for sex, since men can be there operating their seines and gillnets for a long time without their wives. Of course, we have heard that several women in Lake Chilwa and other lakes are engaged in [transactional] sex, but not me. I would rather stick to my business... it is dangerous nowadays due to HIV/AIDS to change men like clothes ...

#### **4.2.2 Response of the households to periodic recessions**

Periodic recessions refer to the drying of the whole lake usually occurring after 20-25 years (Lancaster, 1979). In the lake recession, the fishers that are nomadic within Lake Chilwa stop fishing and concentrate on other livelihood sources usually farming activities. One to two years before recession, fishing becomes diverse with introduction of destructive methods that include poisoning and use of fine meshed seine to exploit remnant fish stocks in river mouths and lagoon. The fishing practises are common in major influent rivers and they target *Matemba*. Women use poisonous plants or herbs while very few own seines, gillnet and long lines. In this context, migration is one of the household strategies applied for livelihoods within the Lake Chilwa basin, especially for seine fishers, which agrees with the conceptual framework (Figure 12). Sarch & Allison (2000) also observed that migration was a livelihood strategy of the Lake Chilwa fishing households.

During FGDs conducted in the three fishing zones, fishers and households indicated that the fisher migration becomes prominent during the recession period, which lasts for 2-3 years. In a group focus discussion at Kachulu beach, fishers explained:

Few fishers especially the seine fishing crew migrate to towns and Mozambique to look for piecework for cash. The fishing crew that operate seines go to tea or tobacco estates for work. Some even go as far as South Africa to look for work. Poor households with limited land for farming become food insecure since hunger is prevalent during the recession periods. Consequently, there is closure of shops, restaurants, vending centres and rest houses in active

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<sup>16</sup> *Chimbowera* is singular term for *zimbowera* which are temporary make shift structures that fishers use while fishing in open waters of Lake Chilwa

places like Kachulu, Namanja, Swang'oma and Mposa. When the lakebed is predominantly muddy, it becomes difficult for people to cross from mainland to island or from the west to east to the east. In general, there is an economic downturn due to decline of the fishery.

Although there is a possibility to migrate to Lakes Malombe and Malawi, the fishers stated that high costs of transporting fishing equipment become a hindrance to many fishers. In addition it may not be economically sound especially fishing in Lake Malombe where the stocks have also declined from 15,000 tonnes in 1980s to less than 4,000 tonnes (FAO, 1993; Bulirani et al., 1999; GoM, 2006). One woman who owned a seine net at Mchenga beach commented:

... fishers migrate to other areas or venture into farming for two to three years while waiting for recovery of the lake [Lake Chilwa]. Businesses in fishing and fish trading collapse and hence threatens livelihoods of many households especially us, the women. The seine fishers do not like to switch from catching Matemba from Lake Chilwa to Kambuzi from Lake Malombe due to increased transportation costs and preference of the former fish species over the latter. Therefore, majority of us, the fish traders, just go home and start farming, as the fishers do.

Another aspect includes technical operations of the *Nkacha* seine as the crew from Lake Chilwa I interviewed at Namanja beach indicated that:

We cannot operate *Nkacha* as efficiently as the Lake Malombe fishers do because it needs a highly skilled fishing crew from where the seine originated. The problem is that it demands one crewmember to dive into water and form a bag by tying the footrope of the seine. However, since Lake Chilwa is muddy they have modified the operation by making sure that instead of diving the crew insert a strong pole into the lake bed and then pull the seine net around it.

Fishers with adequate pieces of farming land shift to farming activities mainly during the dry season in wetlands (*dambo*) areas. For example, one fisher from the eastern Lake Chilwa stated:

...I produce rice and maize in large quantities like in this year [2006] I harvested 70 bags of rice, which I will sell at MK150,000. The amount of money I will earn is adequate to buy food and necessary household items. In contrast, a fisher transferring to Lake Malombe may

not easily earn such an amount considering costs of transport, advance payment made to the fishing crew and the sharing system in form of remuneration.

The increase in population threatens the livelihoods of the households in recession times. There are fishers that migrate from Lake Malombe to Lake Chilwa and do not go back to their original home in times of recession. Counts of in-migrants locally called *obwera* or *alendo* for those settling on pieces of land (Peters, 2002) show a steady increase of fishers settling in Lake Chilwa. Chapter 6 presents the emerging conflicts related to fishing and farming.

During major recessions, fishers abandon fishing and seek employment elsewhere while others shift to farming on the fringes of the lake where the soils are fertile. This is the time when land property rights are prevalent as claimed by one gillnet fisher interviewed at Mposa. The local leaders reclaim their land and apportion it to their subjects either on a free basis or at a rental fee. Fishers indicated that the practice was more common on a seasonal basis in the western and northern marshes than in the southern part where water levels are more or less stable.

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### **4.3 Migration**

#### ***4.3.1 Intra-lake fisher migrations: frequency of transfers***

Intra-lake migration, in the thesis, refers to migration of fishers taking place within Lake Chilwa. Frequency of transfers is the number of transfers that a fisher had made during his/her fishing period for over three years. Migration patterns look at a general trend in terms of directions that the migrants take either at a seasonal or periodic level. In this section, analysis of the migration data focuses on the number of transfers a fisher made for a fishing period of over three years and assess whether there were any distinct migration directions across the lake.

The distribution of migrants and non-migrants in the study sites showed that majority (50%) of the migrants were located in the northern marsh while and majority (54%) of the non-migrants were in the southern part of Lake Chilwa (Table 15). The majority of the non-migrants were located in the northern floodplain. By fishing zone, the north and southern fishing areas had more migrants than the centre. The migrant fishers at Chipakwe beach indicated

The northern part has always been more productive for Matemba unlike the other areas. We get good catches here. That is why we migrate from Kachulu [Centre] to this place to get more money. Apart from that, we easily transport our bags of Matemba to Lilongwe or Blantyre cities due to the railway line that passes along the northern Lake Chilwa beaches to Mozambique.



Table 15: Distribution of respondents (N=354) by migration status in the study sites. Numerals are in both percentages and Ns. There were significant mean differences between the migrants and non-migrants due to beach site,  $F(1,8) = 2.72, p > 0.05$

Fishing zone	Beach	Migration Status				Total (N)
		Migrant		Non-migrant		
		N	Percentage	N	Percentage	
Northern	Chipakwe	6	5	32	13	38
	Mposa	22	20	25	10	47
	Ntila	28	25	54	22	82
Central	Kachulu	11	10	31	13	42
	Mchenga	1	1	68	28	69
	Phimbi	1	1	32	13	33
Southern	Malagani	3	3	0	0	3
	Swang'oma	20	18	1	0	21
	Thanga	18	16	1	0	19
Total		110	100	244	100	354

On why their colleagues in the south do not migrate as frequently as they do, they indicated that cost was a major factor. A certain seine fisher at Ntila beach stated:

For us, the seine fishers, we always work out costs that include hiring a vehicle to pick the seine nets and crew. Looking at a distance of over 80 km, we sometimes fail to move. Instead, you will find our colleagues in the south not migrating to where we are [Ntila, northern floodplain area].

The migration pattern occurs seasonally as mobility of the fishers goes northwards from January to May and then fishers migrate southwards during the dry season from September to November. However, one seine fisher at Namanja beach indicated:

...the seine fishers and a few gillnet fishers migrate southwards as water recedes unlike the fish trap and some gillnet fishers that abandon fishing during the dry season. We fish when

our fishing area here in the north gets flooded mainly from January to July and later on decide to farm or do businesses.

The observation by the fisher shows that although fishers migrate to the south during the dry season the number of fishers is the same that comes to the north for fishing in the rain season. However, just a few north based fishers migrate southwards. The fishers operating during the rain season when Lake Chilwa north floods are higher than the operators do in the south during the dry season since some northern resident fishers abandon fishing during the dry season.

#### 4.3.1.1 Migration by gear type

Majority of the seine fishers were operating in the northern floodplain area followed by the southern deeper part of the lake (Table 16). The reason centred on maximising their income. A seine net operator at Mposa stated:

We invest a lot to have a seine net, boat and paddles. You are talking about spending over K200,000 nowadays. Therefore, we try to migrate to where catches are, of course by also looking at how much you can spend on transport. In our case, we fish to get money- it is our business. Of course gillnet fishers can do but their investment costs are very low. We like fishing in the south and north because of two reasons: In the north, you always get more catches from January to April when the area is flooded. In the south, you get more fish prices because there are few fishers. In Kachulu [centre], we are there during cold months especially from June to early August. Catches become low on the lake but prices are high at Kachulu because of many traders and good road to Zomba [city].

The explanation shows that fishers in Lake Chilwa choose where to go based on seasons and economic factors. In addition, they also consider distance when deciding about migrating to other fishing areas. They hire vehicles to transport boats and seine nets and hence calculate whether any fishing operations would cover the costs.

The migrant fish trap and long line fishers that operate on part time were also area-specific. The migrant fish trap fishers were in the north and south operating in the fringes of the lake for *Matemba* fishery. The long line fishers operate in

deep areas were, therefore, mainly in the south targeting *Mlamba*, which are larger fish species.

Table 16: Distribution of migrants and non-migrant fishers (N=354) by gear type and fishing zone. All numerals are in percentages except the Ns in the far right column

Fishing gear	Fishing zone	Migration Status		Total (N)
		Migrant (Percentage)	Non-migrant (Percentage)	
Seine	North	59	33	71
	Centre	13	66	79
	South	28	1	18
Total		100	100	168
Gillnet	North	52	44	47
	Centre	20	55	48
	South	28	1	8
Total		100	100	103
Fish trap	North	54	89	41
	Centre	0	11	4
	South	46	0	6
Total		100	100	51
Long line	North	0	38	8
	Centre	0	62	13
	South	100	0	11
Total		110	100	32

Source: Migration survey

In contrast, the majority of non-migrant seine fishers were in the centre (Table 14). Majority of the seine fishers were at Kachulu (southern Lake Chilwa) beach but operated in different fishing grounds located in the north or centre, as one group of seine fishers indicated:

Although we the seine fishers appear to be here, we fish in distant fishing grounds. We go to fish in Mposa and Thongwe Island (northern area) and then come here to sell our Matemba fish to traders who find it easier to transport the dried fish product to Zomba due to good road. We find it difficult to migrate due to high transportation costs. When life becomes tough, we just resort to farming as what other villagers do here.

For gillnet fishers they were in the majority in the northern part (floodplain area), the same as the seine fishers. A group of gillnet fishers at Ntila explained:

... fishing with gillnets depends on water levels. We target Makumba [*Oreochromis shiranus chilwae*] that breed in shallow areas. Therefore, during this month [August] we migrate to this northern part because we know this is another breeding time. You know Makumba reproduce twice, from January to March and August to October. However, the highest breeding period is from January to March. The only problem we face is that the seine fishers destroy our nets in water. They fish where we normally set our nets.

From the explanation, reasons for gillnet fishers to migrate also depend on where and when they can get good catches. They target breeding stocks of Makumba for higher prices. Conflicts arise between the gillnet and seine fishers due to competition over fishing grounds as already presented in Chapter 4.

#### 4.3.1.2 Number of transfers

Majority of the fishers (69%) had never transferred to other beaches apart from their villages. The results show that despite the variability of the Lake Chilwa ecosystem in terms of water levels, not many fishers migrate. For the migrants, the number of transfers ranged from 1 to 8 with seine fisher being the highest (Table 17). Generally, fishers transferred either once or twice. The fishers are also farmers and hence fish on part-time basis, as a group of fishers at Chipakwe started:

Here we depend on fishing and farming. We fish when the lake is full of water during rainy season. We resort to farming in dambo areas when the flooded area is dry during the dry season. Therefore, our livelihoods depend on both fishing and farming.

Table 17: Number of transfers that fishers (N=354) made by fishing zone and gear type

Fishing Zone	Gear type	Number of transfers made								Total (N)	
		0	1	2	3	4	5	6	7		8
North	Seine	35	27	8	1						71
	Gillnet	34	6	7							47
	Fish trap	34	5	2							41
	Long line	8									8
Centre	Seine	71	6	2							79
	Gillnet	43	2	3							48
	Fish trap	4									4
	Long line	13									13
South	Seine	1	5	3	2	2	2	1	1	1	18
	Gillnet	1	2	3	1	1					8
	Fish trap		1	3				2			6
	Long line		2	7	1	1					11
Total		244	56	38	5	4	2	3	1	1	354

Source: Migration survey

#### 4.3.2 Inter-lake fisher migrations

Inter-lake migrations mainly involve fishers from Lake Malombe who migrate to Lake Chilwa either on a seasonal or periodic basis. For example, a record of migrants showed an increase of migrant fishers from only two beaches (Mwalija and Chapola) on Lake Malombe to Lake Chilwa. The data showed that 9 fishers migrated to Lake Chilwa in 1997, 15 fishers in 2001 and 25 fishers in 2006. Assuming the counts were for all fishing beaches around Lake Malombe, which totals 35, the migrants could be more than 25.

During a group meeting with Lake Malombe fishers at Chapola beach, fishers indicated that they seasonally and periodically move to Lake Chilwa for good catches as they stated:

Lake Malombe catches have been low for the past 20 years. When we heard that Lake Chilwa stocks recovered after the 1995 recession, we came here to do our fishing business. We heard that fishers here were making more money between 1998 and 2000. However, the catches have now gone down.

On why the catches went down in Lake Chilwa, the fishers indicated that it was just because of changes in water levels. They did not believe in increased number of seines or fishers as their local fisher colleagues believed in.

The inter-lake migrant fishers operated their seines on a full-time basis. The in-migrants were dependent on fishing for their livelihoods. Almost 30% of the interviewed fishers had more than two *Nkacha* seines, one for Lake Malombe to catch *Kambuzi* and the second one on Lake Chilwa to catch *Matemba*. Since the fishers had adapted to seasonal and periodic changes of fish catches on both lakes, they developed a mechanism of spreading the risk by investing in fishing businesses in both lakes.

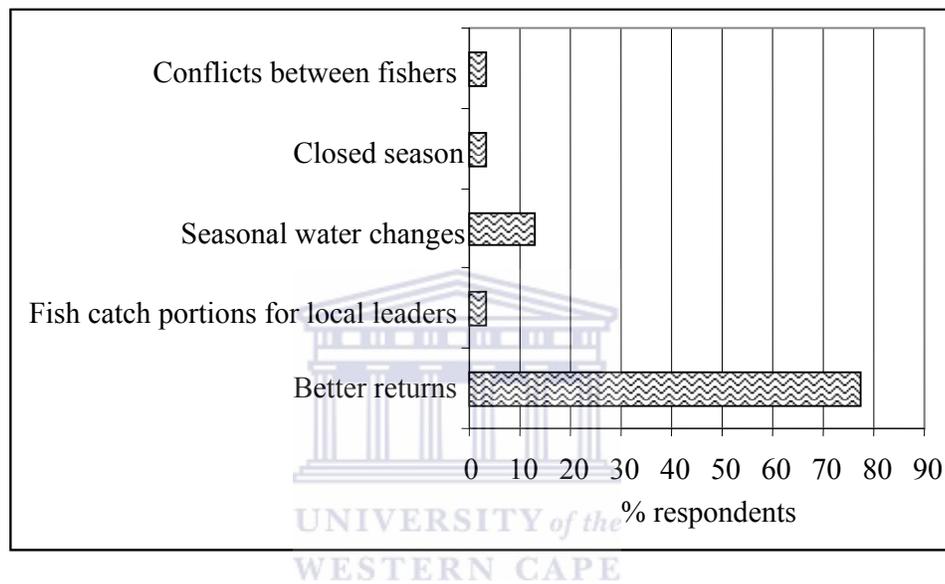
An issue of concern to the local fishers was not the migration *per se*, but the “introduced fishing technologies such as gauze wire, *Nkacha* and *Usodzi wa Mululu*”, as one fisher at Mposa indicated. However, Jul-Larsen et al. (2004) argue that where African ecosystems fluctuate naturally, horizontal intensification, based on a simple increase in numbers of fishers, may not have a major impact on the stock levels but a disastrous effect comes from the vertical intensification, which is dependent on new technology and large-scale markets. Kalk et al. (1979) caution damage to the aquatic vegetation in Lake Chilwa as it might result in overfishing of the fish resources.

#### **4.4 Reasons for migration in both inter- and intra-lake migrations**

Figure 14 presents a summary of reasons for migration. The major reasons for the migration centre on socio-economic, technological, fishing skills, dependence on fishing for livelihoods and regulatory issues as described in the following subsections. The fishers also migrate for fear of paying *cha-kwa-mfumu* (catch

portions as tribute to local leaders), seasonal water levels changes, closed seasons and conflicts. Although not explicitly mentioned, a health issue in terms of cholera outbreaks is also one of the reasons.

Figure 14: Frequency distribution of reasons for migration of fishers (N=354) in the migration survey out of which 14 respondents did not respond



Source: Migration survey (2004)

#### 4.4.1 Economic reasons

Reasons for migration include ecological and economic nature based on pulls and push factors. The ecological reason is fundamental as it links migration of fishers to seasonal upwelling of waters, which attracts large schools of fish. The economic reason includes fishers migrating to earn more money. Considering the *Nkacha* fishery in Lake Chilwa with abundant stocks of *Matemba*, the seine fishers including the migrant Lake Malombe fishers register higher revenue<sup>17</sup> within a short period. With the collapse of Kambuzi (*Haplochromine* spp.) fishery on Lake Malombe (FAO, 1994; Hara, 1996; Donda, 2001), there has been an increase of fishers migrating to Lake Chilwa.

<sup>17</sup> In 2002 one lady fisher owning a seine net operated her seine net for only three months but she got over MK600,000, which used to invest in houses and a vehicle.

#### **4.4.2 Technological aspects**

Fishers reported that it was easy to modify *Nkacha* seine net to catch *Matemba* in Lake Chilwa as compared to modifying the *Matemba* seine net for Kambuzi (*Haplochromine* species) in Lake Malombe. It is for this reason that migration in the other direction (Lake Chilwa to Lake Malombe) is almost non-existent. The Lake Malombe fishers simply reduce depth of their *Nkacha* seines and add mosquito net lining or smaller meshed net bundles on the bunt. In contrast, it is not easy with the *Matemba* seines, which would demand a complete change of the whole net thereby demanding more capital investment.

#### **4.4.3 Fishing skills**

The Lake Malombe fishers introduced *Nkacha* fishery to Lake Chilwa. The Lake Chilwa fishers reported that they found it difficult to operate the gear, as it demanded specialised skills in diving and tying the footrope while in water. This fishing practice restricted the Lake Chilwa fishers to their smaller depth *Matemba* seines as opposed to *Nkacha* seine that could be as deep as 7m from operating in Lake Malombe.

#### **4.4.4 Dependency on fishing activities for livelihoods**

Lake Chilwa fishers are used to switching between fishing and farming unlike Lake Malombe fishers who depend solely on fishing. The latter are ‘full-time’ fishers and ensure that they migrate to places where fish resources are available. Only a third of the local Chilwa basin area fishers operate on full-time basis (Walter 1988).

#### **4.4.5 Disease outbreak**

Disease outbreak is one of the major reasons that cause fishers to migrate from one beach to another. A group of seine fishers at Mposa stated:

We are highly vulnerable to diseases mainly cholera and malaria. This occurs especially during rain season when many areas are flooded. Sometimes what we do is to migrate from beaches with outbreak of diseases to where it is safe. There is no reason to continue staying on such beaches with cholera outbreak when we know we can die there due to absence of hospitals and clinics.

The above explanation shows that fishers are conscious of their health when deciding where to go fishing. With lack of health facilities especially on the eastern part of Lake Chilwa, health risks are high for migrant fishers.

#### **4.5 Conclusion**

The study results in terms of age, ethnicity, education and wealth status showed some differences between the non-migrant and migrants fishers though not statistically different. On age, the non-migrants ranged from 19 to 64 years with a mean of 39 while the migrants aged from 22-98 with a mean of 43. Both non-migrants and migrants were dominant by an age group of 31-40 years. The Lomwe people dominated the fisher respondents for both migrants and non-migrants while the Nyanja came second for both non-migrants and migrants.

Majority of both non-migrants and migrants were primary school leavers. Only a few had never been to school while an even smaller number had attained secondary school education. On wealth status, the results showed that there were many poor non-migrant fishers as compared to the migrants, though not statistically different. Failure to categorise fishers in terms of fishing gear and craft ownership could have contributed to the results on wealth status. The fishers categorise people with seines and boats being richer than those with gillnets or fish traps and canoes.

Lake Chilwa can be characterised into three fishing ecological zones: open water (mainly southern part), marshy areas (mainly central) and floodplain (largely northern part). The ecological zones affect the livelihoods of the fishing-farming households due to changes in water levels at particular times of the year. The results show that water level changes of Lake Chilwa trigger migration of fishers within the lake and between Lake Chilwa and Lake Malombe. The fisher migration is one of the strategies that households apply for their livelihoods.

This study shows that very few resident fishers migrate within Lake Chilwa. However, migration is high for fishers that come to fish in the lake from Lake Malombe. In this case, there is caution when examining migration issues. They depend on gear type and type of fishers (resident or migrant). Majority of the resident fishers operating gear types of all types have never migrated to other beaches within the lake or to other lakes despite the high variability of the ecosystem. The results differ from those by Allison & Mvula (2002) and Mvula (2002) on livelihood strategies.

While migration is a livelihood strategy, generalisation of their results without considering gear type and fishing area, cannot provide an appropriate policy direction with strategies for consideration during recessions, normal fishing period and floods. Fishers operating seine and gillnets are more mobile within the lake than those operating fish trap and long lines, the dominant gear types. There are more in-migrant seine fishers from Lake Malombe both at seasonal and periodic levels than out-migrants from Lake Chilwa. The main reason lies on differences in seine construction design and economic returns.

The migration of fishers is dependent on seasonality. However, the northern marshes that are highly productive in terms of *Matemba* catches attract more fishers of all gear types during the rain season especially from January to April. The economic implication is that with long distance to fishing grounds, fishers spend more time paddling rather than fishing, which leads to reduced fish catches. In addition, as water levels recede further, fishers switch to farming. The water receding pattern exposed *dimba*<sup>18</sup> areas of the northern marsh for irrigated maize farming from May to November 2004 and rice growing from December to April 2005. The results, therefore, demonstrate an inherent adaptive mechanism within the fishing-farming households that enable them to cope with changes in fish catches. The fishers just switch to farming activities both at seasonal and

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<sup>18</sup> In this study, I refer to *dambos* as 'any permanently or seasonally wetlands in valleys, depressions, or floodplains with open herbaceous vegetation, mainly grasses and sedges, and an absence of trees' (Kambewa 2005: 31-1).

periodic levels. They realise higher incomes from rice growing than fishing during dry seasons or recession.

The implication is that development initiatives that aim to enhance livelihood strategies for Lake Chilwa residents should involve participation of the resident households. It is clear from this Chapter that fishing and farming are part of the livelihood strategies of the Lake Chilwa basin households. Therefore, there is a need to promote farming technologies for food security while fishing can be a safety net strategy.

The annual catch estimates vary with fishing areas. The northern marshy and floodplain areas are seasonally highly productive in terms of *Matemba* catches mainly during rainy season and catches decline during dry season when water level drops. The most productive gear type is the seine net used for catching *Matemba*.

Despite the high economic potential of Lake Chilwa to surrounding districts, the households are highly vulnerable to food insecurity and poverty. This implies that majority of Lake Chilwa households are vulnerable to food insecurity during closed seasons (November to March) in which no seining operations take place and during droughts or recessions. Although vulnerability to food insecurity is high due to recessions, the Chilwa basin households have adapted to such conditions over the past generations.

The study examined conflicts in relation to fishing especially due to migration of fishers. Chapter 5 presents results of the identified conflicts and their impact on access to resources such as fish and land.

## CHAPTER 5

### FISHERIES-RELATED CONFLICTS IN THE CHILWA BASIN

This chapter presents conflicts associated with fishing activities especially between resident and migrant fishers. In this Chapter, the study results relate to conflicts based on cultural, ecological, technological changes, socio-economic and institutional issues and policy and legislative frameworks. I also outline perceptions and beliefs of the respondents on the impact of the conflicts on resource status with a focus on possibility of overfishing the lake. The data analysis presents possible relationships on conflicts with co-management strength as outlined in Figure 12.

#### 5.1 Conflicts associated with cultural issues

The results from the focus group discussions showed that conflicts that are associated with migrants occur due to social and economic reasons. The social aspects include access in form of power differential within the traditional structures whereby migrants do not seek authority from a village head (VH) to operate from his/her beach. This is due to the introduction of co-management as the Beach Village Sub-Committees (BVCs) appear to wield more powers and authority than the local leaders, for example, at Mposa. The parallel structures (BVC structure and traditional leadership) that exist in the fishing communities are a source of conflict over allocation of fishing areas and methods mainly between gill net and seine fishers.

Another aspect is favouritism that the local leaders express towards *Nkacha* seine fishers from Lake Malombe and the resident *Matemba* seine fishers in return for fish catch portions (*cha kwa mfumu*) as a group of fishers at Ntila stated:

When it comes to enforcement by BVCs during closed seasons, we notice that the patrolling teams always confiscate our *Matemba* seines leaving the *makoka a mfumu*, to continue fishing which are left for the local leaders. This demonstrates favouritism just because the local leaders look for the catch portions or cash during the closed seasons, which is also usually a

lean period when majority of households are food insecure from December to March. This is bad because we also need to fish to get money and buy food for our households. Moreover, we [Lake Chilwa fishers] always participate in fish resource management while our colleagues from Lake Malombe just come to fish without managing the fisheries resources.

With the favouritism perceived by the resident fishers, conflicts between the fishers and BVCs or among resident and in-migrant fishers abound. Majority of the BVCs around the lake always seek permission from their local leaders before they go out patrolling on the lake during closed seasons. In most cases, local leaders appoint members of the BVSCs so that they have indirect influence on the committee's activities.

The co-management arrangement is mainly between the Department of Fisheries and Traditional Authorities that have BVCs dominated by artisanal<sup>19</sup> fishers that operate fish traps, gillnets and long lines who take instructions from their local leaders. In this context, participation and partnership is not inclusive and hence management measures have been formulated to target the seine operators and not for the benefit of the Lake Chilwa fishery.

## **5.2 Conflicts associated with ecological issues**

An ecological aspect refers to where seines and gill nets operate. In most cases, the seines damage gillnets during operations. However, advantages of the migrants include improvement of the local economy in terms of employment opportunities for the seine crews that include a few from the local fishing communities, increased fishing landings for fish traders and demand for fishing-related activities such as boat building and boat engine repairs increases.

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<sup>19</sup> FAO (1995a) in the context of Malawian fisheries, defined artisanal fishery as a small-scale commercial fishing operation, using various nets and small plank boats or canoes, powered manually or by outboard engine. They are generally referred to as 'Traditional Fisheries' and can be divided into the group of fisher-entrepreneurs, who own the fishing equipment and the group of crew members, who are employed to operate or to assist in operating the fishing unit. In another publication, FAO (1995b) defines artisanal fisheries as those that are mostly commercially oriented and where the fishers operate their own fishing units, or with support from their immediate community

Access to distant fishing grounds involves use of bamboo poles (*miponda*) as shown in Figure 15 and paddles (*malemu* or *nkhafi*) as shown Figure 16. The Lake Malombe fishers introduced use of paddles in 1980s. Traditionally Lake Chilwa fishers operate seines in inshore waters or localised areas where they construct temporary structures for dwelling (*zimbowera*). They claim offshore fishing targets breeding and immature *Matemba* while mature ones migrate to shallow and marshy areas as one old seine fisher at Khanda stated:

The *Matemba* breeding stock and immature ones are located in deeper waters after which they migrate to shallow and marshy areas for feeding and hiding. These are the areas I target for seining but you see that our colleagues from Lake Malombe go to the deeper areas using their planked boats propelled manually by use of *malemu* [paddles] instead of *miponda* [bamboo poles] where I believe are spiritually reserved sites [sanctuaries] for fish breeding and yet they operate their seines there. The migrant Nkacha fishers always fish in the sanctuaries. This is unfair to our tradition and culture, which involves giving respect to our spirits.



Figure 15: Fishers in a planked boat using *miponda* (bamboo poles)

Photo by Hara (2006)

However, from 2005 there were suggestions to regulate access to the fishery resource indirectly. One BVC chair at Mchenga on the Lake Chilwa south indicated:

Since I cannot physically chase away the migrant *Nkacha* fishers because of the rights that every Malawian has, by constitution, in terms of access rights with respect to the fisheries resources, we will just come up with rules that will restrict operations of the *Nkacha* seine in open waters. We will just limit use of fishing equipment like *malemu* [paddles] and instead tell them to use *miponda* [bamboo poles] to propel their boats. I am certain that they will not go far because bamboo poles cannot propel their big plank boats to the open waters.



Figure 16: Lake Malombe fishers propel planked boats by using paddles  
Photo by COMPASS (2005)

The introduction of limited access measures specifically affects the full-time resident *Matemba* seine fishers who adopted open water seining techniques and the in-migrant *Nkacha* fishers who operate by using paddles. The Lake Chilwa variability induces migration within the lake and attracts full-time seine fishers

from Lake Malombe. Any measures aimed at limiting access would not be in the interest of the seasonally full-time fishers who land larger catches of fish. The seine operators contribute to the local economy in terms of small-scale businesses such as restaurants, rest houses, sell of foodstuffs and wares belonging to the local residents due to their high fish catches from *Nkacha* seines.

Additionally, the *Nkacha* seine net owners seek local crew and hence offer employment opportunities to young unemployed men who take up fishing as safety net. Field observations and even data from the co-management survey shows young people (18 years old) becoming fishers, which can negatively affect their educational prospects. There are also problems like marriage break-ups mainly as some in-migrant fishers seek resident status by taking women some of whom are married as their wives as one fisher at Mposa stated:

The in-migrant fishers, especially those from Lake Malombe propose marriages, which are temporary as they break up once the fishers return to their lake during recessions with a view of getting pieces of land for farming owned by their wives. These forms of marriages are common here and our chiefs encourage them because they benefit from such arrangements in form of giving tribute to the local leaders.

This is also a source of conflicts between in-migrant and resident fishers and local people. Despite these issues, the restriction on accessing fishing areas through use of paddles can be an important tool for resource tenure. What is important is to give authority and power to community-based organisations (CBOs) including BVCs to allocate fishing areas to migrants and charge a certain landing fee for the benefit of the households. The decentralization policy demands transfer of power from central government to local government and even devolve authority to lower structures. The fisheries sector is one of the targeted sectors for decentralisation of its functions. Therefore, any suggestion to institute access rights will benefit the resource users.

### 5.3 Conflicts associated with technological changes

Fishing technologies have been introduced in Lake Chilwa mainly from 1970s (Table 18) although at national level production of nylon nets for constructing gillnets started in Malawi (then Nyasaland) in 1958 (Kalk et al., 1979). The Department of Fisheries introduced beach seines to utilize underexploited fish in the lake. In the 1980s, migrant fishers from Lake Malombe introduced *Nkacha* (open water seine operated by using two boats and paddles) while from 1990s gauze wire has been used to catch fish in the lake. The local fishers consider *Kwakwaza* as an old seining method originally for the lake. Fishers load their canoes with *Matemba* seine nets and propel it to fishing grounds by using bamboo poles (*miponda*) and instead of paddles (*nkhafi*) that Lake Malombe fishers introduced on Lake Chilwa especially from the 1980s.

Table 18: Introduction of fishing methods in Lake Chilwa (first three columns) reported by respondents (N=166) with 46 respondents indicating that they did not know about the new technologies

Technology	Who introduced	when	Impact	Source
Nylon nets	Government	1958	Change of nets from fibre nets to nylon nets	Interviews and Kalk et al. (1979)
Kwakwaza	ancestors	Old fishing method	Conflicts with gillnet fishers	Migration and co-management survey interviews
<i>Matemba</i> seine	DoF	1970	Conflicts with gillnets fishers	Migration and co-management survey interviews
<i>Nkacha</i>	Migrants Blantyre Netting Company (BNC) Chiuta fishers Tanzania traders	1980	Conflicts between local fishers and migrant as described in Section 6.1	Migration and co-management survey interviews

	DoF and MAGFAD Mozambicans			
Mosquito nets	migrants	1980s	Conflicts between local fishers and migrant as described in Section 6.1	Migration and co-management survey interviews
Gauze wire ( <i>Gozi Waya</i> )	Mangochi fishers	2004	Conflicts between local fishers and migrant as described in Section 6.1	Migration and co-management survey interviews
<i>Usodzi-wa-Mululu</i>	Mangochi fishers	2004	Conflicts between local fishers and migrant as described in Section 6.1	Migration and co-management survey interviews
Use of paddles enabling fishers to exploit open water fishery resources	Mangochi fishers	2004	Conflicts between local fishers and migrant as described in Section 6.1	Migration and co-management survey interviews

Source: Co-management survey (2004)

A group of fishers at Namanja cautioned that the wide use of fine meshed seines as shown in Figure 17 could be detrimental to the Lake Chilwa habitat. They also claimed that use of *Nkacha* seines destroy gillnets set in open waters where Matemba seines do not operate.

The introduced seining technologies are destructive. Seines or *Nkacha* and gauze wire are non-selective. They catch fish of all sizes including non-target species. They also destroy breeding grounds for *Makumba* due to the dragging effect. As they propel their boats to the fishing grounds, the *Nkacha* fishers also destroy gillnets.



Figure 17: Chair of Seine Fishers Association demonstrating a *Gozi Waya* net  
Photo by Hara (2006)

Linking to the above is the issue about resource tenure. Although not explicit, there appear subtle indications on reluctance of the resident fishers to allow fishers from elsewhere to exploit ‘their’ fisheries resources. The local fishers claim that *Nkacha* seining cleared vegetation in Lake Malombe, a situation they do not want to experience on Lake Chilwa. At Mposa, fishers expressed resentment against the Lake Malombe fishers who they claimed had overfished their lake by using *Nkacha*. The fishers argued: “Lake Malombe was weedy in the past as is the case with Lake Chilwa but today the lake is clear of the weeds due to *Nkacha*.” Already the in-migrant fishers are using *Usodzi wa Mululu* fishing method, which clears the vegetation. In this context, they fear Lake Chilwa would also be cleared of vegetation. They further argue that Lake Chilwa fishers cannot migrate to Lake Malombe because of differences in depth and mesh sizes of the nets.

During focus group discussions the resident fishers (26 May 2006, Mposa beach) indicated that it was easier to change *Nkacha* seine into a *Matemba* seine, as it

just involves changing the smaller meshed panel on the bunt while the converse involved a complete change of the net. Additionally, it was easy for Lake Malombe fishers to operate on Lake Chilwa. A group of gillnet fishers at Mposa explained: “It needs a skilled person to dive under water to tie the footrope of *Nkacha* seine.” They also claimed that the in-migrant seine fishers always operate their gears on full-time basis, thus, operating even during November-March rainy season, a period when catching of juvenile *Matemba* is common in open waters.

The conflicts arise due to the introduction of new fishing practices and between resident or local fishers and in-migrant fishers. Warner (2000) argued that a combination of demographic change through migration and the limits to sustainable harvesting of the natural resources including fishers are the underlying cause of conflict over the utilisation of the natural resources. On Lake Chilwa, conflicts of this nature are common usually from full-time fishing operations by seine operators, usually over eight months of fishing within a year. This explains a direct impact of conflicts on co-management strength, which can be either positive or negative. It can be positive where conflicts result in improved access to natural resources by artisanal fishers but can be negative where it blocks access to fishing areas with underutilised fisheries resources.

#### **5.4 Overfishing issue**

Another conflict arises in terms of possibility of causing overfishing in Lake Chilwa. While some scholars believe Lake Chilwa cannot be overfished (Kalk et al., 1979; Sarch & Allison, 2000) due to the resilient nature of the ecosystem, the local fishers strongly believe that overfishing can occur on the lake, as a certain woman seine owner at Mchenga stated:

When I started fishing in 1997 with the seine net, which my father gave me, I used to land high catches with subsequent high daily revenue from fish sales. I bought a car and built a house within one year. However, the situation changed from 2000 when the daily sales were declining to the point of depending on income from the house rent and car hire services.

The divergent view of the possibility of overfishing of Lake Chilwa fish stocks contributes to conflict between the migrant seine fishers and the resident fishers using traditional seines and other passive gear types (fish traps, long lines and gill nets). Consequently, there are conflicts among partners in the co-management arrangement as presented in Chapters 7 and 8.

When gaining access to the landing beaches, the in-migrants *Nkacha* fishers also pay something either in monetary or material form to the chief for favours. This undermines the duties of the BVCs, which have a mandate to regulate access of the new entrants or in-migrants into Lake Chilwa fishing waters. Chapter 8 examines these issues as they affect co-management mainly in terms of participation, transparency and accountability.

### **5.5 Socio-economic aspects**

Conflicts arise in different forms. Kambewa (2006) states that in the Lake Chilwa wetland conflicts tend to associate with access and control over resources that are important to households' livelihoods. In a fishery, divergent interests arise due to differences in ethnic origins of the user groups, gender, colonial domination and fishing class (Malasha, 2003). Although not explicit in this study, ethnic differences have been associated with conflicts over utilisation of fisheries resources. There is linkage of certain gear types to specific ethnic groups. The Yao from Lake Malombe are associated with the introduction of *Nkacha* seines on Lakes Chilwa, Chiuta, Malombe and Malawi. Scoop and cast nets on Lake Chilwa are for the Sena people from Lower Shire valley. In most cases, conflicts occur when the introduced fishing gear is more efficient in exploiting the resources.

On the classes of fishers, conflicts between small-scale<sup>20</sup> and large-scale fishers have been prevalent on Lake Chilwa in the recent past. The most prominent conflicts arise between gillnet fishers and *Nkacha* seine operators. The gillnet

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<sup>20</sup> In the context of Lake Chilwa, the small-scale fishers refer to those using fish traps, cast nets, scoop nets and long lines while the large-scale fisher operate seine nets and gillnets.

fishers complained that the *Nkacha* seine fishers destroyed their set gears in open waters as one gill net fisher at Ntila complained:

The problem with seine fishers is that they operate their seines everywhere including in places where we set our gill nets. In the past, gillnet fishers set their gears in the open waters since seine fishers could not access such fishing areas. However, nowadays with the coming of the *Nkacha* fishers from Lake Malombe the whole lake is under exploitation. The problem is that the seining operations in the open waters damage our gill nets and it becomes difficult to recognise who is responsible for such damage. We the gillnet operators end up buying new gillnet materials on amore frequency which is costly.

The *Nkacha* seine operators are mostly in-migrants who have introduced the gear and its fishing technique on the lake. Additionally, membership in BVCs depends on where a member comes from, thus, between being a resident or an in-migrant and by gear type or fishing technique. In many cases, membership to BVCs includes the local or resident fishers only with very few exceptional cases where in-migrants also become members. An in-migrant fisher can become a BVSC member only if he secures a permanent residence status through marriage, as one BVSC member at Chinguma explained:

All BVCs in this eastern area are composed of local fishers. We do not have in-migrant fishers on committees because we know that one day the fisher will go somewhere and leave the BVSC. After all, the in-migrant fishers seem not interested in fish resource management. The lake Malombe fishers failed to manage their lake.

The traditional small-scale fishers operating gillnet and fish traps are in BVSCs and not the commercial operators that use seines. The small-scale fishers and traditional leaders formulate regulations without participation of the seine operators who operate on full-time basis. This implies exclusion of *Nkacha* seine operators from decision-making processes making the whole process lack inclusiveness, which is an attribute of good governance. The DoF appears to lack conflict management skills, as the small-scale fishers believe that it supports the commercial fishers.

The local fishers feel the in-migrants are a source of socio-economic conflicts. Fish catch competition is one major source of conflict between the local fishers

and migrant fishers from Lake Malombe. The seine migrant fishers land higher catches than the gillnet fishers. The local gillnet fishers at Swang'oma beach explained that:

...the higher fish catches by the in-migrant operating *Nkacha* seine can induce reduced prices of fish, as they land more fish from the distant open waters where many of the local fishers, cannot go. We the local gillnet, fish trap fishers strongly believe that the seining operations especially with *Nkacha* destroy gill nets. On the other hand, the in-migrant fishers entice young girls of school-going age to exploitation through sex for money activities and unplanned marriages just because of more cash they earn from fishing. In some cases, our marriages have broken up due to relationships between married women and *Nkacha* fishers. With the risky sexual relationships, we are also afraid of the HIV/AIDS pandemic, which may put lives of the girls at risk.

Majority of the chiefs support the in-migrants for socio-economic and technological reasons. The *Nkacha* (open water seine net) fishers catch larger amounts of fish for sale to fish mongers. Usually their presence on beaches is associated with increased economic activities such as shops, rest houses, restaurants and transport. There are also conflicts related to land that the in-migrants may rent or loan for food production. One chief on northern Lake Chilwa contended:

I feel it is important that we allow the in-migrant fishers to operate in our areas. Apart from their fish landings, which are larger due to use of *Nkacha* seines, they also use land, which could be lying idle. As you know, many of these seine fishers from Lake Malombe are rich and hence have adequate capital to invest in our villages mainly in terms of farming in which case they also employ young men, which I believe is necessary.

However, the resident fishers argued that 'the chiefs support the in-migrants because they always get *cha kwa mfumu*<sup>21</sup>, which is traditionally acceptable as a token of thanks'.

Other social cultural issues include theft of gear and catch, gender, beliefs in use of traditional medicine and demand for token of thanks (*cha kwa mfumu*). Theft

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<sup>21</sup> A portion of fish catch given to a local leader as a way of tribute. In other places like Mangochi they call it *mawe* (Hara et al. 2002 while on Lake Chilwa it is termed *cha-kwa-mfumu*)

of gears and fish catch is common among fishers as a source of conflict in Lake Chilwa and other water bodies. Usually, the seine operators can steal fish caught in overnight set gillnets or nets lying on beaches. A gill net fisher at Mposa complained:

The seine operators have destroyed my gill nets and yet this is what I was depending on for my livelihood. In addition to that, they have even taken the nets with the fish. This is the reason we do not like these Nkacha fishers because they fish in open areas that we designated for gill netting only.

On gender aspects, it is not easy for women to buy fish from *zimbowera*. This is because the fishers that reside in the *zimbowera* have a belief that ‘fishing activities are for men only and involvement of women on water may affect amount of the catch’, as a fisher at Kachulu stated. However, this may not be true since men fish while half-naked, and hence men do not want women to see them while fishing. This restricts women to buy fresh fish in very few landing beaches.

Use of traditional medicine is common among fishers in Africa including those of Lake Chilwa although this was not explicit during the study due to sensitivity of the issue. Fishers believe that use of medicine will protect them from bad omen or bad luck and from fierce animals like hippos (*Malawi News* 8-15 December, 2007). The conflict lies on the fact that there is a belief that any bad omen is associated with being bewitched.

In selected landing beaches, traditional authorities demand a regular portion of fish from fishers especially from in-migrants that operate seines. While this is a traditional way of expressing gratitude to the traditional leaders for the beaches they use, nowadays it may be termed as corruption mainly in cases where traditional leaders allow illegal fishers to operate during closed seasons. Conflicts arise between the resident fishers and the in-migrants over the illegal operation of the seines. Majority of the interviewed fishers cited the conflicts in Ntila and Kachulu beaches.

During closed season, there are special seines that our traditional leaders allow to operate for food. They earmark such seines not for confiscation by BVCs. Therefore, we always ask whether the closed season is only for the ordinary fishers and not including those in authority.

Land tenure systems are also in contestation between resident and in-migrant fishers. The in-migrant *Nkacha* fishers can easily get pieces of land through marriage or by renting it from poor households. The resident fishers feel the in-migrant fishers were also getting their land, which they use, for rice growing. Several groups of fishers at Ntila, Namanja and Chinguma contended:

While we allow the *Nkacha* seine fishers to operate in Lake Chilwa after they destroyed their fish stocks in Lake Malombe, they are also engaged in getting our land. They have temporary marriages just to ensure that they can easily access land. This is unfair...

## **5.6 Conflicts associated with policy and legislative frameworks**

Policy and legislative frameworks governing natural resource use in the Chilwa basin (Annex 11) have been in conflict with each other. At national level, the policies and legislations on water use, environmental, land, forestry, parks and wildlife and fisheries have been in conflict with each other. For instance, the ministries responsible for agriculture and irrigation promote cultivation along riverbanks for food security and yet it promotes siltation of the rivers and the lake due to soil erosion.

At international level, the Ramsar Convention that promotes the principle of wise use of the natural resources with participation of the community largely recognises numbers of bird species for protection. The fishery component is not a determining factor in declaring wetlands of importance as Ramsar sites. Legal pluralism seems to apply to Lake Chilwa ecosystem with conflicting issues and yet the local fishing-farming household used to manage the ecosystem in a holistic manner as a group of fishers on Chisi Island stated:

We used to utilise and manage Lake Chilwa as one ecosystem with fish, water, birds, grass, trees and land with guidance from our traditional leaders unlike nowadays when I hear about BVCs for fish, *Mwayi wa Mbalame* Association for birds, Village Natural Resource Committees for trees and so on. During drought, we offered sacrifices to have water, which refilled the lake and subsequently have fish and grass...

The above statement shows how difficult it may be to introduce policy frameworks to guide management of fish, water, wildlife mainly birds, land, and forests. It also follows how difficult it may be to have a co-management arrangement for each one of the natural resources. The problem lies on having the same people elected into positions in the community-based natural resource committees. Eventually there is limited efficiency in resource utilisation and effectiveness in achieving intended objectives of the co-management arrangements.

### **5.7 Who has the power: gear owner or crew?**

In another dimension, conflicts occur between gear owners and fishing crews. At certain times, especially during farming seasons when fish revenue decline due to post harvest losses of *Matemba*, shortage of labour (crew) exist among seine fishing units. The available crew can become powerful in terms of making decisions as to where and when they can operate as fishers at Ntila, in northern Lake Chilwa explained:

There comes a time when fishing crew members are unavailable to many seining units. When employment in other sectors like agriculture becomes promising, the crew switch their occupations. There has been labour migration from south to centre [regions of Malawi] over the past years, which involved recruitment of young men to work in tobacco estates. Conflicts arise in cases where few fishing crews are available and can demand to operate the seines at their own will. They can even get the seine net confiscated by operating during closed season, in which case, the gear owner loses while the crew can go to another seine fishing unit. Competition over fishing crew becomes so serious that short-term contracts that may last for a day are common.

These problems are more common among the indigenous *Matemba* seine fishers and not the in-migrant *Nkacha* fishers from Lake Malombe. The *Nkacha* seine fishers always bring their own crew that are on long-term contracts. Very few *Nkacha* seine units have crew from Lake Chilwa due to lack of *Nkacha* seining skills, which are traditionally inherent among the Lake Malombe seine operators.

## 5.8 Conclusion

Conflicts due to fisher in-migration trigger the households' social pressure or collective action as presented in Chapter 7. The main conflicts include competition over space or resource, competition on prices, social problems, inherent 'ownership', and perceived wrong partners in the co-management arrangement. The same problems were also prevalent on Lake Chiuta.

On competition over space or resource, *Nkacha* fishing has been in conflict with gillnets and fish in open waters where they believe there is juvenile fish. By August, *Nkacha* seine operators go to fish in waters as far as over 5km and they use <sup>22</sup>*nkhafī* for paddling their fishing vessels to distant fishing areas and not with <sup>23</sup>*miponda* operated by local *Matemba* seine fishers. On price changes, seine nets influence lower prices due to high catches. The opposite occurs when catches are lower mainly by fish trap and gillnets that are gear types largely by resident fishers. Therefore, competition over prices occurs between fishers using cheaper gear types (gillnets, fish traps and long lines) and *Nkacha* seines mainly by in-migrants.

Finally, the results in this chapter show that migration triggers conflicts among fishers especially between the locals and in-migrants. The main issue focuses on fishing grounds and the type of fishing gears they use. The traditional leaders grant permission for any access to the landing beach. In the next chapter, I explore the role of the traditional leaders in the co-management of Lake Chilwa mainly with respect to how they support BVCs.

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<sup>22</sup> *Nkhafi* is a local term for paddle

<sup>23</sup> *Miponda* are bamboo poles use for propelling fishing vessels.

## CHAPTER 6

### LAKE CHILWA CO-MANAGEMENT: PARTICIPATION, ACCOUNTABILITY AND TRANSPARENCY

In this Chapter, I focus on the fourth research question that centres on the assessment of Lake Chilwa co-management. The key aspects include participation of key actors, support that BVCs get from TAs, transparency and accountability. First, I present a background to the co-management by relating it to the pre-colonial rule as to how user communities with guidance from their TAs were involved in natural resource management in the Lake Chilwa basin. Governance reforms are another key area I analyse by associating them with socio-political and economic transformation.

On participation, I examined how the fishers were engaged in BVC activities. Furthermore, I analysed the past and present roles of the Traditional Authorities to provide a basis for argument on how best the local leaders, as key actors would fit within the co-management arrangements and other fisheries development projects.

The chapter also presents findings on the relationship between the water level variability on both seasonal and periodic levels and collective action as community's strategy towards fishery recovery initiatives. Specific reference lies on the challenges and opportunities of fisher migrations and their impacts on the co-management arrangement. In co-management, the issue is on access to fishing beaches by migrant fishers with respect to the role of traditional authorities and BVCs in permitting the migrants.

I also assessed Lake Chilwa co-management by focusing on accountability as to how fishers elected their BVSC members. It was also necessary to identify which authority got reports from the BVSCs. This was to determine whether they were

accountable to their fishers (downward accountability) or to their local leaders, DoF and district assembly (upward accountability).

Finally, assessment of the transparency of the co-management involved examining questions on: (a) whether the co-management partners made decisions publicly, (b) whether TAs and BVSCs held their meetings openly and (c) how the authorities reported on the use of funds.

For understanding of the basis of the current co-management arrangement, the following sub-section provides a background to the previous governance systems, which included traditional or community-based fisheries management system, centralised fisheries management system and fisheries co-management.

## **6.1 Evolution of management systems on Lake Chilwa**

This sub-section outlines changes in fishery management regimes experienced in Malawi, with specific reference to Lake Chilwa. The aim is to understand how roles of traditional institutions and government have changed over the years and whether policies by the colonial and independent governments have influenced principles of co-management. Understanding of the past management regimes is useful in designing appropriate participatory fisheries management programmes in small and shallow lakes. The historical perspective in the management regimes provides an analytical basis for assessing the impact of variability on collective action that is necessary in those particular management approaches (GTZ, 2001). This section also outlines a timeline of events for Lake Chilwa fisheries management systems to examine changes in management systems in relation to other socio-political, economic, policy, technological and ecological changes such as recessions.

### ***6.1.1 Ethnic settlement patterns, political and socio-economic transformation***

The historical background of the ethnic settlement patterns, political and socio-economic transformations in terms of fishing policy changes have had a major influence on the evolution of Lake Chilwa fisheries management strategies. It is

necessary to understand ethnicity, as it is a social identity to particular groups of people. It may influence the way people make decisions.

The historical background of the ethnic settlement within the shire Highlands including the Lake Chilwa catchment area and the Shire Valley is not clear. Nevertheless, Schoffeleers (1987) indicates that the Maravi states expanded aggressively before and after 1600. After the Iron Age, the early settlers were the Maravi people who established their kingdom in Malawi, Zambia and Mozambique. Vaughan (1982: 353) states: “for most of the eighteenth century the Shire Highlands, Upper Shire valley and Chilwa basin were occupied solely by Nyanja people living on the margins of what had been the Maravi state system, and organized into small, kinship-based political units”.

Thereafter, the Mbewe Yao from Portuguese East Africa (Mozambique) settled around the area in the 1860s while the Lomwe also from Mozambique migrated to the area in late 1890s after arrival of the European settlers and missionaries in the 1870s and 1880s respectively. The European settlers established estates on vast areas of apparently uninhabited land while the missionaries were engaged in spreading the word of God.

The establishment of the large farming areas triggered migration of the northern Malawians (then Nyasas) who together with the Lomwe were the first to work in the estates and (Vaughan, 1982). The local Nyanja and Yao were reluctant to work in the estates since the Nyanja were farmers by occupation and the Yao, traders within their settlements. The implication was that the settlement patterns influenced land ownership with the Nyanja and white settlers owning larger areas of land for farming. The Nyanja had authority over the control of the commons including fish. During in-depth interviews, one chief in the southern Lake Chilwa indicated that: “The Nyanja lived along the lake mainly to farm and utilise the natural resources including fish. The common food crops grown then were millet, sorghum and later maize.”

However, the coming in of the Yao who were associated with the Portuguese in trading activities, had disrupted settlement patterns of the Nyanja through ethnic conflicts and wars during the slave trade within the Lake Chilwa catchment area. These conflicts and slave trade ended upon arrival of the Church of Scotland missionaries in the late 1880s and early 1890s (Vaughan 1982). By then the white estate owners introduced *thangata*<sup>24</sup> system, which disgruntled the natives. Therefore, the Reverend John Chilembwe (a Nyasa) led an uprising against the white settlers in 1915 to abolish the system. After his death during the uprising, the fight continued until the *thangata* system ended in the 1930s.

Following the ethnic settlement, the subsequent political, socio-economic and policy transformations influenced the fisheries governance. There had been changes in political authority from tribal dominated rule to the British colonial rule in the early 1900s, which later resulted in the Federation of Rhodesia and Nyasaland in the 1950s. Malawi and Zambia broke away from the Federation of Rhodesia and Nyasaland to become independent states in 1964. Chirwa (1996) asserts that conflicts between colonial rulers and the 'African natives' emerged when the white settlers introduced hut tax. The increased fish production policy especially from Lake Malawi was due to the need to supply fish to the British armed forces from southern Africa on their way to East Africa for the World War II while tea estate owners of Mulanje and Thyolo used Lake Chilwa fish to feed workers (Chirwa, 1996; Hara, 2001; Vaughan, 1982).

The change from one-party rule to multi-party democratic state instituted in 1994 had also influenced governance reforms including co-management, decentralisation, devolution and deconcentration with popular participation, accountability and transparency as the mechanisms of governance (Béné & Neiland, 2005). There was a shift from traditional fisheries management (before 1930s) to centralised during the colonial era (1880s to pre-independence time before 1964) and post independence in one-party-state of government to early

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<sup>24</sup> A system whereby the local people could work without pay during the colonial era especially in coffee and tobacco estates

1990s that coincided with the ushering in of the multi-party system of government.

Apparently, during the political transformation there was a shift from subsistence to cash economy. Hickling as quoted by Kalk et al. (1979) notes that the commercialisation of the Lake Chilwa fisheries commenced in 1950s. This replaced the barter trade (fish for cloth or guns) that the natives and the Portuguese practised during the slave trade era in the area before the coming in of the British missionaries (Vaughan, 1982).

The fisheries management regimes have also been characterised by changes in the policy framework with the Natural Resource Ordinance developed in 1949 and subsequent revisions of the policy made in 1973 and 1997 (Njaya, 2007). Apart from the fisheries policy and legislative changes, other relevant policies include forestry, water, agriculture, environment and wildlife (Annex 11). All these changes including formulation of policies and legislative frameworks based on sectors like fisheries, land, forestry, water and wildlife (legal pluralism) have had influence on the fisheries resource utilisation with socio-economic and political changes influencing policy reforms. The co-management regime in the multi-party era faces several problems in understanding roles of the stakeholders, responsible fisheries management in a transparent and accountable manner with a broader participatory process of the resource users, and limited mechanisms to address conflicts.

The evolved management system changes on Lake Chilwa include traditional fisheries management, centralised fisheries management and co-management. The changes occurred mainly due to the influence of colonialism around mid 1800s, economic shifts from subsistence to commercial economy in the 1970s and climatic change. Figure 18 illustrates the management regime changes.

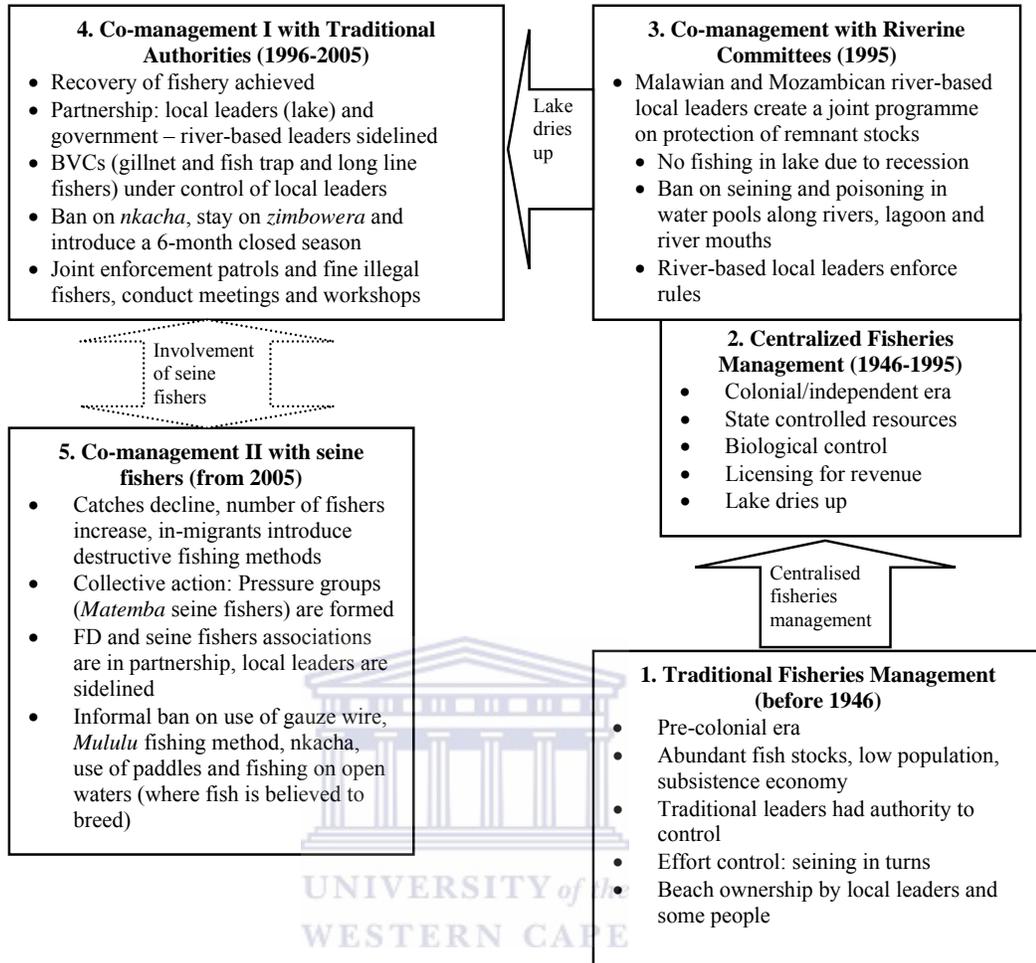


Figure 18: Evolution of fisheries governance types on Lake Chilwa from pre-colonial era to independent and multiparty democratic era

Adapted from Njaya (2002)

Figure 19 shows the timeline of events that led to the introduction of co-management in Lake Chilwa. The drought that occurred between 1990 and 1994 influenced partnership between river-based traditional leaders and DoF to conserve remnant fish stocks in lagoons and rivers that flow into Lake Chilwa.

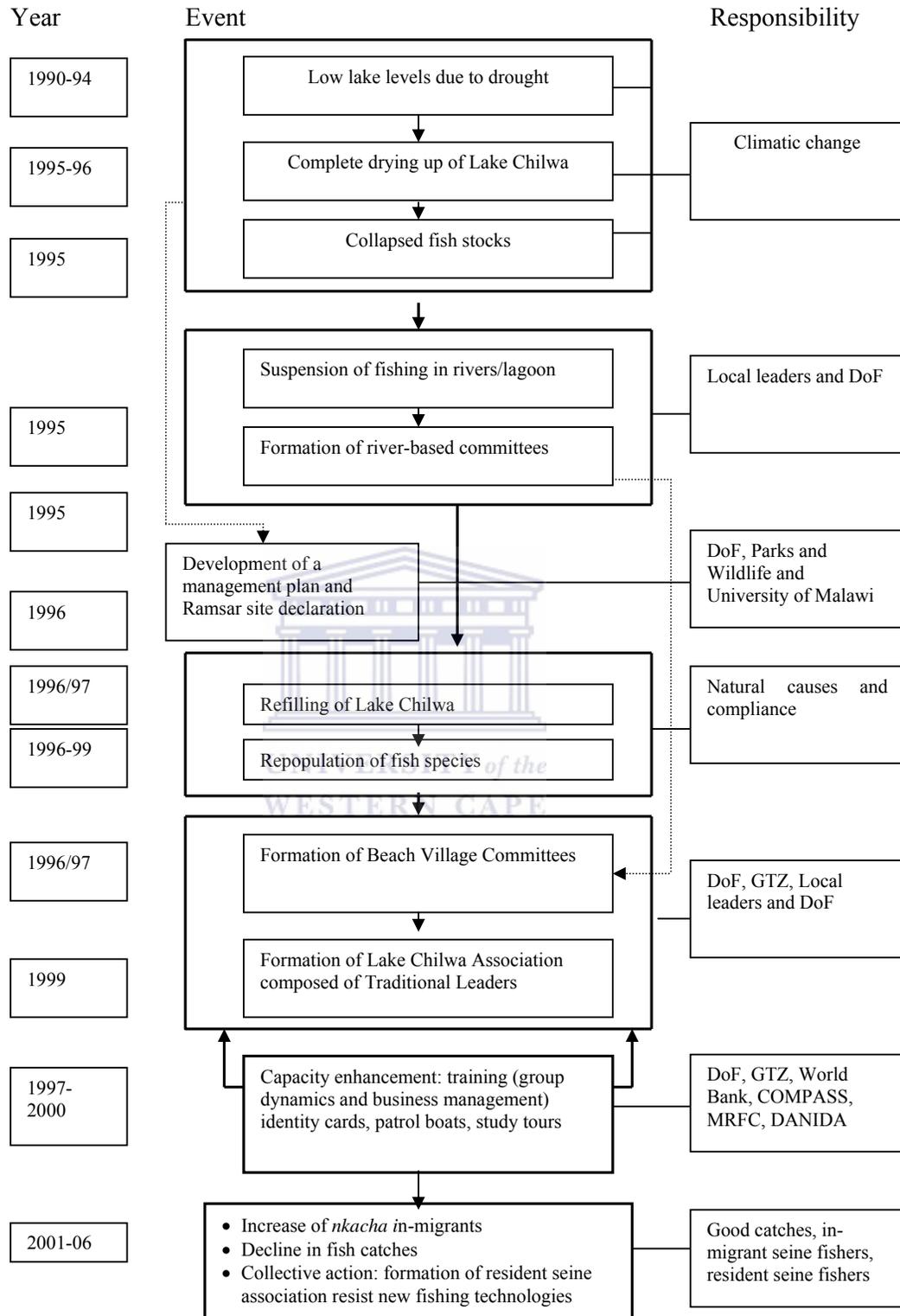


Figure 19: Timeline of events that led to establishment of co-management

Source: Focus Group Discussion at Ntila and interviews in October 2004

#### 6.1.1.1 Traditional fisheries management system before 1900 (pre-colonial era)

It is still unclear whether the past traditional form of managing natural resources by Traditional Authorities<sup>25</sup> had any specific management strategies. Donda (1997) asserts that during the pre-colonial era demand for fish was lower probably due to less population than at present. Dissi & Njaya (1995) indicated that chiefs were in control of assigning landing beaches to fishers on Lake Chiuta, which could indirectly imply regulating effort. However, it is uncommon for small-scale fishers to experience restricted access to the fishing areas as long as his conduct is acceptable. It was rather during the colonial period when chiefs had a mandate to control access. This was to demonstrate their powers and authority. The chiefs had powers to collect licenses as Chirwa (1996:364) states:

With the introduction of Indirect Rule and the establishment of Native Authority treasuries in 1933, chiefs in the lakeshore districts were empowered to collect fees on canoes made in their areas. The Forest Ordinance (Forest Rules GN. 12/32) forbade the cutting of trees for canoes without payment of a royalty to the chief in whose area the tree was cut. Quotas were imposed on trees to be cut for canoes.

This implies that chiefs could have powers to limit access. However, it is debatable whether the revenue collected was for managing the fisheries resources or merely for government revenue, as has been the case at present.

In the traditional fisheries management system the landing beaches had chairpersons appointed by the local chiefs assigned to draw up a timetable for seining operations. The beach chairpersons still exist in African countries for example Uganda (Republic of Uganda, 2003). The local chiefs have mandate by virtue of their authority to control use of their beaches. The chiefs are responsible for settling social conflicts, which arise due to theft of fishing gear or land encroachment.

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<sup>25</sup> The term “traditional authorities” include different local institutions. They are mainly non-elected chiefs holding offices based on their ethnic groups (Wilson et al. 2005).

However, there have been some incentives locally known as *mawe*<sup>26</sup> or *cha-kwa-mfumu* for the chiefs to be engaged in the control of the beaches. Currently, many fishers in Malawi still give tribute *mawe* or *cha-kwa-mfumu* to their chiefs, as a way of respect (Hara, 2001). The change of authority from the traditional leaders to other systems especially, co-management, has brought about conflicts in some cases between the local level institutions and the local leaders (Njaya et al., 1999). The traditionally grounded *mawe* has been a controversial practice in fish resource management as some scholars consider it a recipe for corruption where some chiefs allow the illegal fishers to operate in their areas with the aim of obtaining more tribute on a regular basis (Njaya et al., 2006).

On Lake Chilwa, the local fishers had rules, agreements and norms that they enforced at household or village level as shown in Table 19. One chief stated, “Although the biological or socio-economic rationale for such rules remains unclear, what is important is the socially bound pressure that influenced compliance to the rules”.

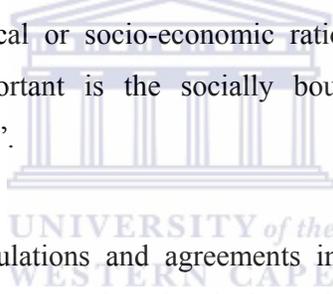


Table 19: Norms, regulations and agreements in the traditional management system indicating socio-economic rationale for each regulation

Rule/norm	Socio-economic rationale
Seining in turns (according to	To ensure equity on the access to the fishing grounds
Large meshes (nets made of fibrous plant material) and large spaced traps	Large size fish was culturally accepted for consumption and for higher price

Adapted from van Zwieten & Njaya (2003)

<sup>26</sup> *Mawe*, as locally called on Lake Malombe and *cha-kwa-mfumu* on Lake Chilwa, is a predetermined amount of fish mostly well selected fish - big in size if it is tilapia or a tin for the smaller fish species given to the local leader by the fishers as a way of respect for using the beach. In agricultural terms, Vaughan (1982) defines *mawe* or *cha-kwa-mfumu* as tribute the local leaders (Nyanja and Yao) extracted from their subjects.

During that time, population was smaller than at present and fishing was mainly for subsistence use. The main gear types used were fish traps and gill nets made of fibrous materials (*chopwa*).

#### 6.1.1.2 Centralised system (1946-1995)

The colonial government assumed responsibility to ensure efficiency in resource exploitation and utilisation and hence formulated regulations as shown in Table 20. While the government introduced licensing of beach seines and gillnets on Lake Chilwa in 1960s (Ratcliffe, 1971), the exploitation of the fishery resources remained largely unregulated. The main problem is that the licensing system is considered a revenue generation scheme and not as a management. The capacity of the Department of Fisheries in enforcing fisheries regulations became constrained due to limited budgetary provisions.

Table 20: Regulations in the centralised system (pre-1995 recession) indicating socio-economic rationale for each regulation

Rule	Socio-economic rationale
Minimum size of tilapia was set at 100 mm	To fetch a higher price
Headline length for <i>Matemba</i> seines should not exceed 300 m	Equitable distribution of benefits
Minimum mesh size for gill nets was set at 2¾ inches (69 mm)	Larger fish fetches higher market prices
Licensing of seines and gill nets	Revenue for the government
Trawlers to pay commercial licence fees	Generate revenue for the government

Adapted from van Zwieten & Njaya (2003)

#### 6.1.1.3 Co-management arrangement (post 1995 recession)

The Lake Chilwa co-management was a response to a crisis of lake recession after a three-year drought period (1992-1994). As was the case in 1968 when a similar recession occurred, a strategy was necessary to facilitate recovery of the

collapsed fishery. The first strategy involved conducting artificial restocking by breeding *O. shiranus chilwae* in ponds at Domasi and then releasing the fish into the lake. However, this could be more expensive due to required resources such as funds, human and technical skills. Furthermore, it was practically difficult to breed *Matemba* (*B. paludinosus*) in ponds for restocking in the lake, hence natural restocking during the 1995 recession was the only suitable strategy.

The traditional leaders and DoF suggested that for a successful natural restocking programme, there was a need to conserve all fish stocks in Mpototo lagoon and reservoirs along the influent rivers that include Domasi, Likangala, Thondwe, Phalombe, and Sombani in Malawi, and Mnembo and Chimazi in Mozambique. The aim was to have the conserved fish stocks repopulate the lake after refilling. The households had a similar idea, as that was what they had been doing during the past recessions. A similar programme took place in 1968.

Therefore, a collective action with involvement of the river-based households in this recovery management strategy was important, as it would be easier to enforce regulations. The local leaders and DoF organised meetings in several villages located along the major influent rivers seeking to work out an effective partnership for enforcement of rules, which they formulated and publicised on radio and newspapers. The rules were as follows:

- (a) Ban on the use of poisonous plants (*katupe*) for fishing in rivers flowing into Lake Chilwa.
- (b) Ban on seining operations in all influent rivers and lagoon.
- (c) Ban on the use of seines from 1996 to 1997.

Upon refilling of the lake in 1996, DoF decided to seize the opportunity for introduction and expansion of the co-management framework with all the lake-based fishing communities. A meeting was organised at Chilema in 1996 with the lake-based traditional chiefs and excluded the river-based traditional leaders. The meeting reviewed the regulations as shown in Table 21 with the introduction of a closed season and transfer letters as new rules. They agreed to review some

regulations while maintaining the licensing and mesh size restrictions regulations formulated under the centralised management.

Table 21: Regulations in the co-management arrangement indicating socio-economic rationale for each regulation

Rule/norm	Social-economic rationale
Lake Chilwa and Mpotto lagoon should be closed from 1 December to 1 April	To enable fishers to work on their farms
Riverine fishing is closed from May to September	To protect breeding <i>Matemba</i> when swimming upstream so that fishers catch them abundantly and hence high income when upon returning to the lake
<i>Nkacha</i> is a prohibited gear	To avoid competition with the existing beach seines
All gillnets and seines should be licensed	Revenue for government
Fishing should be done during the day time only	For easy inspection of gears
Any thief or non-compliant fisherman should be evicted	Ensure security of fishery products and compliance to regulations
Every fishermen should be registered with a BVC and pay a fishing licence	Revenue for the government and community (proposal)
All fish traders should not market their fish within the waters	To ensure that fish landed is checked by BVCs

Adapted from van Zwieten & Njaya (2003)

Towards the end of 1996, the DoF sensitized the households on the need to form BVSCs. The fishers were mostly those operating fish traps, gillnet and long line became members into 48 BVCs through elections. In the following year, 1997, six TAs and four Group Village Heads (GVHs) around the lake formed the Lake

Chilwa Fisheries Management Association. The association had no elected fisher to represent the interests of fishing households. The co-management arrangement was criticised since no representative from the fishing community was included in the association (Lowore & Lowore, 1999; Njaya et al., 2002). This implied that the reviewed rules were not in the interests of the fishers but for the benefit of the association, especially for charging penalties in the form of fines imposed on illegal fishers. Additionally, the exclusion of seine fishers in the BVSCs meant that there was limited participation of other user groups in the co-management. However, through meetings conducted during the United States International Development Agency (USAID) funded programme, many local seine fishers joined the co-management as partners through their own association and did not want to recognise the existing one composed of the chiefs.

After recovery of the fishery in 1998, there was an influx of in-migrant *Nkacha* fishers from Lake Malombe. In response to the migration, the local fishers formed a pressure group to regulate fishing practices of the migrant *Nkacha* fishers as shown in the timeline of events (Figure 19). The local seine fishers are now supporting the BVSCs and are in the process of formulating a new regulation to ban use of paddles (*malemu*) to prevent *Nkacha* fishers from accessing offshore fisheries resources. They also demand a change on the closed season reducing it from six to four months.

The Lake Chilwa seine fisher involvement has shifted the form of co-management partnership from TA-DoF to seine fisher-DoF. As a result, the *Matemba* seine fishers have now become actively involved in the BVCs. This clearly shows that co-management is dynamic (Njaya, 2007) and local fishers tend to fight for a cause whenever there is a tangible reason or problem. This is where the inherent ability to protect local property rights is also in practice within the lake. One key informant (crewmember) from Machinga district indicated:

People from Zomba chased us, and yet the lake is one. They took away our boats and gears telling us to leave Kachulu area because it belonged to them. When we approached local

leaders from the area, they did not pay any attention to us, indicating that we should indeed get away from their fishing places.

## **6.2 Assessment of Lake Chilwa co-management**

### **6.2.1 Support from key co-management partners**

#### **6.2.1.1 Support by Village Heads**

In this study, traditional leaders refer to the Village Heads (VHs) that are closer to the fishing or landing areas and Traditional Authorities that are usually far away from the lake but their influence on the co-management activities is significant. The respondents observed that the VHs provide support to the BVSCs. A few fishers at Mposa indicated that:

Our Village Head is engaged in BVSC activities mainly when new fishers come here. He makes sure that we register the in-migrant fishers and then pay something to our TA who stays far away from here. The TA also supports the BVSCs by presiding over cases of illegal fishers caught fishing during closed seasons.

The main reason is that the area is accessible to fisheries extension agents. Consequently, meetings between the fisheries extension agents and the fishers are more frequent than in the other southern fishing zone. The trend is similar even in respect of DoF support. Additionally, the village head and TA are both involved in the BVSCs due to money they get from illegal fishers as a seine fisher indicated:

It is tough to fish here without giving a *cha-kwa-mfumu* [catch portions] or money to the village head that also sends some to his TA. This is unlike in other areas where village heads do not see what BVSCs are doing. Of course, you need to give something in form of money to a village head but once you do that, you can stay as long as you can. However, here you need to pay money or give *cha-kwa-mfumu* on a regular basis.

#### **6.2.1.2 Support by Traditional Authorities**

Respondents in the southern and eastern parts indicated that BVSCs lacked support from the Traditional Authorities. In comparison, the respondents reported that TAs in the western and northern Lake Chilwa supported their BVSCs. The

TAs supporting the BVSCs usually ask their VHs to “confiscate any seine operated in the rivers to protect remnant fish stocks for repopulation of the lake after recovery”, as a few informants at Mposa explained.

Lowore and Lowore (1999) and Njaya et al. 2002 criticize the partnership of TAs and DoF as it seems fishers become observers. The perceived TA support takes the form of charging fines on illegal fishers, although the leaders often fail to account for the money. As one BVSC member at Kachulu indicated:

Our chiefs are interested in money and not fisheries management. Imagine any offender is told to pay over K20,000 as a fine and for a particular closed season 40 illegal seines can be confiscated which translates into a lot of money. The problem is that we do not know how much the TAs collect and for what purpose they use the money. Moreover, it is, we [BVSCs] that do much work and yet we do not get any share from the money collected.

The sentiments show that fishers do not appreciate the role of the traditional authorities. They rather support their village heads' role. Furthermore, it appears co-management places emphasis on enforcement during closed seasons. The co-management partners do not perform other duties, for example, counting the number of fishers on beaches to maintain registers, inspecting boats and gears, licensing and developing infrastructure like toilets.

Another point is that active participation of the traditional leaders depends on several factors. First, the traditional leader should have an interest in fisheries management, as evidenced by the river-based ones during recession periods. Second, location of the traditional leaders matters. The traditional leaders that are more active are those that are close to extension services. The DoF extension agents always encourage the traditional leaders to support the BVSCs. Where the traditional leaders have active beaches, for example Mposa, they tend to focus much on revenue generation and not fisheries management.

#### 6.2.1.3 Support by District Assemblies and Non-governmental Organisations

The District Assemblies have never provided any direct substantial support to the BVCs on Lake Chilwa. The district authorities attend meetings of BVCs upon invitation from the DoF. Likewise, for the non-governmental organisations (NGOs) there are very few that have provided support to BVCs. A group of fishers at Chisi Island noted:

Since co-management started, we have never seen any district authority from our assembly coming here to talk about fisheries management. We see our District Commissioner sometimes presiding over meetings called by Department of Fisheries. The District Commissioner has never supported us in terms of by-law formulation or enforcement. On NGOs, we are just familiar with the ones involved in bird hunting but not directly with our work.

The above explanation shows that not many DAs and NGOs show interest in fisheries management. The reasons could be due to less publicity about the importance of fisheries resources in their districts or that their priority areas are on infrastructure related projects.

### ***6.2.2 Participation in co-management activities***

Assessment of participation centred on attending meetings and patrolling the lake. Participation of the respondents in attending BVC meetings was generally low in all the fishing zones although the floodplain recorded highest with a mean perception level of 3.27 (Table 22). The least was the southern part where water level is relatively stable with depth of over 2m. The northern floodplain area is where BVCs are actively involved in patrolling the lake with support of their village heads. It is during the planning of the patrolling programmes that the BVCs meet.

Table 22: Perception levels for respondents (N=166) with missing cases on the participation in BVC activities. On the involvement in BVC formation N=92 with missing cases = 74 (1 skipped and 73 not familiar with BVCs). On patrolling, N=93 and missing data=73 (1 skipped and 72 not familiar with BVCs) while on attendance of BVC meetings, N=88 and missing data= 78 (6 skipped cases, and 72 not familiar with BVCs) by fishing zone in the co-management attitude survey.

Question	Fishing Zone	N	Mean of perception level	Sig.
1. Were you involved in the formation of the BVC?	North (<1.5m)	26	3.27	0.04**
	Centre (1.5-2m)	23	2.04	
	South (>2m)	43	2.21	
	Total	92	2.47	
2. How often do you patrol the lake?	North (<1.5m)	26	3.12	0.07
	Centre (1.5-2m)	23	2.61	
	South (>2m)	43	2.05	
	Total	92	2.49	
3. How often do you attend BVC meetings?	North (<1.5m)	22	4.27	0.16
	Centre (1.5-2m)	22	3.14	
	South (>2m)	44	3.70	
	Total	88	3.70	

\*\*Means are statistically different ( $p=0.04$ )

Source: Co-management survey (2003)

During follow-up meetings with BVCs, the respondents indicated that the authorities (DoF and TAs) ask them to attend sensitisation meetings about any new management measures and not during formulation of such measures. One committee member on Chisi Island explained:

The authorities [TAs and DoF] tell us to attend meetings to inform us about new regulations after they review the old ones without consulting us. For example, they are telling us to stop

fishing while residing in *zimbowera* [temporary shelters constructed in open waters] and yet this has been our traditional way of fishing. We just get instructions to comply with what they agree to do.

This means that the co-management also lacks transparency since the BVCs are excluded from decision-making processes as they just receive instructions taken elsewhere. It would be appropriate to involve the BVCs since they represent the interests of the fishers. Similar results emerged on how frequent the respondents participate in patrolling the lake. Generally, patrolling of the lake was rare. However, the same northern part of the lake with the largest floodplain scored highest with mean perception level of 3.12 and the deepest part with over 2m was the lowest. The deepest area is remote where enforcement team of DoF rarely goes to patrol with BVCs unlike the floodplain area where it is easily accessible by DoF staff.

In contrast, participation of respondents in BVC meetings was higher than in formation of the committees and patrolling the lake. Similarly, the floodplain area scored highest with a mean of 4.27. This fishing zone has fishers also taking part in patrolling and being involved in the BVC formation as compared to the other zones. Based on the results, I can conclude the strength of co-management arrangement in Lake Chilwa differs. The northern floodplain area with more in-migrant fishers and hence more conflicts is stronger than in the other two fishing zones, that of the centre and the south.

### **6.2.3 Accountability**

I assessed accountability of the BVCs by looking at how they are elected and to whom they submit their reports. This was to determine whether they were accountable to their fishers (downward accountability) or to their local leaders, DoF and district assembly (upward accountability). Majority of the respondents (about 85%) indicated that the whole community elects their BVCs (Figure 20). DoF and local leaders play a role in electing members into BVCs, which weakens accountability of the fisher committees to their represented fishers. In this

context, they report to the traditional leaders, DoF, not representing views and interests of the fishers.

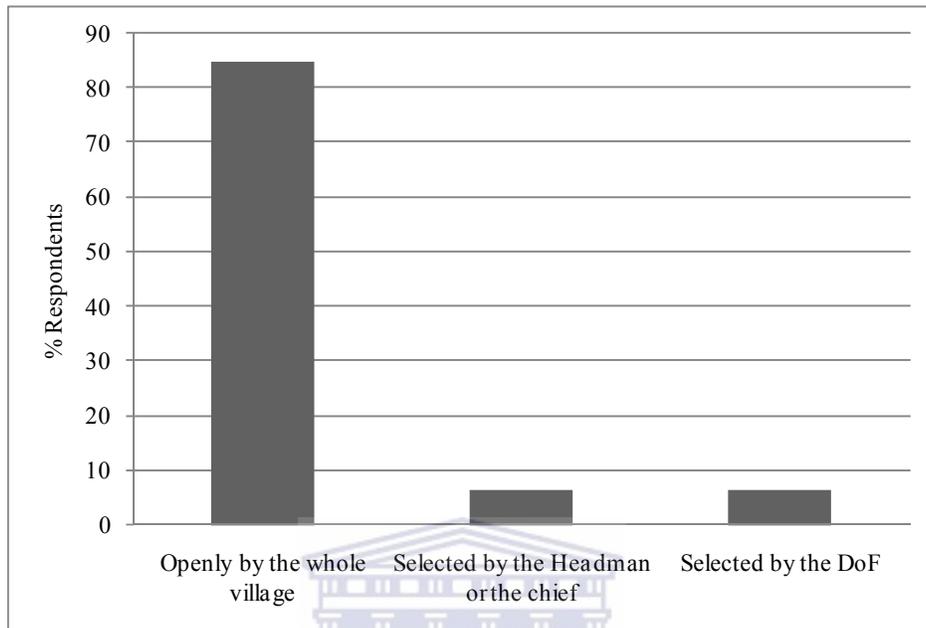


Figure 20: Graph presents the process of electing members into the Beach Village Sub-Committees with N=166. Valid cases were 93 and 73 were missing cases (one respondent did not know while 72 were not familiar with BVSCs).

Source: Co-management survey (2003)

Despite the fact that majority of the respondents indicated that the BVCs were elected openly elected by the community, the whole process lacked transparency as decision on who to appoint came from either their chiefs or DoF as fishers at Chisi and Chinguma and a fisheries assistant noted:

In some areas, the village heads or chiefs have appointed their relatives to become BVSC members so that it becomes easier to share proceeds from confiscated nets. For example, on the Lake Chilwa east, Village Head Namalele appointed his wife to be treasurer of the BVSC there with an aim of sharing money that they got from in-migrant fishers as fees.

#### 6.2.4 Transparency

On the transparency of co-management, questions included the following:

- (i) Do co-management partners make decisions publicly?

(ii) Are meetings open?

(iii) Do authorities report publicly on the use of funds?

On decisions-making processes, majority of the respondents indicated that they do not know how both the DoF and TAs made decisions regarding formulation of management measures. For example, groups of seine fishers at Mposa and Swang'oma beaches stated:

The authorities do not ask about our views regarding any new management measures for Lake Chilwa. For example, when Department of Fisheries and TAs met at Chilema in 1996, they just told us to stop seining in the river mouths without any explanation. To us this was cruel because at that time we were dependent on such fishing activities to get money for food for our families.

Despite the co-management arrangement, DoF still appears dominant in decision-making processes. The local leaders are also more dominant in making decisions than the BVCs who just get instructions from DoF and TAs. In this respect, there is limited transparency in terms of decision-making processes.

Majority of BVC members indicated that meetings that aim to formulate management measures were not open. They stated:

The Department of Fisheries and TAs agree on formulating new fishing rules without asking us the fishers what we want. There are rules that apply during recession period and others after recession. For example, we cannot have the closed season regulation now, which is six months. During the 1995/96 recession that was applicable but not now. Therefore, if we were to attend such meetings we could advise them on the most appropriate rules.

The above sentiments show that the Lake Chilwa co-management is still centralised at the lower level. The fact that DoF and TAs actively formulate new fishing rules without involvement of the resource users, explains why this study can characterise the co-management arrangement to be of limited transparency.

In addition, TAs and DoF collect penalty fines especially from the fishers caught during closed season. For example, one fisheries extension officer stationed at Kachulu indicated that:

...from 1998 to 2002, the TAs could demand over K20,000 from every confiscated net. Therefore, with nets ranging from 40 to 60 the TAs could accumulate over K100,000. The fishing community and we as BVSCs do not have any information as to how the TAs spent the money.

This means that transparency on the use of funds was lacking in the co-management. Additionally, an 'elite capture' had characterised the centralised co-management at the lower levels (TA level), which was to the advantage of the TAs and not the fishers.

#### **6.2.5 Impact of the work of BVSCs on fish stock levels**

I assessed the impact of co-management institutions on the resource status by examining responses to the questions outlined in Annex 2 (Section 8) of the co-management attitude survey. The questions are as follows:

- (a) Do you think there is more fish now because the BVSC has been working?
- (b) Do you think the village is better off because of the BVSC?
- (c) How often do you attend BVSC meetings

In the co-management attitude survey, the perception levels varied (Table 23). Generally, perception levels on the roles of BVSCs towards fish stock status in Lake Chilwa were low with a perception mean level of 2.22. The main reason is that it is easier for the Department of Fisheries extension unit to access these areas. They are closer to district fisheries offices and have passable road networks unlike on the southern, eastern and northern areas. In addition, the western part has had prominent meetings especially during closed seasons with attendance of politicians including ministers. The local leaders in that area are also able to limit in-migrant *Nkacha* fishers from Lake Malombe.

Table 23: Perception levels of respondents with N=166 on the impact of the BVSCs on fish stock levels and living standards of the households. On having more fish due to the work of BVSCs, the valid N=96 with missing values of 70 (1 skipped and 69 not familiar with BVSCs). ANOVA showed significant differences on the perception on more fish due to the work of the BVSCs,  $F(2,93)=22.61$ ,  $p<0.05$  by fishing zone. There was a range of 1-3 on the 6-step perception ladder. On the improvement of the living standards of the households in their village due to the BVSCs, valid N=96 with missing values of 70 indicating lack of BVSCs in their villages and 2 being skipped ones. ANOVA showed significant differences on the perception on village better or worse off for the past years  $F(2,94)=4.311$ ,  $p<0.05$  by fishing zone. There was a range from 1-6 on the 6-step perception ladder

Question	Fishing Zone	N	Mean perception level	Sig.
1. Do you think there is more fish in the lake due to the work of the BVSC?	North	26	2.19	0.00**
	Centre (1.5-2m)	27	2.70	
	South (>2m)	43	1.93	
	Total	96	2.22	
2. Do you think the village is better or worse off than five years ago?	North (<1.5m)	26	5.12	0.07**
	Centre (1.5-2m)	27	5.63	
	South (>2m)	44	4.89	
	Total	97	5.15	

Source: Co-management survey (2003)

However, the respondents perceived that their villages were better off due to the work of the BVSCs with a mean score of 5.15 (Table 23). The results show that the villages are better off due to the BVSCs mostly because the respondent thought that the lake fishery recovered after the co-management arrangement, as one fisher at Mposa noted:

The Lake Chilwa BVSCs assisted government to have the fishery recovered because of their involvement in enforcement of the regulations on closed season and *nkacha* ban. This started when the lake dried up in 1995 but also when it receded in 1968 although we did not have BVCs that time.

The perception levels on fish abundance in the lake due to the work of BVSCs, was low for the whole lake (Table 23). The main reason given was that there was an increase in *nkacha* seine fishers from Lake Malombe from 2000, which resulted in low catches since *nkacha* was operating in both shallow and open waters. The local fishers indicated that the increased *nkacha* seines in the shallow lake was a threat to breeding *Matemba* and *Makumba* fish and could eventually lead to overfishing. During one of the focus group discussions at Mchenga beach, the local fishers stated:

Catches were good from 1997 when fishing resumed on this lake after the recession. It was until this year, 2003, that we have had low catches because our colleagues from Lake Malombe have dominated the whole lake. They operate in rivers, flood plain areas and in the open waters where we, the locals, regard as sanctuary areas.

Another reason is that the TAS took advantage of the co-management for financial gain. A BVSC on the northern side explained:

Our traditional leaders like this [co-management] programme not necessarily for managing fisheries resources but because they get money and fish catch portions from the in-migrant fishers from Lake Malombe. They take this programme as one way of generating their income.

This assertion implies that the in-migrant fishers are an ‘elite capture’ of the Lake Chilwa co-management. It is financially rewarding the local leaders in one way or another because they get money upon arrival of any fisher on their beaches. Therefore, incentives for the local leaders co-management seems focused more on material and financial gain than on resource management. Previous studies on the qualitative assessment of co-management on the lakes (Njaya et al., 1999; Hara et al., 1999; Donda et al., 1999) support these results. Key reasons given

were that the forms of incentives for TAs in the co-management centred more on gaining fish catch portions or money rather than on resource management.

### **6.3 The emerging seine fisher-DoF co-management**

There is interest especially among the local seine fishers that operate *Matemba* seines to have the rules reviewed. They claim that the current rules are not for resource management since they promote removal of vegetation. In 2006, the resident fishers proposed the following rules, which are locally in force.

#### **(a) Gear type restrictions**

The local fishers are against use of the new gear types. During interviews at Mposa a group of local fishers indicated: “gauze wire, mosquito nets and *Nkacha* seines are gear types that are non-selective because of their fine meshes”. The fine meshed gear types operate in both shallow and deeper waters targeting various fish species especially *Matemba*. Since they are non-selective, the local fishers consider them destructive to the habitat and fish stocks as supported by biologists (Banda & Hara, 1995).

#### **(b) Fishing method restrictions**

The local fishers propose a ban on *Usodzi wa Mululu*, which involves clearing aquatic vegetation around the fishing area and use of a seine net. Fishers cast the seine around a given area and then remove all the aquatic vegetation inside to expose the target fish for easy catch. One key informant at Swang’oma claimed: “the fishing technology is disastrous since it removes vegetation that is necessary for food and provision of hiding places for the fish”.

#### **(c) Fishing techniques restrictions**

The local fishers traditionally use bamboo poles for paddling their dugout canoes or planked boats. The fishers stated that with use of the bamboo poles, they cannot go to open waters for distant fishing, but they can exploit the open water fisheries resources only if they use paddles. They are interested in exploiting fish stocks located in shore based resources and not those in the open waters. The

fishers indicate that the traditional restriction of fishing in open waters aims to conserve such stocks, as one TA at Chisi Island explained:

We do not encourage fishers to fish in open waters. We want to conserve such stocks. You need to know that the open water stocks migrate into marshy areas for breeding or feeding. Therefore, we target such inshore stocks when fishing. We have always been against the promotion of open water fishing by the Department of Fisheries since the 1970s. We could not say anything against the idea of open water fishing by introducing large plank boats with engines since we were in the one-party rule. Now with our democracy we say, no to open water fishing to avoid overfishing. Therefore, we are trying our best to formulate a rule that will restrict their movements to access the open water stocks.

Therefore, the fishers proposed a ban on the use of paddles (*malemu*) when going out to fish but use bamboo poles (*miponda*) to propel the dugout canoes and boats on water. The Lake Malombe migrant fishers always use paddles with their planked boats when accessing distant fish resources, in which case this rule targets them.

Apart from prohibiting use of *Nkacha*, gauze wire and *Usodzi wa Mululu*, which promote removal of vegetation, it can be argued that the other rules banning use of paddles are just restricting access by targeting the in-migrants *Nkacha* fishers. The local fishers fear that the removal of vegetation may threaten fish stock levels and experience the same situation as that on Lake Malombe. Such an argument is however in contrast with that by other biologists, for instance, Furse et al. (1979) who observed that Lake Chilwa has a high regenerative capacity and hence overfishing can take place.

Based on the issues outlined above, there appears to be another form of partnership evolving between the DoF and the seine net association. The seine net association is mainly composed of local *Matemba* seine owners mainly from the Lake Chilwa area excluding the *Nkacha* seine owners mostly from Lake Malombe. The same scenario led to introduction of Lake Chiuta co-management (Njaya, 1998). The emerging partnership can provide an opportunity for an effective form of co-management implemented in situations where either a crisis

or conflicts occur. In this context, co-management becomes a strategy for addressing conflicts.

However, there can be threats based on an ‘elite capture’ (Béné & Neiland (2005) and ‘a fox in a hen’s pen’ phenomena Jentoft (1993). With the inclusion of the most powerful seine fishers in the BVCs, their participation contribute to a strong co-management process, however, if not properly planned and implemented there could be a violation of rules including mesh size, closed seasons and licensing of gears. It can be difficult to regulate the seine fishers who could be members or relatives of the BVSC members.

#### **6.4 Lake Chilwa co-management type**

Currently, Lake Chilwa co-management ranges from *instructive* to *consultative* type depending on the fishing zone. In 1996, the co-management was largely *consultative*. It was the time when the lake receded. Both DoF and fishers were formulating strategies to recover the fishery. The river-based Village Heads and fishers actively participated in enforcing the fishing ban in river mouths and lagoons. However, when the Village Heads together with TAs from the lake-based area joined the co-management they became more influential in decision-making to the extent of abandoning the river-based groups and not listening to the lake-based BVCs and VHs. One BVSC chair at Ntila beach explained:

As soon as our TA became involved in the fish resource management programme, we knew that our roles were over. There was no way we could ask him [TA] about the regulations let alone money they get from confiscated nets. We became passive in our activities and left them to work with the government [DoF]. There was a time when we thought we could change the closed season period from six months to three, but there was no way we could make our views known to government because of the TA.

Thereafter, the co-management shifted to the *instructive* side in 1998 when the government and local leaders jointly drew up strategies for recovery of the fishery in 1995/96. It was a top-down co-management regime. The participation of the TAs was for their benefit we can describe that as an ‘elite capture’. The

most powerful and authoritative class of people became partners leaving out the fishers who had interest in the management of the resource.

## **6.5 Conclusion**

Governance of Lake Chilwa fisheries resources has undergone several changes mainly influenced by socio-political and economic issues. In the past (before colonialism), management was not an issue because fish was plentiful and people caught fish for consumption only. With the commercialisation of the economy and changes in the political landscape, management became an issue because people wanted to catch more fish for sale and fishers from other water bodies came to fish in Lake Chilwa. The demand for fish was higher because of the growing Zomba town and the establishment of tea and tobacco estates in Mulanje/Thyolo and Zomba, respectively, which required plenty of fish to feed the workers. More sophisticated and efficient methods of fishing were thus introduced onto the once naïve lake. The colonial government then assumed responsibility of managing the fishery with the aim of ensuring efficiency in resource exploitation and utilisation. This was a highly centralised system and traditional leaders who previously were custodians of the resources were engaged in collecting fees for the local government.

The co-management is characterised by shifts in partnership. While the initial collective action aimed to conserve fisheries resources in lagoons and rivers, the DoF initiated the subsequent co-management arrangement, which had limited participation of the fishers especially the seine operators. The lake-based local leaders that worked in partnership with DoF during the recession replaced the river-based ones. Furthermore, the DoF did not conduct any situation analysis to assess how co-management could be designed taking into account the seasonal and periodic lake level fluctuations. The DoF adopted the initial earlier co-management arrangement by recognising local leaders as partners and not the fishers.

The co-management regime lacks participation of seine fishers and hence seems to target them especially by formulating regulation on the closed season for seine fishery without their input. Moreover, the local leadership now views co-management as means of generating money through the tributes that they receive from migrant seine fishers.

Additionally by definition, a BVC is supposed to be composed of fishers, traders, processors and boat builders but this is not the case on Lake Chilwa and other lakes. Accountability is weak since certain local leaders and DoF technical officers have taken the lead in appointing BVC members. Despite the election of the sub-committee members by villagers, there is some influence from the local leaders and DoF technical officers. What this entails is that the members become accountable to those who appointed them and not to their fellow fishers, processors, traders and boat builders. In effect, there is upward accountability as opposed to downward accountability.

Transparency is also lacking with most of the decisions made by the local leaders and DoF without the knowledge of the resource users. Despite these limitations, the local leaders play a major role in enforcing the regulations they formulated in 1996 to facilitate recovery of *Clarias gariepinus*, *Barbus paludinosus* and *Oreochromis* species. The local leaders have formulated heavy fines for illegal fishing to minimise use of non-selective seines and mosquito nets during closed seasons.

Generally, the fishing community does not recognise the role of the district assemblies despite the decentralisation rhetoric since the 1990s. The decentralisation process lacks commitment in its implementation. The government has not yet implemented the planned fisheries devolution programme with functions of extension licensing of small-scale gear types and enforcement. Additionally, capacity of the district assemblies in terms of appropriate skills in handling finances and resource management is weak (Hara 2008). Owing to the

constraints, the level of participation, accountability and transparency, which are mechanisms of good governance, is limited, as discussed in Chapter 8.

In the flooded area the fishers operate seasonally mainly from January to April when the area is in flood and hence attract *Matemba*, *Mlamba* and *Makumba* fish. Following the abundant fish stocks, fishers operating various gear types migrate to the area and hence conflicts occur especially between gillnet and seine fishers and between resident and migrant fishers. The southern part is of relatively stable water levels. Migration of fishers is less frequent than in the north. BVCs located in the flooded area conduct meetings and patrol their fishing zone more frequently than the BVCs that are in the southern part.

Based on the typology of co-management as shown in Box 2, currently, Lake Chilwa co-management ranges from *instructive* to *consultative* type depending on the fishing zone. In 1996, the co-management was largely *consultative*. Then it shifted to *instructive* in 1998 when the government and local leaders jointly drew up strategies for recovery of the fishery in 1995/96 with lake-based TAs in a top-down manner. In this context, there is dynamism in terms of the type of co-management. During recession, co-management is stronger because interest of the fishers in fish stock management measures higher than after the recession. What they show as of interest to them after the recession is just advancement of principles of management of the fisheries resources by ‘exclusion’ of the migrant seine fishers that land more catches and fish in areas where the local fishers also do. Conflicts emerge due to competition over fish prices, fishing areas, status or class (between resident and migrant; gear type and asset ownership), and ethnicity (although not explicitly identified but associated as presented in this Chapter and the previous two Chapters 5 and 6.

## CHAPTER 7

### DISCUSSION

In this Chapter, I discuss the study results and draw key issues on water level changes, migration, conflicts and co-management for formulation of appropriate management strategies for Lake Chilwa in relation to the conceptual framework (Figure 12). In particular, I describe the evolving pattern of fishing techniques in response to the variability of the ecosystem, and their effects on the households' livelihoods. The chapter also examines discourses on whether it is possible to overfish Lake Chilwa. Finally, it discusses the roles of local leaders and communities, and magnitude and patterns of migrations.

The research problem that I identified in this study relates to household and community responses to changes in water levels of Lake Chilwa both seasonal and periodic. The responses include migration of fishers, collective community actions and conflicts that arise mainly due to migration of fishers.

#### **7.1 Water level changes and changes in fishing technologies**

The human population changes in the Chilwa basin is due to either natural birth or in-migration of people from elsewhere including fishers from other lakes. For the recent past especially from 2000, the majority of fishers from Lake Malombe have tended to adopt a dual settlement pattern. They invest in fishing units operated on both Lakes Malombe and Chilwa. Sarch & Allison (2000) and Mvula (2002) argue that a co-management regime that aims to regulate fisher migration across lakes is not appropriate as it limits livelihood strategies of the migrants. Additionally, Jul-Larsen et al. (2003) state that in ecosystems that naturally fluctuate, horizontal intensification based on a simple increase in numbers of fishers may actually have little impact on the stock level in a long term.

These arguments appear not to consider impacts of new fishing technologies on habitat destruction, as they focus on the livelihoods of the migrant fishers and not the fishing methods and gear types they employ. The migrant fishers from Lake Malombe introduced new fishing methods and gear types that are destructive and hence not locally acceptable. While migration of fishers is generally acceptable, the locally binding rules should apply to the migrants. If it is seining operations, the *Nkacha* seines of the in-migrants should modify theirs to match with the *Matemba* seines allowed in the fishing area. With the new fishing methods that destroy aquatic vegetation, there are fears that these practices could result in a similar destruction of Lake Chilwa fisheries as they did in Lake Malombe.

Despite the high regenerative capacity of the lake, the fishing households claim that over-fishing would still occur on the lake as observed on Lake Malombe (FAO, 1993; Banda & Hara, 1995; Donda, 2001; Hara, 2001; Hara et al., 2002). Biologists disregard the destructive side of the introduced fishing methods, which are a source of conflict between resident and migrant fishers. Furthermore, there is no policy related to migration of fishers. The complexity of the issue stems from the fact that biologists disregard local knowledge. They observe that conventional management of Lake Chilwa is not suitable due to the high variability nature of the ecosystem (Sarch & Allison, 2000; Goulden, 2005).

In response to the introduced destructive fishing methods, by 2004 the local fishers collectively took action by forming a pressure group, which was composed of *Matemba* seine fishers only. They established a partnership with the DoF to confiscate illegal nets and engage fishers caught using fishing methods believed to be destructive especially *Usodzi wa Mululu*, gauze wire and *Nkacha*; and proposing change of the closed season. In 2005, they formed an association composed of *Matemba* seine from Kachulu, Mposa and Swang'oma beaches with the specific aim of introducing measures to exclude *Nkacha* seine from Lake Chilwa.

However, Kalk et al. (1979) and GoM (1962) caution against use of under-meshed gillnets. They believe that any fishing method that promotes removal of aquatic vegetation like *Nkacha* or *Usodzi wa Mululu* may threaten stock levels. Delaney et al. (2007) suggests that the reduced sizes of *Barbus paludinosus* in Mnembo River on the eastern side of Lake Chilwa might be due to overfishing. Knowing that Lake Malombe went through a similar situation where *Nkacha* operations promoted removal of aquatic vegetation which serves as hiding places for breeding and juvenile fish, resident Lake Chilwa fishers have expressed their concerns on the growing number of *Nkacha* in-migrants.

Most of the conflicts identified in the study are associated with migrations, operational nature between static gillnets and active seine gear types and the role of local leaders that allow the in-migrants to operate in their areas. Although not explicit, other factors that have contributed to the conflicts include the competitive nature of the fishing businesses with the in-migrant *Nkacha* fishers landing more fish than the local fishers and the in-migrants accessing to farming land in the highly densely populated Lake Chilwa plain. The Lake Chiuta community experienced a similar problem between late 1980s and mid 1990s (Njaya, 2002).

## **7.2 Migration of fishers**

The study results show that majority of the resident fishing households do not migrate from Lake Chilwa to other lakes. The study also specifically examined the form of migration (inter- or intra-lake migration), resource user groups by gear type and areas for policy formulation. Consequently, this specificity brings in different interpretations, which either agree or disagree with the hypothesis that high water level viability results in high migration of fishers.

Insignificant numbers of the Lake Chilwa fishers are involved in inter-lake migration. A few fishers migrate to other lakes either seasonally or periodically during recession times. Limitations are largely due to fishing techniques. Their fishing techniques employing traditional fish traps, gillnets and *Matemba* seines

are suitable to their shallow ecosystem. The households' ability to adapt to fishing and farming gives them an opportunity to change their livelihood strategies without necessarily moving to other water bodies in case of drought and recessions. This shows that variable water level ecosystems trigger fisher migrations within the context of inter-lake migration involving the Lake Chilwa fishers and intra-lake migration by *Nkacha* seine fishers from Lake Malombe.

On gear type, the seasonal and periodic water level variability largely triggers migration fishers operating expensive gear types (seine and gill net) as compared to those operating cheap gear types (fish traps and long lines). The policy implication is that the traditional fishing techniques are suitable to specific types of ecosystems in terms of livelihood strategies.

The southern and eastern fishers migrate more than the northern and western marshy area fishers do. The reason is that fishers migrate to the northern fishing areas seasonally from December to April to exploit the abundant *Matemba* fish stocks. The seines and gillnet fishers are highly mobile as compared to long lines that are concentrated in deep eastern fishing waters and fish traps in the southern marshes. This implies that there is need for caution when making general statements about migration of fishers in Lake Chilwa and other lakes. This study has therefore contributed to the understanding of the specific fishers by gear type that migrate on Lake Chilwa either from other lakes or from within the same lake. It is now clear for the policy makers to make decisions regarding migration of fishers by gear type.

A comparison among three water bodies, Lakes Chiuta, Chilwa and Malombe on perceptions of changes in number of fishers on various beaches indicated that the Lake Chilwa scored the highest of them all. By Traditional Authority, the northern and western marsh composed of Kawinga, Mlomba, Mposa and Kuntumanji has higher level of perceptions on migration in those areas. These areas are shallower than the southern and eastern areas of Lake Chilwa.

Within Lake Chilwa, the fisher migrations exhibit variations by gear type use especially seines and fishing zone mainly in terms of open water or floodplain areas. Majority of gillnet and fish trap fishers are farmers. They fish from April to November. The households farm during the rainy season as another livelihood strategy. This is unlike the seine fishers that are dependent on fishing as their major economic activity throughout the year. They are commercial fishers because their investment into the fishing business is enormous (over MK120, 000, which is about US\$85 at an exchange rate of US\$ 1 to MK140) as compared to the fish trap and gill net fishers (MK5, 000 only, which is approximately US\$38) as stated by one fisher at Mposa. Therefore, measures that aim at sustaining Lake Chilwa fishery should focus on economic returns for these seine fishers while checking their destructive fishing technologies.

In Lake Chilwa, migration takes different forms: migration within the lake called intra-lake migration, and between Lake Chilwa and others known as inter-lake migration. Reasons for the migration include ecological and socio-economic as previously reported by Kraan (2005) and Salagrama (2005). The ecological factors trigger mobility of fishers into areas where active fishing takes place based on the gear type at certain times of the year. The fishers operating seine nets and fish traps migrate to the northern marshes from January to March following good catches of *Matemba*. During these months, the area is flooded and hence provides a suitable feeding and breeding ground for the fish. When water level drops the fishers shift to land their fish on the western marshy area as it becomes uneconomic to land in the northern marshes due to longer paddling time.

By fishing gear, the majority of migratory fishers own gillnet rather than other gear types. This is due to the fact that gillnet setting requires a deeper water level. The same applies to long line fishers. However, fish trap owners use the swampy areas to set their traps. Fish trap fishers migrate to nearby beaches and mostly the open water temporary shelters (*zimbowera*). Nkacha seine fishers migrate both within and outside Lake Chilwa (inter and intra-lake migratory patterns) while

*Matemba* seine fishers only migrate within the lake (intra-lake migration). It is interesting to note that majority of fishers who have never migrated elsewhere are those owning seines and to some extent gillnets. From the sample, two seine fishers and three gillnet fishers had never migrated elsewhere since the 1960s and the early 1970s.

By fishing area, fishers migrate to exploit abundant *Matemba* stocks during rainy seasons (January to April) in the northern marshes and migrate towards the southern part as the water level drops. By August, distance to the fishing waters becomes long which forces some fishers especially those operating cheaper gears including fish traps and gillnets to shift to farming. This makes Lake Chilwa fishers dependent on farming and fishing. They sometimes become fishing opportunists, as they set their fish traps in rice fields during cultivation. In some instances, fish like *Makumba* feed on rice stalks thereby reducing harvest quantities.

Periodically, there is movement of fishers from Lake Chilwa to other lakes especially Lake Malombe. This migration is restricted to Lake Malombe fishers who return home to continue fishing in either Lake Malombe or Lake Malawi. Lake Chilwa fishers who own traditional gears especially fish traps, gillnets and long lines do not migrate to distant water bodies. A few fishers that are resident between Lakes Chilwa and Chiuta occasionally migrate to Lake Chiuta for a limited period. When recession occurs on Lake Chilwa, the majority of the fishers opt for other types of occupation to sustain their livelihoods until such a time that the lake recovers. The fishers are engaged in farming vegetables on high fertile soils of the lakebed while others migrate to tea and tobacco estates and towns for employment. Those along the eastern border with Mozambique migrate to nearby towns and villages within Mozambique for gleaning or working in farms in return for food.

In some cases, long-term migrations both into fishing and into non-fishing activities occur. It may also involve migration of fishers from villages to towns or

cities at particular times of the year either to sell fish or to settle and look for alternative livelihood activities when catches are poor (Salagrama 2005). When Lake Chilwa recession occurs, food stocks are exhausted and households seek food relief from donor organisations and government. These are policy issues that are important when designing food security programmes in the Chilwa basin.

The results from this study indicate that socio-economic, policy, technological and environmental factors influence the fishing-farming households' response to the variability of Lake Chilwa. These changes follow a cyclic pattern whereby during *normal*<sup>27</sup> water levels, the households respond by practising fishing and farming as major economic sources to support their livelihoods. During recession, however, the households farm mainly in the wetland areas while others do businesses or seek employment elsewhere.

### **7.2.1 Tenure systems**

A question on tenure rights that include land in the floodplain fishing areas and water has been central to the fish-farmer households. With farming during recession periods, there is communal or private property ownership of land. The VHs recognise their land and so do the individual farmers. Owing to land constraints in Lake Chilwa basin (Peters, 2002; Kambewa, 2006), conflicts are common especially where claims of ownership involve a traditional leader apportioning it to more than one person. In areas with rice schemes, land given to tenants is state property. Although the new Land Policy recognises the state as the principal owner, its legitimacy remains contested by chiefs, primarily because they want to retain their customary powers for allocating land (Kambewa, 2006).

When the farming area is flooded open access to the resource is a common characteristic. Although there has been an initiative to develop a common property right regime through the Lake Chilwa Participatory Fisheries Management Programme (PFMP), its implementation has been delayed due to

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<sup>27</sup> Period between major recessions such as from 1969-1994 when the water level changes were just seasonal

limited commitment and weak capacity by DoF and local district assemblies. The decentralisation process that provides a framework for local community participation in development work has not yet produced any successful results, due to lack of accountable members in the assemblies and weak capacity of the local district authorities (Njaya, 2007).

### **7.2.2 Migration as a livelihood strategy**

Migration of fishers is of two types. First, there is migration that takes place within Lake Chilwa, and second, migration that involves movement of fishers from the lake to others. Fishers migrate within Lake Chilwa on a seasonal basis between the southern and northern marshy areas. This usually takes place unusually during the rainy season when the north is flooded. The fishers target *Barbus* species that breed during the flooded period of November to March (Jamu & Brummet, 1999).

The capital-intensive seine fishery involves a higher mobility of fishers than the other traditional gear types (gillnet, fish trap and long lines). With the continued ban of seining on Lake Chiuta, the seine fishery appears confined to Lake Chilwa and other water bodies including Lakes Malombe, Malawi and the Shire River system. Fishers migrate to other lakes only during major recessions. However, only a few fishers with seines migrate due to gear technological differences.

Generally, results from this study show that migration does not contribute significantly to the livelihoods of the Lake Chilwa fishing households during recession periods. Fishers that migrate mainly own gillnet and mostly operate within Lake Chilwa. In terms of seine fishers, the results show that very few migrate to other water bodies because their traditional *Matemba* seines lack the suitable depth to operate effectively in a similar way as the *Nkacha* seines do on Lakes Malombe and Malawi. A policy implication on these results points to the fact the Chilwa basin population is vulnerable to climatic changes mainly in terms of drought and recessions. Safety net mechanisms are necessary with diversified income sources for risk distribution (Béné & Neiland, 2005). During

drought, food security is threatened, and hence farming and dependence on other natural resources like birds and keeping livestock could alleviate human suffering.

#### 7.2.1.1 Fishing for livelihoods

Fishing is the dominant occupation for Lake Chilwa households. The termination of mine contracts that enabled Malawians to work on South African mines from the 1960s to the 1980s has left fishing as the only means of earning cash for households within the Lake Chilwa basin. Furthermore, because of the resiliency of the Lake Chilwa fishery, some fishers from Lakes Malawi and Malombe migrate to operate their seines in Lake Chilwa on an annual basis. This increases pressure on the resource. If not checked, the increasing investment levels and number of operators will be at variance with the scientific explanation that Lake Chilwa has high prolific breeders (*Matemba*) (Sarch & Allison, 2000). The resident fishers disagree with these scientific and economic justifications, as they continue to blame DoF for introducing seining technology. To them fish trapping, gillnetting and long lining were their major fisheries. Any proposed measures focusing on tenure rights will be widely accepted by the resident fishers, mostly those operating fish traps, gill nets and long lines.

#### 7.2.1.2 Fishing for economic reasons

While the majority of the fishers operate their gears on part-time, the in-migrants are full-time fishers. The migrants transfer their fishing assets including Nkacha seine, planked boat and accessories like paddles and ropes. Fishing crew also transfer due to their special skills in diving to tie footropes in water, an operation rarely used by local fishers. Additional costs include an 'access fee' paid upon arrival and regular fish catch portions given to the TAs as tribute. Because of high transportation costs involved in migrating from Lake Malombe to Lake Chilwa the Nkacha seine fishers usually fish illegally to cover their costs. Whether it is during the closed season or the gear is destructive, is not a major concern for the in-migrants. The only motivation is high returns within the

shortest period. Consequently, fishers report that *Makumba* has never recovered to levels as those between 1970s and early 1990s.

Apart from accessing the fisheries resources, the in-migrant fishers also gain access to farming land through marriage or receive it from chiefs at the expense of local people. In some cases, poor households enter into rental agreements of the resident's land with the in-migrant fishers due to increased costs of farming inputs that include seed and fertilizer. The inputs are mainly needed in some areas with poor sandy soils especially the northern part (between Lake Chilwa and Chiuta) where a sand bar separates the two lakes. Matiya (2005b) also asserts that Lake Malombe fishers own larger pieces of farming land than non-fishers. A proportion of the poorer resident households do not have adequate land for farming.

### **7.3 Impact of water level changes and migration on co-management**

#### **7.3.1 Roles of the traditional authorities in co-management**

This sub-section discusses the major impact of water level changes on co-management. In this aspect, I refer to roles of the Traditional Authorities (TAs) that are a major focus in the Lake Chilwa co-management and for comparison sake, the District Assemblies, non-governmental organisations and Village Heads. I single out the Traditional Authorities because they collaborated with DoF during the recession to formulate management measures for the lake.

Mbalanje (1986) referred to a Traditional Authority as the head of a community. Each administrative district in Malawi has areas, which TAs with several group village heads (GVHs) control. In turn, the group village heads have authority over the village heads (VHs). Under the village heads, are family leaders called *limana* or *eni mbumba* (clan or sub-clan heads) in some areas especially among the Nyanja.

The role of traditional institutions in the management of natural resources in the southern African region has been ambiguous and controversial. One school of thought is that changes made in the post-colonial period led to the erosion of the capacity of traditional institutions from effectively managing natural resources. Mamimine & Mandivengerei (2001) argue that modern institutions are in conflict with traditional authorities a situation, which has the potential of leading to the degradation of a resource.

Vaughan (1982) describes kinship ties that existed among the Nyanja in the Chilwa basin around the 18<sup>th</sup> Century. The Nyanja was the dominant ethnic group at that time and were organised into small-kinship-based political units that shared a common cultural tradition characterised by a territorial religious cult, as well as by the economic exchange based on ecological diversity. Farming was the mainstay of the tribe because of the fertile soils, which relegated fishing to a part-time activity. Apart from farming and fishing, the Nyanja were also involved in hunting game including birds and making salt as additional occupations.

Response to the catastrophes such as drought is associated with certain practices including dancing *Tchopa* and offering sacrifices to ancestral spirits. These traditional practices aim at receiving rains from their ancestral spirits that link up with their god (*Chisumphu*). In effect, they ask for rains to replenish the lake and for crop production since crop failures are common during recessions. This is ostensibly intended to benefit the whole community within the basin and other areas. Communities within the Lake Chilwa basin consider natural catastrophes, drought and diseases outbreaks like smallpox and measles as punishment from the ancestral spirits for the community's evil ways. When this occurs, the community believe that some people within the community may have offended the spirits. However, beliefs in such deities are waning due to the growing influence of Christianity and commercialisation of the fisheries. Nonetheless, these practices are still common in other parts of Malawi like Nsanje district where villagers still conduct traditional rituals (*Makolo* believers) in deference to *Mbona* (god) asking for rains (*Malawi News*, 2007).

The question about the TAs' role in Lake Chilwa co-management may be justified as a stakeholder group within the co-management arrangement. It is a requirement that only elected members should be members of the fishing-farming committees (Ribot, 2002), as a way of promoting accountability to the groups. This is usually within the decentralisation and devolution processes of state functions to local governments and fishing-farming communities respectively (Njaya, 2007). The argument, however, fails to recognise the roles of the African traditional leaders in resource management before colonialism mainly in the 19<sup>th</sup> Century. During that time the TAs were mainly involved in settling disputes, allocating land for landing fish and farming, controlling cutting down of trees and leading communities in seeking rains from their ancestral spirits. In situations like Lake Chilwa where BVC members may migrate to other areas, the traditional leaders are responsible for monitoring the fishing activities through their permanent beach-based representatives (*nduna*), otherwise illegal fishing may increase in that village.

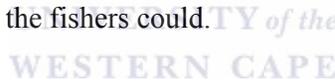
In some areas, however, traditional leaders nowadays appear be more concerned with financial reward. In beaches like Kachulu and Ntila, local leaders and BVCs demand regular payments (*cha-kwa-mfumu*) for use of the beach. Although this has been an old practice, the introduction of co-management has benefited the elite or local leaders. In the past, the village heads could get a certain amount of fish of good quality and larger size as tribute for letting fishers use the beach. However, from 1995, the village heads do not only get fish, but also money to allow illegal operations during closed seasons.

There are multiple institutions responsible for allocating resources like land in the wetland, which are now becoming private property. Kambewa (2006:88) asserts that 'some traditional leaders have turned land into their personal property' and yet it is illegal to hold land as a private property in the new Land Policy (GoM 2002b). This assertion agrees with what the study found in that the traditional leaders are assuming ownership of landing beaches and hence exercise their

powers as to who should have access. BVC formation with alienation of these customary institutions in terms of rules and organisational structures will lead to failure of co-management as power contestation becomes common in this case (Hara and Nielsen 2003).

### **7.3.2 Roles of other key co-management partners**

There is limited participation of the District Assemblies on fish resource management. Seymour (2005) indicates that the district commissioner for Zomba could not articulate the role of the district assembly in fisheries management. The non-governmental organisations (NGOs) have limited interest in natural resource management especially fisheries management. The three district assemblies of Zomba, Phalombe and Machinga that share Lake Chilwa have not yet materially supported enforcement, extension or research activities apart from attending workshops organised by DoF. Co-management is not only about partnership between the state and the fishing community but also civil society groups although Wilson et al. (2005) argue that inclusion of members that do not take fishing as their primary livelihood strategy can not represent interest of the fishers in the same way the fishers could.



### **7.4 Participation, accountability and transparency**

Based on the results in Chapter 7, partnership of the Lake Chilwa co-management had been largely limited to DoF and the traditional chiefs until 2006 when the seine fishers became actively involved in participatory fisheries management. The key participants, which are fishers, in this context, did not participate in the process. Additionally, civil society groups and other decentralised structures like District Assemblies (DAs), Area Development Committees (ADCs) and Village Development Committees (VDCs) were not actively involved in the fisheries management activities. Participation of the DAs, ADCs and VDCs has been mainly in political and infrastructural development issues. The District Assemblies have not yet played their role in the fisheries co-management (Njaya, 2007).

For an effective co-management arrangement, governance reforms are necessary. This includes issues of decentralisation and devolution processes. In this respect, the co-management regime should be inclusive with broader partnership of all fisher groups by gear type ranging from those operating cheap fish trap and gillnets to those using expensive seine nets.

In Malawi, the centralised approach is still evident in the case of legal provisions outlined in the Malawi Fisheries Conservation and Management Act of 1997 despite initiating the co-management arrangements in early 1990s. For example, Sections 5(1) and 4(1) give powers to the Director of Fisheries to appoint members of the Fisheries Advisory Board, and Honorary Fisheries Protection Officers respectively. The Director has powers to develop local management plans, which he or she can unilaterally impose. Although in this process consultations take place with the local communities, they lack opportunities to advance their interest in the co-management arrangement. Given this legal arrangement, it will be no surprise that the overall level of participation is low.

Hara et al. (2002) point to the fact that the composition of the fishing-farming committees is crucial. In Malawi, the fishing committees are not always composed of fishers only. Owing to the initial promise of paying sitting allowances and buying *Nkacha* nets by donors, power rather than need and relevance determines composition of BVCs formed around Lake Malombe. In some studies (Hara, 1996; Hara & Nielsen, 2003) it was found that participation by actual fishers in BVCs was low (30%) while participation of people engaged in various other occupations was high (70%). The sitting allowances are a clear example of an institutional arrangement leading to perverse incentives, undermining the co-management initiative. In sharp contrast, the same survey found that Lake Chiuta BVCs that initiated the co-management process were composed of over 90% fishers.

The fact that there is low representation of the seine fishers in the fishing committees is problematic. It means that they cannot participate in the decision-

making about rules and regulation that target the use of specific gear types, like *Nkacha*. The *de facto* exclusion of many fishers from the committees has resulted in co-management practices that lack not only transparency but also legitimacy. Unsurprisingly, this leads to general non-compliance to regulations on closed season, mesh and gear sizes and licensing. One reason cited for the specific exclusion of (migrant) *Nkacha* fishers, is the consensus about the destructiveness of the practices they use. However, most lakes are characterised by multi-species and multi-gear fishing practices, and it is therefore unlikely that BVCs will consist of only *Nkacha* fishers. It is likely that long line-gillnet and fish-trap fishers will be in the fishing committees as well.

Another question centres on how accountable the Beach Village Sub-Committees (BVSCs) are to the fishing community. While the fishing households elect BVSCs, in some areas traditional leaders just pick the fishing-farming committees (Hara 1996). Consequently, the sub-committee members become more accountable to the traditional leaders who chose them and not to the fishers. The Lake Chilwa co-management generally lacks downward accountability of the BVSCs, TAs and DoF especially in the south-western parts due to limited interaction with fishers. In the area, Village Head (VH) Namalele appointed the sub committee members whose accountability is upward and not downward. The sub-committees report to their local leaders and do address the concerns of fellow fishers. Accountability is mainly about elections and representations. In the western perspective, emphasis is on elections or representations by elected members while in the African perspective it may not be applicable due to the influence of the local leaderships. Traditional leaderships or kingdoms are inheritance from one generation to another and in some communities, they command more respect than governments.

Finally, the DoF and district assemblies do not respond to any issue or proposal that the households raise with urgency; for example, that of banning fishing technologies that promote clearing of aquatic vegetation or any farming methods that trigger siltation of rivers and the lake. The co-management arrangement

focuses more on the fishery component, unlike in the past when traditional management considered all natural resources including land, water and birds in a decentralised framework, as means of minimising conflicts on the structures for the co-management and decentralisation (Njaya, 2007; Katerere, 2000).

There was a high compliance with the rules formulated to facilitate recovery of the fishery. The chiefs played a greater role towards community mobilisation and publicity of the informal rules on the prohibition of seining and use of poisonous plants. This strategy worked since the local fishers found the rules legitimate during that recession period. It took two to three years to realise catches of *Mlamba* in 1997, then good catches of *Matemba* and *Makumba* in 1998 and 1999. The fish landings increased to about 12,500 tonnes (GoM, 1999) in 1999, which was an indication of the fishery recovery. This explains the shifting of Lake Chilwa co-management from consultative to instructive as presented in the Section 7.6 in the previous chapter.

Pomeroy (2005) asserts that fisheries co-management arrangements in some areas have shown that involvement of traditional leaders in the management structures was one of the conditions for the success of such arrangements. Historically, chiefs have had control over fishing since 18<sup>th</sup> Century, especially among the Nyanja in the Maravi Kingdom as Vaughan (1982:356) notes: “Only in the case of the fishing industry of Lake Chilwa is the evidence of significant chiefly control over an important industry”. The implication is that any policy changes that exclude chiefs in decision-making processes and their consent may not succeed. Co-management should, therefore be based on the traditional values and culture. In this context, application of useful traditional practices like authorising access to beaches by chiefs is necessary.

However, the continued enforcement of the regulations after recovery of the collapsed fisheries, lost legitimacy. Fines that the TAs demanded from illegal fishers became their incentives for their active participation in the co-management arrangement. The co-management lacks participation of the fishers

and has limited transparency and accountability. The main interest for the TAs was to confiscate illegal nets and charge fines ranging from K20, 000 to K30, 000. In some places, tribute influences continued illegal operations during closed seasons by Nkacha seine fishers. In this case, the local leaders become opportunists to benefit from co-management through penalty fees and tributes they get from illegal fishers. During the key informant interviews one respondent (Committee Chair for Ntila BVSC) indicated that:

The influence of TAs in the co-management is not for resource management but rather for their personal benefit. They encourage us to confiscate seines especially of those who do not respect the local leaders. The local leaders get angry when I confiscate *Nkacha* seines that 'belong' to the local leaders. There are gears that are for the local leaders that I refer to them as *makoka a mfumu*.

The shift in partnership from river-based local leaders to lake-based local leaders has also resulted in a shift of objectives from conservation of the remnant stocks to socio-economic benefits with TAs getting money from confiscated illegal seine nets. This is critical as the ecosystem is bound to recede again, hence participation of the river-based local leaders will be necessary, and yet they are presently not participating in fisheries management programmes like training. The shift in objectives has also created conflicts between the seine net users and the lake-based TAs since they seem to allow introduction of illegal fishing operations (*Usodzi wa Mululu* and *Gozi Waya*) and hence the formation of a pressure group to protect the resource.

Usually, the community's motive for participating in co-management originates from either benefits mainly in form of financial resources that donor funded projects provide when implementing such co-management initiatives or identifying strategies on resolving conflicts especially in cases where there are increased rates of in-migrants who introduce new fishing technologies that are often more efficient (Wilson 2003; Hara et al. 2002). On the government side, co-management has provided a platform to demonstrate democratic entrenchment into the fishing-farming community although it has failed to address challenges

like policy review, lack of guidelines for PFM agreements This is achieved through participation, accountability and transparent mechanisms that are pronounced in decentralised fisheries management regimes (Bèné and Allison 2005; Njaya 2007).

It is nearly a decade since Malawi's legislature approved the fisheries legislation. However, no substantial progress has been made towards implementation in terms of by-law formulation, signing of management agreements and development of management plans. Implementation of the PFM has lacked a proper programme. In some cases, the DoF has implemented the activities just to fulfil donor funded project requirements. Furthermore, the PFM needs a fully decentralised framework, which is not yet in place. These are key aspects that are necessary to finalise steps of the PFM process.

While it is necessary to assess co-management based on what is on the ground, as previous evaluation studies (Njaya et al., 1999; Donda et al., 1999; Hara et al., 1999; Hara et al., 2002) show, there is also a need to examine what the government has done in terms of creating an enabling environment. The establishment of the Fisheries Fund (FF), as provided for in the Fisheries Conservation and Management Act of 1997, would reduce corruption among BVCs and traditional authorities. Their planned activities would attract funding from such a Fund. The appointment of the Honorary Fisheries Protection Officers would also support enforcement activities thereby reducing illegal gear types and fishing methods. The previous co-management assessment studies have emphasised the institutional arrangements and operational capacity without looking at what both DoF and community planned and achieved. Probably, the DoF has not done what it planned and yet community structures have been in place for over ten years.

## CHAPTER 8

### CONCLUSION AND RECOMMENDATIONS

This chapter concludes the thesis based on the research questions, results and discussions as outlined from Chapters 1 to 7. Firstly, I focus on the influence of lake level changes on fishing households, subsequent responses of the households towards the lake level changes including migration of the fishers, and co-management arrangement and conflicts. I draw conclusions by examining how demographic changes due to fisher migrations induce conflicts, which in turn, affect co-management resilience or strength as outlined in the research framework. Secondly, I propose a course of action for optimal utilisation of the fisheries resources in Lake Chilwa and sustainable livelihoods of the fishing-farming households.

Based on the conceptual framework (Figure 12), I draw key conclusions on the impact of the lake levels of Lake Chilwa on the livelihoods of the households.

#### **8.1 Water level changes, migration and livelihood**

As a response measure, the Lake Chilwa households apply diverse livelihood strategies in response to the fluctuating environment. The responses of the local fishing households to variability include shifting from fishing to farming or vice versa and migrating to other fishing beaches. There is less frequency of migration in deeper areas located in the south of Lake Chilwa. For occupational migration, fishers abandon fishing at particular times of the year especially from September to December. They farm rice and vegetables along the dry exposed areas of the lake for cash incomes pending flooding in February when fishing resumes. During this period, farming activities are in a trough state. As Landes & Otte (1983) assert, introduction of any innovations on Lake Chilwa may experience socio-economic constraints. The Lake Chilwa fishers are against any innovations

regarding fishing methods. This implies that there is likelihood of resistance for adoption of any of the new technologies if not in the interest of the local people.

Wilson et al. (2005) examine different categories of resource utilisation in relation to resource tenure by looking at people who utilise a fishery resource by virtue of being closer to it, while in some cases there are people from other places who come to exploit the resource. The interaction between the two groups may be either positive or negative depending on group type. On Lake Chilwa, the local leaders benefit from the in-migrants as they obtain money (*cha-kwa-mfumu*). Another beneficiary is DoF due to licensing of the *Nkacha* seines, which are a source of government revenue. Some fish traders support the in-migrants due to higher catches they land as opposed to local fishers. This conflict of interest leads to collective action among local fishers in their attempts to exclude the outsiders from accessing the fisheries resources.

Lake Chilwa depicts floodplains, shallow and deeper water areas. These areas have different characteristics in terms of fishing gear types used, fish species caught, land use patterns and traditional institution arrangements. The variable nature of the ecosystem induces migrations within (intra-lake) and across lakes (inter-lake). Looking at the whole lake, the results show that there is high in-lake migration due to the variable lake levels depending on gear types. Resident *Matemba* seine and in-migrant *Nkacha* fishers and some gillnet operators are highly mobile within the lake as opposed to those fishers operating fish traps and long line and other less important ones, cast nets, scoop nets, *lumba* and *kungwi*.

The seasonal and periodic impacts of the Lake Chilwa water level changes on the livelihoods of the fishing households in the wetland are a common practice within the fishing community. The fishing-farming households' livelihoods from both fishing and farming in upland areas is threatened by drought, which after three consecutive years, results in recession of the lake. Fishing, which at times becomes a 'safety net' for the local fishing community in terms of employment opportunities and source of food comes to a halt due to the climatic effect.

In this context, the floodplain and fishery components of the lake are, therefore, important for both economic and livelihood dimensions of the fishing households that includes the local and in-migrant fishers and fish traders. However, they are part of the cultural and traditional systems within the localities. The economic benefits through commercial fishing activities are, however, largely for the in-migrants from elsewhere especially Lake Malombe. Very few seine fishers from Lake Chilwa migrate to other lakes during recessions while the opposite happens seasonally and periodically. This is due to the technological differences for constructing and operating the seines. The Lake Malombe *Nkacha* seines are deeper with most of them over 10m deep while the Lake Chilwa *Matemba* seines are less than 6m in depth. Heavy exploitation of the fish resources is due to use of the *Nkacha* seines, which operate in open waters where the local fishers cannot reach. The Lake Malombe fishers use paddles (*nkhafi* and *malemu*) while the local Lake Chilwa fishers use bamboo poles (*miponda*), which cannot take them to far distant fishing waters.

Within the ecosystem migration tends to be variable due to water depth and types of gear used. The seasonal flooding and drying regimes of the lake are more common in the northern and western marshy than the southern and eastern marshy areas. The intra-lake migration involving Lake Chilwa fishers is almost insignificant mainly due to different fishing technologies and fishing status (part- or full-time).

Migration of the fishers is thus characterised by gear type and fishing zone. Seine and gillnet fishers are highly mobile as compared to fish trap and long line fishers. The seine fishers are ‘professional’ in that they are dependent on full-time fishing for their cash income while the other ‘traditional’ fishers can fish on part- or full-time basis. There are more in-migrant fishers in the northern floodplain area than in the south where water level is stable. Apparently, conflicts are more prevalent in the floodplain area than in the southern deeper part of the lake due to seasonal influx of migrants to the north.

The study results do not support the idea of local Lake Chilwa fishers migrating to other lakes, as an insignificant number of Lake Chilwa fishers do so during seasonal drying up of the northern marshes and periodic desiccation of the lake. In contrast, the Lake Malombe fishers migrate to Lake Chilwa seasonally and on a periodic basis after recovery of the fishery during recession times. Economic incentives drive migrants from Lake Malombe to Lake Chilwa. The fishers crop the abundant fish stocks for economic gain while the resources exist.

During low catch periods or closed seasons, they go back to Lake Malombe. In recent years, many *Nkacha* fishers have invested in fishing units (boats and *Nkacha/Matamba* seines) on both lakes. This is a way of spreading fishing risks, as they tend to earn revenue from either of the two units at times of closed seasons, poor catches and seasonal fishing patterns. The commercially oriented fishers are opportunists that migrate to any place as long as their costs are covered. While in the past they were not interested in farming, they have now gained access to land on Lake Chilwa for rice farming. The in-migrant fishing investors have either rented land or used land belonging to the local women as their wives.

To majority of the local fishers around the lake, fishing is a part-time occupation. Commercial oriented fishing has been new to the area after learning from migrant fishers from Lake Malombe. Based on the above explanation the question on resource tenure and 'free riding' becomes central in this context. The Lake Chilwa fishers are involved in resource management strategies while the in-migrant fishers from other lakes reap the benefits. This is where conflicts associated with migratory patterns of the fishers become central to the basis of collective action and co-management.

## **8.2 Co-management**

Community participation is not new to the Lake Chilwa basin although co-management or collective action that African countries adopted in the early 1990s

appears to be a new concept. In 1968 when the lake dried up the DoF and local community formulated a strategy for recovery of the collapsed fishery by banning fishing in rivers and lagoons. They formulated a similar strategy during the 1995 recession. During recession, community participation becomes strong while in-between recessions it is weak.

The typology of co-management is characterised by fishing zone with the floodplain area having more conflicts and more fishers participating than in the stable fishing zone of the southern part. It is clear that where conflicts occur, co-management appears stronger. This links to areas where there are increased migrations of fishers. In this situation, co-management is a tool with which to exclude outsiders and address conflicts.

However, the development of a co-management programme on Lake Chilwa has not recognised the key actors mainly the river-based communities that participated in the conservation of remnant fish stocks in lagoon and rivers during the recession of 1995. In addition, the seine fisher, both local and in-migrants were excluded from participating in the co-management. The following subsections conclude the thesis and present a course of action to minimise vulnerability and shocks that the local fishing households experience due to the lake level changes.

### **8.3 Conflicts**

Differences in fishing technologies and fishing activities are main sources of conflicts in Lake Chilwa. There are conflicts among fisher user groups mainly between seine fishers and gill net operators. The latter complain against damage that the seine cause to their gill nets in open waters. At times, there are cases of theft that occur while gill net fishers are at home. In addition, the in-migrant seine fishers have been favoured locally due to their higher fish landings than the local fishers. This tends to induce competition and hence reduce prices for the traders and fish for local villagers' consumption. The local leaders have also benefited from the in-migrants through payments of either cash or fish catch portions (*thini*

*la mfumu*). During closed seasons, there are designated seines (*makoka-a-mfumu*) that the BVCs are allowed to operate as instructed by their local village heads. This tendency compromises co-management effectiveness with majority of the BVCs receiving instructions from their local leaders despite being elected by their communities. Consequently, they become accountable to their local leaders and not their fellow fishers. This lack of accountability has negatively affected performance of the co-management arrangement in Lake Chilwa (Lowore & Lowore, 1999; Njaya et al., 1999).

Based on this argument, the role of the local leaders in the co-management arrangement should therefore focus on providing guidance to the resource management programmes based on recommendations from the BVCs. The co-management institutions should be accountable to their fishers in a downward accountability scenario and not the opposite. The limited support from the TAs should provide a critical element of extension programmes on Lake Chilwa. All proceeds from monetary sanctions should be transparently accounted for with a certain proportion budgeted to support BVC activities that may include message delivery, maintenance of beach registers for fishers, gears and fishing vessels, enforcement activities and other rural based development projects like sanitation and environmental management.

Ethnic differences, though, salient, can be another potential source of conflict. On Lake Chilwa, the historical ethnic settlement patterns with Nyanja being the first to settle owned larger pieces of land than the Yao who came second. The Lomwe that came last settled in the area by asking for a share of land from the earliest settlers.

The other source of conflict is the perceived destructive nature of the introduced fishing methods (*Nkacha* seining, gauze wire and *Usodzi-wa-Mululu*) by the immigrant fishers. Seining and gill netting have been associated with mobility of Lake Malombe fishers and Lake Chilwa fishers respectively, as in most cases, the migrant fishers operate on full-time basis unlike the local fishers most of whom

(70%) operate as part time operating between 6 and 7 months per year fishers (Landes & Otte 1983). They become opportunists to fishing during flooding periods (January to April) and abandon fishing during the dry season. This means that they take up fishing and farming as their livelihood strategies.

#### **8.4 Major lessons and recommendations**

Based on the research questions, and conceptual and co-management frameworks, the major lessons drawn from this study include migration of fishers based on seasons and periods and by gear type, conflicts and relationships that exist between water level changes and household strategies.

##### **8.4.1 Fishing and migration**

Fishing is on a seasonal basis mainly from January to April in the north while for the south it may be throughout the year depending on targeted species and gear type used. Conflicts tend to emerge between resident and migrant fishers because for the locals fishing is largely on part-time basis while the migrant fishers who may be of 'professional' class fishing is on a full-time basis.

However, the local fishers aim at excluding the *Nkacha* in-migrant fishers from exploiting the abundant Lake Chilwa fisheries resources. This exclusion is also prevalent in BVCs as only the local fishers that mainly operate cheap gear types like gillnet and fish traps and long lines become elected members of the BVSCs. However, the local fishers claimed that the introduced fishing technologies (*Nkacha*, gauze wire and *Usodzi-wa-Mululu*) could pose a threat to the stock levels of the lake. Despite this claim, what becomes the source of conflict is the competition in fish landings between the migrants and local fishers. With the highly skilled fishing techniques from Lake Malombe in the use of *Nkacha*, the migrant fishers are able to land larger quantities of fish than those by the local fishers. In addition, the widely publicised destructive nature of the *Nkacha* on Lake Malombe by DoF, is another source of conflict as the seine net is taken as a destructive gear that removed aquatic vegetation Lake Malombe in 1970s and 1980s and hence not to be allowed in other lakes.

While migration is a livelihood strategy, I conclude that there is need to specify which fishers in terms of type of fishing gears benefit from their nomadic life. This is necessary for formulation of an appropriate policy direction with strategies for consideration during recessions, normal fishing period and floods. Fishers operating seine and gillnets are more mobile within the lake than those operating fish trap and long lines, which are the dominant gear types.

#### ***8.4.2 Effect of water level changes on co-management***

Governance issues are necessary for improved accountability, transparency and participation. The participation of civil society groups including all riverine and lake-based traditional leaders, BVCs, and DoF will ensure effective participation of the marginalized groups to their benefit, although Donda (2001) argues that the BVC composition is important for co-management effectiveness, hence need to have majority of fishers with similar interest on resource management as an incentive to become BVC members.

For effective decentralised fisheries management, there is a need to enhance capacity of district assemblies in the form of skills, adequate staff and equipment for effective delivery of services to the co-management institutions. In addition, the DoF should finalise steps on the PFM including registration of fishing-farming committees, establishment of a Fisheries Fund, identifying BVC boundaries and clear membership, appointment of honorary fisheries protection officers and signing of management agreements with enforceable by-laws and management plans. It will then be most appropriate to assess the co-management outcomes after creation of the enabling environment that includes implementation of governance reforms (decentralisation and devolution).

With poor planning and implementation, co-management will not be a strategy for poverty reduction among the vulnerable and marginalized segments of the society but for the rich (Béné & Neiland, 2004). Empowerment of the poor in decision-making processes and access to resources at sustainable level is a

recommended policy action for poverty reduction. Additionally, Isaacs et al. (2005) recommends formulation of poverty reduction strategies in co-management arrangements, which will also serve as an incentive for the community. Empowerment is necessary for the local community in these present times when commercialisation of the fishery and globalisation issues can become challenges beyond the capacity of the local fishers.

The Lake Chilwa co-management type is dynamic both at seasonal and periodic level and at fishing zone level. Fishing households actively participate in the management of fisheries resources (co-management) during recessions and at fishing level, in the floodplain area more than in-between recessions and in the southern Lake Chilwa due to water stability at seasonal level. This means that using the co-management arrangement typology Lake Chilwa exhibits different types based on water levels. It is *consultative* in the floodplain area and *informative* in the deeper southern area.

Conflicts emerge due to water level changes as fishers compete over fish landings, prices, and fishing grounds especially in the floodplain area during the rainy season mainly from January to April. Resource access and tenure system also contribute to the conflicts mainly in terms of power and authority between the Beach Village Sub-Committees and Traditional Authorities. There is also an 'elite capture' of the co-management, as the Traditional Authorities tend to centralise management of the resources at their levels.

#### **8.4.3 Overfishing dilemma**

A critical question centres on whether overfishing can occur in Lake Chilwa as it relates to one of the major causes of conflicts between in-migrants and local fishers. The fishers believe that the overfishing can occur on the lake because of the introduced destructive fishing methods. Furse et al. (1979) assert that biological and environmental issues, which have been of major concern within

the Lake Chilwa catchment area, can affect fish production. In addition, Kalk et al. (1979) recommend conservation of *Typha* swamps around Lake Chilwa. She notes that the fundamental role of rivers and peripheral flood plains and swamps serves as an inoculum source of plankton, benthos in shallow lakes and hence she could not recommend focusing on the management of the open water without management or protection of the surrounding swamps and/or floodplains.

#### **8.4.4 *Integrated management plan***

UNEP (1981) also recommends formulation of environmental management policies that would cover the whole catchment area of shallow ecosystems like Lakes Chilwa and Chad. This emphasises the need to manage the whole lake, wetland and its catchment area as the fishing-farming households used to do in the past. Culturally the households at village, TA level or basin level could also consider management of all the common pool resources (land, water, birds, fish, wildlife and forestry resources) in the Lake Chilwa ecosystem. They were praying to their ancestral spirits for rain, which eventually led to refilling of the lake and hence fishing activities could resume after two-three years. Therefore, formulation of an integrated management plan that aims to reduce fishing methods that involves removal of aquatic vegetation, deforestation in the watershed areas and pollution into Likangala River, as it passes through Zomba municipality is necessary (Njaya, Chiotha & Kabwazi, 1996; Jamu & Brummet, 1999; GoM, 2000).

#### **8.4.5 *Traditional ecological knowledge***

The human element is also important since management of the fisheries resources is part of the local community's culture (Chipeta, 1979). Therefore, involvement of the fishing-farming community in the management of the resource (co-management) with consideration of their use of the indigenous knowledge will promote optimal utilisation of the highly variable fish stocks from Lake Chilwa. Furthermore, the community's involvement will minimise conflicts that arise due to measures that the local leaders formulate in a top-down manner within the co-management arrangement. However, the adaptive form of co-management is

necessary, as it will promote utilisation of the fisheries resources when they are abundant and cease fishing during recessions. It is illogical that the closed season that the traditional leaders introduced during recessions in 1995 continues being in force without any revision.

Another issue is about empowerment and roles of partners. The community empowerment includes assignment of clear rights and responsibilities to stakeholders mainly the fishing-farming communities, government (local and central) and non-governmental organisations. The study results show limited participation of fishers, district assemblies and upward accountability of the BVCs and lack of transparency in terms of how the co-management institutions make decisions. Therefore, it is necessary to revise the co-management set up with fishers playing a key role and having support from district authorities and their local leaders. Capacity building for the co-management institutions is also important. Normann (2006) recommends that the enhancement of skills through training should not target the fishing-farming households only, but also the fisheries technical staff.

#### **8.4.6 Social stratification**

By occupation, the Nyanja people are farmers and fishers. They grow maize, rice, sorghum and millet, and fish by using traditional gear types that include fish traps, gillnets and *Matemba* seine. They take fishing as a 'safety net' mainly during recession or flooding times. The Yao have been involved in fishing for business and hence could consider fishing as a source of employment. The Lomwe were labourers in the pre-colonial times but later became engaged in fishing especially at a later stage after transformation of the economy from subsistence to commercial to supplement earnings from low crop yields during drought. They have also been working as crew in *Matemba* seining operations although for the past three to four decades a few of them have begun to invest in fishing. Understanding of these differences is important so that policy makers are able to target specific development programmes that aim at enhancing social

security of households to particular areas, although it may be challenging to do so due to mixed ethnic groups because of marriages.

Additionally, with such diverse resource user groups in the Lake Chilwa, it is necessary to analyse their social stratification when planning development initiatives for clear identification of relevant stakeholders, vulnerable groups, conflicts and their socio-economic needs. Policy interventions need to be more general in nature to target various vulnerable groups including women and the youth that are dependent on seasonal fishing. Women are active farmers within the Lake Chilwa basin and are at times engaged in small-scale businesses by trading various commodities including fish, crop products and bakery products. The youth are engaged in fishing as crewmembers hence they need alternative means of livelihoods to reduce risks and vulnerability caused by the lake level variability. Promotion of small-scale businesses for the youth and improved economic opportunities to provide employment for those with some level of education will reduce their dependency on fishing.

#### ***8.4.7 Improved crop and livestock productivity***

Fishing and farming constitute the key occupation for the Lake Chilwa community. Phiri, Meke, Kamundi & Salubeni (1999) indicated that crop production, fishing and fishery-related trade and livestock production are the main economic activities for Lake Chilwa wetland. However, due to limited land holding capacity, agricultural policies should aim to increase farm productivity. Farming is an important occupation to the Lake Chilwa households at times being more important than fishing especially during recession periods or seasonally to the northern-based households where water recedes from July to November. Nevertheless, the high population affects landholding capacity.

With the continued rise in human population within the wetland and catchment area of Lake Chilwa, majority of the households will have smaller pieces of land of less than one-quarter of a hectare by 2020. This calls for agricultural and land policy reforms. These should target the marginalised and vulnerable households

by promoting their access to land and farming inputs through subsidy programmes. Implementation of the new land policy that has raised concerns to some researchers (Kambewa, 2006) should take into account existence of the poor households. An equal opportunity to land access is the key to farm productivity and food security.

The livestock production policy should target the Chilwa basin households that depend on selling household assets like farm animals and poultry in times of catastrophe like hunger due to drought or floods during heavy rain seasons. The livestock may therefore reduce vulnerability of the fishing-farming households during recession periods. Mfitilodze (1999) identifies the following key constraints to livestock production in the wetland: institutional, limited land, management skills of farmers, poor infrastructure, diseases, and insufficient feed and breeding stock. To address the problems, he recommends access to capital for farmers, veterinary services, and establishment of cooperatives for production of rural based tanneries. He also recommends rearing of sheep and goat production due to their non-competitiveness with man for food and lack of taboos associated with their consumption, and hence can contribute to household food security and poverty reduction.

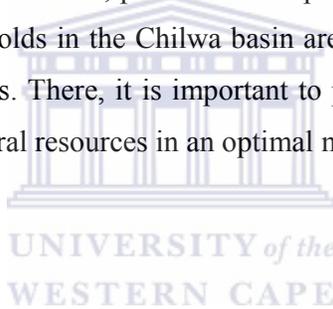
#### **8.4.8 Conflict management**

Fisheries management mainly borders on addressing conflicts, which may relate to policy, operational and socio-economic parameters. Delays in addressing conflicts coupled with inadequate skills to handle them by the responsible authorities like DoF or the fishing-farming committees and association leads to many problems in the fishing operations. For example, there have been operational conflicts between fisheries using gauze wire, *Nkacha* and *Usodzi-wa-Mululu* fishers (perceived destructive gear types by the local fishers) and the other fishers operating gill nets, seines and fish traps. Up until now, the DoF has not paid any attention to the ban on the perceived destructive gear types by the local fishing households. This lack of urgency can make the BVCs lose trust in DoF and hence weaken the co-management arrangement. Therefore, it is

necessary that DoF technical officers examine validity of the proposed ban of gauze wire, *Nkacha* seines and *Usodzi-wa mululu*.

#### **8.4.9 Policy intervention**

There is a need to harmonise policy and legislative frameworks for Lake Chilwa. Being a RAMSAR site, emphasis has been on the conservation of birds while other natural resources like water, fish, land and forestry appear neglected. The households depend on both fish and birds for food and cash income. It is, therefore, important to reduce conflicting issues regarding governance of the natural resources for diversified livelihoods and optimal utilisation of natural resources that the fishing-farming households utilise during recession periods. There is a need to examine policies that promote community-based management of natural resources. In addition, policies on adaptability and vulnerability of the fishing-farming households in the Chilwa basin are necessary to address poverty and food security issues. There, it is important to promote farming, fishing, and utilisation of other natural resources in an optimal manner.



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Newspaper articles

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## **Annex 1: Description of the main fishing gear types and methods applied in Lake Chilwa**

### *Matemba* seine net

*Matemba* seine nets are local seines suitable for operation in Lake Chilwa. The nets usually measure 80-200m in length, 2-3m in height, mesh measurement in the wings is 8m and in the central part 4mm. Fishers use the nets for catching small fish (*Matemba*). In the absence of natural beaches, fishers haul the nets into the boats. Fishing mainly demands a crew of 9 people who get half the amount of revenue earned from that particular fishing operation. The other proportion goes to the owner of the gear who takes care of the net and maintains the fishing vessel.

### Gill nets

Several types of gillnets are in use.

- (a) Nets with 33mm mesh size, approximately 1.3m in height, stretched between bamboo poles. Its length ranges from 50-500m long. Fishers commonly use it in open water.
- (b) Nets with 33mm mesh size, approximately 1.8 in height with stone weights and wooden floats. Length of the nets can be 500m and operate in open water.
- (c) Nets with approximately 18mm mesh size, about 0.6m in height, stretched between bamboo poles. It is mainly common in vegetation-covered areas along the lakeshore.

### Scoop nets

The scoop net consists of a triangular piece of netting measuring approximately 2m x 2m x 2m. The mesh size is about 15mm. The net remain open by two bamboo poles. The scoop net usually catches *Oreochromis shiranus chilwae*.

### Long lines

The long lines consist of the main line with branch lines and large hooks. Fishers use both dead or live bait and only *Clarias* species are a target species.

#### Bamboo traps

The bamboo traps are round baskets measuring about 30cm in width and 50cm in length, with a single throat. Fishers operate is during receding lake levels in shallow waters and among the floating vegetation or reeds with bait.

#### *Nkacha* seine

*Fishers operate Nkacha seines in Lake Malombe only. Nkacha seines measures over 250m long and 5m deep and have meshes of less than 12.5mm on the bunt although the recommended mesh size is a minimum of 19mm. Fishers operate Nkacha seines in open waters unlike other beach seines that are shore-based.*

The Lake Malombe fishers developed *Nkacha* seines after a serious decline of fish stocks in late 1970s having realized that they could not catch as much Kambuzi as they could with *kambuzi* seines traditionally known to exploit *Copadichromis* species locally known as *Kambuzi*.

Biologists and fishers indicate that the *Nkacha* seines have been responsible for the collapse of Chambo fishery on Lake Malombe due to the nature of its operations like fishing in open waters, almost covering the whole water column when fishing on the lake thus destroying suitable habitat for fish breeding and feeding as it removes aquatic vegetation. The other proportion goes to the owner of the gear who takes care of the net and fishing vessels in terms of maintenance. The main intriguing aspect observed during *Nkacha* operation while on water is that one crew member dives to locate where the footrope is, and he ties it to form a bag before hauling the net into one of the canoes or boats. The fishing method uses a crew of usually 9 people, a diver locally called *bilamani*, who gets twice the amount of money that the other crew members get.



## **Additional guiding questions for migration survey**

### Personal details and fishing history

1. Name, age, home village, TA, district, marriage status, number of dependents
2. When did you start fishing?
3. How many gear types do you own?
4. Do you fish on full- or part time basis? (Full time >8 years)

### Migration

1. Are you allowed to land or fish anywhere in the lake? Can you compare access to the fisheries resources between now during the co-management and before?
2. What prompts you to move from one beach to another? Is it water level changes or abundance of fish stocks?
3. Have you ever been to other lakes? Explain
4. Have you ever crossed the lake to Mozambican side of this Lake Chilwa?

### Access procedures

1. How do you approach local leaders when going to new beaches?
2. Do you give the traditional leader something like money or fish? If so, how frequent do you do that?
3. How has been the mode of payment between gear owner and crew?
4. When you move to other beaches, are you accepted by traditional authorities there?

### Investment

1. How much did you spend as capital for your fishing business? From where did you get the capital? (farming, fishing, piece work, employment, TEBA contract, borrowed money from banks, inherited or other sources etc)
2. How much do you get on average per week?

**Annex 3: Survey on calendar of events, livelihood diversification and coping mechanisms for fishers and households in the Lake Chilwa wetland area**

*Guiding questions*

1. Can you outline the economic activities you do on annual basis – specifically indicate what you do every month for the whole year?
2. How did the fishery dependent communities survived during the 1968/69 recession and 1995/96 recession?
3. Which fishers by gear type migrated to other lakes? Mention where they went for fishing
4. Were they just farming or doing other income generating activities? Indicate the activities.
5. Did they get food handouts?
6. If yes, from where?
  - (a) Relatives
  - (b) Government
  - (c) Local leaders
  - (d) Religious groups
  - (e) NGOs
  - (f) Others
7. How do people get fish? Which fish and from where get to their areas and how frequent do they consume the fish?
8. How and from where did they buy their food?
  - (a) Locally,
  - (b) Agricultural Development and Marketing Corporation (ADMARC)
  - (c) Within the villages
  - (d) Other districts or counties such as Mozambique
9. Did they resort to other food types apart from maize as a staple food crop? Which food types are these? Were they farmed or wild foods? Mention the types



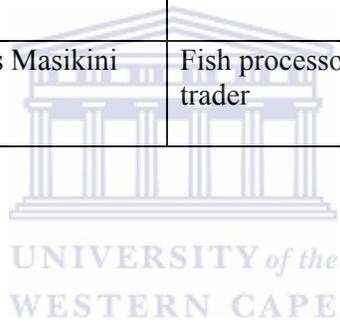
10. How do Chisi community that does not have land for farming survive during recessions? Do the same for Chinguma community, Swang'oma, Mposa and Namanja areas for comparative sake
11. Consider social capital and natural capital in the framework in terms of collective action and fishery dependent livelihood systems
12. What support do the communities get from local leaders, government, religious groups during lean periods of food in any year? Which months do people stay without food in general?
13. Do authorities make decisions publicly?
14. Are meetings open?
15. Do authorities report about any use of funds publicly?



**Annex 4a: List of key informants that include fishers, local leaders and fisheries technical staff interviewed in 2004**

Date	Name of Key Informant	Position/Occupation	Place
May – August 2004	Chigaya	Lake Chilwa Boat Association Chair	Chisi
	Chirwa	Seine fisher	Kachulu
	Nasiyaya	Seine fisher	Ntila
	Makochera	Beach Recorder (Kachulu)	Kachulu
	S. Mwale	Fisheries Technical Assistant	Chinguma
	Kawinga - Sub-Traditional Authority (Nkowlola)	Senior Chief	Kawinga
	Group Village Head Namanja	Traditional leader	Namanja (Lake Chilwa North)
	Village Head Mpambiche	Traditional leader	Chinguma (Lake Chilwa East)
	Nkhalamba	Seine fisher	Njalo Island (Lake Chilwa South)
	Chasi (Ms)	Seine fisher	Swang'oma and Mpoto (Lake Chilwa South)
	Group Village Head Nthambula	Traditional leader	Swang'oma and Mpoto (Lake Chilwa South)
	Group Village Head Chimalanga	Traditional leader	Kachulu (Lake Chilwa South East)
	Mr Chimdenga	Fisheries Assistant	Zomba Fisheries Office
	Mr Bulugama	Gillnet fisher	Mposa (Lake Chilwa West)
	Mr Mitumbu	Fish trapfisher	Khanda (Lake Chilwa West)
	Barnett Jamali	Fish trap fisher	Khanda (Lake Chilwa West)
	Mr Kamoto	Gillnet fisher	Kachulu (Lake Chilwa South East)
	Masikini	Gillnet fisher	Khanda (Lake Chilwa West)
	Bambo Doka	Fish trap fisher	Mposa (Lake

			Chilwa West)
	Traditional Authority Mkumbira	Traditional leader	Chisi Island (Lake Chilwa Central)
	Mrs Green	Mposa Women Group Chair	Mposa (Lake Chilwa West)
6-10 October, 2006	Mr Ajenga Chiwanda	Farmer	Mposa (Lake Chilwa West)
	Mr Makwacha	Seine fisher	Chinguma (Lake Chilwa East)
	Mr Pusepuse	Gillnet fisher	Ntila (Lake Chilwa North)
	Mr Namgubudu	Ntila BVSC Chair	Ntila (Lake Chilwa North)
	Mr Bamusi Kalonga	Seine crew member	Mposa (Lake Chilwa West)
	Mr Chirwa	Seine crew member	Kachulu (Lake Chilwa South West)
	Mrs Masikini	Fish processor and trader	Kachulu (Lake Chilwa South West)



**Annex 4b: Focus Group discussions**

<b>Date</b>	<b>Place</b>	<b>Number of Participants</b>
2 June 2004	Kachlu	17 (fishers, farmers, traders)
17 May 2004	Mposa	22 (fishers, farmers, traders)
15 August 2006	Mposa	8 (fishers, farmers, traders)
4 September 2004	Chisi	11 (fishers, farmers, traders)
5 September 2004	Chinguma	16 (fishers, farmers, traders)
7 September 2004	Swang'oma	23 (fishers, farmers, traders)
18 October 2004	Namanja	31 (fishers, farmers, traders)
16 November 2004	Ntila	19 (fishers, farmers, traders)
16 August 2006	Ntila	12 (fishers, farmers, traders)

**Annex 5: Combined survey question schedule for the analysis of co-management institutions**

Zone Name:  
Zone Number: ZONE

Village Name:  
Village Number: VILLAGE

Interview type (CIRCLE ONE): ZONE

01 = BVC member                      02 = Fisher                      03 = Household

This interview is what number of this type of interview for this village (CIRCLE ONE): NUMBER

BVC	Fisher	Household
1	1	1
2	2	2
3	3	3
4	4	4
	5	
	6	
	7	
	8	

Unique ID for interview:  
Zone number    BVC Number    Village Number    Type    Number of this Type

WRITE THE UNIQUE ID ON EVERY PAGE OF THE SURVEY SCHEDULE BEFORE BEGINNING THE INTERVIEW.

BVC interview is to be done with four people randomly selected from the list of members of the BVC.

Fisher interviews are to be done with the owners, or if owner is absent the operator, of 8 boats chosen at random from the boats fishing from the village when the team arrives in the village.

Household interviews are to be done with four households randomly selected from the headman’s list of village residents. Household interviews should be done with a “providing head of household or their spouse” meaning the senior man or woman living in the compound who is able to carry out economic activities.

## Basic Instructions

1. The basic unit of the survey is the zone. A team should expect to stay in a zone for one week and carry out a total of 32 interviews in this zone. These consist of 16 in each of two villages: 4 household interviews; 4 BVC member interviews; and 8 fisher interviews. When the team arrives in a new zone, say on a Monday morning, one member should go to one village to set up the interviews and the other team member should go to the other village to do set up.

Village set up:

(a) When the set up person arrives in a new village, he or she should visit the local headman and inform him or her of their activities. From the headman he or she should get a list of all the households in the village.

(b) The set up person should then visit the BVC chairperson (or other BVC leader if the chair is not available) to provide them with a list of all the members of the BVC.

(c) With the help of the BVC chair, the set up person should begin to fill out the village data sheet.

(d) At an appropriate time of day when fishers can be expected to have their boats on shore the team should visit the all fishing boat-landing places used by fishers in the area under the responsibility of the BVC. They should list all the boats that are physically present on the village data sheet.

(e) From the list of BVC members, the team should randomly select four members to interview.

(f) From the list of households, the team should randomly select four households to interview.

(g) From the list of boats at the landing places the team should select 8 boats. For each of these 8 boats the team will interview the owner, or if the owner is either not available or does not involve his or herself in the ongoing operations of the boat, then they should interview whoever is in charge of the boat's day-to-day operations.

2. The next day both members of the team should go to one village, and interview four persons each. The third day they should complete the first village. The fourth day they should go to the second village and interview four persons each. The fifth day they should finish the second village.

3. The team must interview 16 people in every village. If a randomly chosen person cannot be located for the interview during the time the team is in the village, then the next person on the list should be selected.

## Reading the Survey Schedule

*What the interviewer wants to do is make every presentation of every question in every interview to every respondent exactly the same.*

R stands for *Respondent*, the person you are interviewing.

The interviewer should read the questions in the interview schedule exactly as they are written.

Words written in ALL CAPS are instructions for you, the interviewer. They are never to be read to R.

Only words written in **bold** are to be read to R.

The interviewer must not change the way that he or she reads a question from one time to the next.

The interviewer must read all the questions in a neutral voice, treating all answers equally.

The interviewer must never disagree with R's response.

The interviewer must never encourage R to answer in a certain way.

The interviewer should avoid trying to explain questions. This is especially true of questions asking for R's opinion. If a question is looking for a specific fact (for example, 'how many people in this household fish') then explanations are not a great problem.

If the interviewer asked to explain something about an opinion question (for example 'how fairly do you think the Department of Fisheries treats people in this village?') the only thing the interviewer can do is to repeat the question exactly as written. If this is not enough the interviewer should just write 'question not understood.' Explaining a question will mean that it is not asked the same way every time. If an opinion question causes many people to ask for an explanation *there is something wrong with the question*. This should be reported to senior staff for action.

Words in [brackets] are options. The interviewer should choose one appropriate phrase among those offered. The brackets usually exist because I do not know R's gender.

Answers must be clearly marked with a heavy pen and never be placed on a line between two answers.

A *household* is defined as those who eat together on a regular basis. If several co-wives live on the same compound and eat separately then the household of the eldest wife resident in this village should be what the household questions refer to.

To *probe* means to encourage R to say more. For example if you asked R to list the fishing gear he owns and you keep asking "what other gear do you own" then you are probing. Many questions say DO NOT PROBE, which means I want to know only the things that come to R's mind right away.

### Section 1: Fishing information

NOTE THAT THIS IS CAPTURE FISHING ONLY, AQUACULTURE AND FISH PROCESSING ARE ADDRESSED IN THE NEXT SECTION

1. In the past year has anyone in this household ever gone fishing using any fishing gear larger than a line with a single hook or employed others to fish with his or her boat or gear?

1.NO ----> GO TO NEXT SECTION 2) YES GOFSH11

2. What are the most important species caught by members of this household?

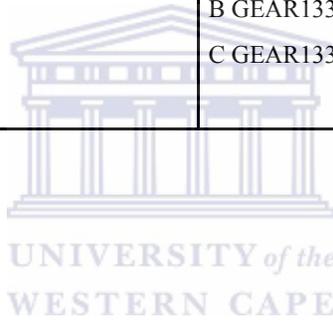
ASK R TO LIST THE MOST IMPORTANT SPECIES CAUGHT BY MEMBERS OF THIS HOUSEHOLD ACCORDING TO WHAT HE OR SHE THINKS IS "IMPORTANT". *ACCEPT HOW EVER MANY SPECIES R MENTIONS UP TO FIVE. DO NOT PROBE.* FILL OUT THE FOLLOWING TABLE FOR THE SPECIES THAT R MENTIONS.

Species	What is the most important use of this species?	How much of your catch of this species do you sell? READ RESPONSES AND ASK R TO CHOOSE ONE RESPONSE	Is this species more important to you than five years ago, less important, or the same as five years ago?
SPEC121 OTH121-5	1.food USE121 2.cash	1.all of it it 3. less than half of it it SELL121	2. most of it 4. none of it IMP121
SPEC122	1.food 2.cash USE122	1.all of it it 3. less than half of it it SELL122	2. most of it 4. none of it IMP122
SPEC123	1.food USE123 2.cash	1.all of it it 3. less than half of it it SELL123	2. most of it 4. none of it IMP123
SPEC124	1.food USE124 2.cash	1.all of it it 3. less than half of it it SELL124	2. most of it 4. none of it IMP124
SPEC125	1.food USE125 2.cash	1.all of it it 3. less than half of it it SELL125	2. most of it 4. none of it IMP125

3 How many people in this household have gone fishing this past year? \_\_\_\_\_ NUM13

FOR THREE PEOPLE WITH THE MOST GEAR GET THE FOLLOWING INFORMATION.

What is the relation to head of household?	How many boats does this person own?	What gear does this person own?	How much / many of gear?
REL131	BOATS131	A GEAR1311 othgr1311	AMGR1311 UNIT1311
		B GEAR1312 othgr1312	AMGR1312 UNIT1321
		C GEAR1313 othgr1313	AMGR1313 UNIT1333
REL132	BOATS132	A GEAR1321 othgr1321	AMGR1321 UNIT1321
		B GEAR1322 othgr1322	AMGR1322 UNIT1322
		C GEAR1323 othgr1323	AMGR1323 UNIT1323
REL133	BOATS133	A GEAR1331 othgr1331	AMGR1331 UNIT1331
		B GEAR1332 othgr1332	AMGR1332 UNIT1332
		C GEAR1333 othgr1333	AMGR1333 UNIT1333



IF R IS NOT ONE OF THE FISHERS SKIP TO THE NEXT SECTION.44

4. Now I would like to ask you some questions about your own fishing.

		J	F	M	A	M	J	J	A	S	O	N	D
Which 4 months do you fish the most? momon141-4													
Which 4 months do you fish the least? lemon141-4													
LIST SPECIES FROM QUESTIONS TWO	spec141-5	spjan141-5											spdec141-5
When do you fish for them?													
CHECK THE MONTHS	othsp141-2												
are the most important gears you use for fishing?	gear141-4	gejan141-4			geap141-4								gedec141-4
AGAIN LIST DON'T PROBE													
When do you fish with each one?	othgr141-2												
Where does this person fish and what months does he fish there?	Lake	lajan141											ladec141
RECORD AREAS WHERE R FISHES LIST DO NOT PROBE	Grassy areas	grjan141											grdec141
	River	rijan141											ridec141
	Lagoons	lgjan141											lgdec141
	Other	otjan141											otdec141
	Where does this person land fish and when does he land them there?	land1411	lnjan141-3										
RECORD NAMES OF LANDING PLACES PROBE FOR ANY OTHERS?	land1411												
	land1411												

		First and Second Importance	How often do you sell to these people
Indicate which kind of customer is the most important, which is the second most important, and how important the others are.  (IMPORTANT = LARGEST SOURCE OF MONEY)	People who sell the fish in large cities or outside this province.	imp141-5	1. Often 2. Sometimes 3.Never  seoft141-5
	People who sell the fish in towns in this province		1. Often 2. Sometimes 3.Never
	People who sell the fish in towns in this district		1. Often 2. Sometimes 3.Never
	People who sell the fish in this and neighbouring villages		1. Often 2. Sometimes 3.Never
	People who eat the fish		1. Often 2. Sometimes 3.Never

5. How many years ago did you begin to fish for the very first time? \_\_\_\_\_ Years or \_\_\_\_ Year started

YEARS15 YEARST15

6. How many years ago did you begin to fish on this [lake / river / swamp] for the very first time?  
\_\_\_\_\_ Years or \_\_\_\_\_ Year started

YEARS16 YEARST16

7. Have there been any time since the beginning when you stopped fishing for an entire year or more?

1. NO. YES-----> How often have you stopped fishing for an entire year or more?

STOP17 1. Just Once 2. Two or three times 3. Many times. OFSTOP17

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8. Please tell us if you agree or disagree with each of the following descriptions of how you decide when to go fishing. CIRCLE ONE

A. I only go fishing when the farming conditions make it difficult to live only from farming.  
DEC181 Agree Disagree

B. I go fishing only during the seasons when there is little work to do in farming, then I return to farming when the work begins.  
DEC182 Agree Disagree

C. I both farm and fish all the time whether the conditions for farming are good or not.  
DEC183 Agree Disagree

D. Farming has never been an important activity to me, when I was not fishing I was employed by someone or engaged in other business activities. Agree → Q10 Disagree  
DEC184 Agree Disagree

E. Farming has been important to me, but in the past I was also employed by someone and I only started fishing when I left that work. Agree----> Q10 Disagree  
DEC185 Agree Disagree

F. I was never a farmer, I have only been a fisher or been engaged in other business activities.  
DEC186 Agree Disagree

G. I fish because fishing always gives me the highest cash income of all activities I can do.  
DEC187 Agree Disagree

H. I fish because fishing always gives me the most food for my family of all activities I can do.  
DEC188 Agree Disagree

I. I am fishing but it is not because it gives me the most food for my family or cash income.  
DEC189 Agree Disagree

J. In the past I was a farmer, but I stopped now I only fish, but someday I hope to go back and farm again. Agree → Q9 Disagree  
DEC1810 Agree Disagree

K. In the past I was a farmer, but I stopped now I only fish, and I want to stay a fisher from now on. Agree → Q9 Disagree  
DEC1811 Agree Disagree

9. IF R AGREED WITH K OR L ASK -> Why did you stop farming?

WYSTOP19

10. IF R AGREED WITH D or E ASK → What activities were you doing? \_\_\_\_\_

WHTAC110 250 CHARS

11. Why did you leave? WHLV110 OTH110 a) I was made redundant b) I retired c) I did not like the work d) I still do this activity when I am not fishing e) other

## Section 2: Perceptions of the Resource and the Fisheries

- How has the overall amount of fish in the lake (river, swamp etc.) changed over the last five years?  
RESPONSE FROM LADDER THREE \_\_\_\_\_AMT21
- Which species has increased the most? \_\_\_\_SPEC22\_\_\_\_\_ (RECORD SPECIES)
- Which species has decreased the most? \_\_\_\_\_(RECORD SPECIES) SPEC23
- How has the overall number of fishers on the lake (river, swamp etc.) changed over the last five years?  
RESPONSE FROM LADDER THREE \_\_\_\_\_ CHNG24
- What new methods have been introduced? DO NOT READ, PROBE IF NECESSARY, FOR EACH METHOD MENTIONED FILL OUT THE FOLLOWING INFORMATION

Method name	Year first seen.	How many are now seen?	Who introduced this method?
METH51-3	YEAR51-3	1. Few 2. Some 3. Many SEEN51-3	WHO51-3 150 CHARS
		1. Few 2. Some 3. Many	
		1. Few 2. Some 3. Many	

- How much have fishing practices in this area changed in the past five years?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_PRAC26\_\_\_\_\_
- How has the amount of money people are investing in fishing changed?  
RESPONSE FROM LADDER THREE \_\_\_\_\_  
MON27
- How many new fishers have come to fish from far away in the last five years?  
RESPONSE FROM LADDER FIVE \_\_\_\_\_NEWFIS28
- How many of the new fishers from far away fish in the same places where [you / your neighbours] fish?  
RESPONSE FROM LADDER FIVE \_\_\_\_\_FARFIS29
- How many fishers have left off fishing here in the last five years?  
RESPONSE FROM LADDER FIVE \_\_\_\_\_LFISH210
- What do you think are the two worst gears used in this fishery for the conservation of the fishery?

Gear	Why is this gear destructive?	Who brought this gear?	Who uses this gear?
GEAR2111-2	WHY2111-2 250 CHARS	WHOBR211-2 150 CHARS	WHUS2111-2

### Section 3: Enforcement and Compliance

IF R IS NOT A FISHER SKIP TO THE NEXT SECTION

1. What are the two most important fisheries conservation rules or measures in this fishery?  
FILL IN THE FOLLOWING TABLE

Rule	RULE311-2 150 CHARS	
How strictly do fishers in this place follow this rule? LADDER TWO	STCK311-2	
Who told you about this rule?	1. DoF 2. Chief 3.BVC WHOT311-2 OTHT311-2 4.Other _____	1. DoF 2. Chief 3.BVC 4.Other _____ —
Who made this rule?	1. DoF 2. Chief 3.BVC WHOM311-2 OTHM311-2 4.Other _____	1. DoF 2. Chief 3.BVC 4.Other _____ —
Who punishes those who break this rule?	1. DoF 2. Chief 3.BVC WHOP311-2 OTHP311-2 4.Other _____	1. DoF 2. Chief 3.BVC 4.Other _____ —
How often are violators punished? LADDER 6	PUN311-2	

2. Do the people in this village know when people are breaking fisheries rules here?

RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_  
VILKNO32

3. Does the BVC know when people are breaking fisheries rules here?

RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_  
BVCKNO33

4. Does the DoF know when people are breaking fisheries rules here?

DoFKNO34  
RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_

5. Does the Chief or sub-Chiefs know when people are breaking fisheries rules here?

RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_  
CHIKNO35

6. Does the village headman know when people are breaking fisheries rules here?

HEDKNO36  
RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_

7. Do fish traders encourage people to break fisheries rules?

TRAD37  
RECORD RESPONSE FROM LADDER TWO \_\_\_\_\_

8. Have you ever been caught breaking a fishing rule?  
 1. NO -> SKIP TO NEXT SECTION 2. YES YOU38

9. Which authority caught you?  
 1. DoF 2. Chief 3.BVC 4.Other \_\_\_\_\_ WHO39 OTH39

10. Was the punishment you were given harsh?

RECORD RESPONSE FROM LADDER FOUR \_\_\_\_\_  
 HAR310

11. What punishment(s) did you receive? \_\_\_\_\_ WHAT311 200

12. What regulations did you violate? DO NOT READ, DO NOT PROBE, CHECK ALL THAT APPLY  
 MESH312 A . Mesh size and other gear regulations  
 CLOS312 B. Closed or protected areas  
 ACCRI312 C. Access rights (R was fishing where he was not allowed but where other fishers are allowed)SEA312 D. Closed season

13. Why did you violate this regulation?  
 FILL OUT THE FOLLOWING TABLE FOR EACH VIOLATION IDENTIFIED IN Q 24  
 DO NOT READ DO NOT PROBE CHECK ALL THAT R MENTIONS

Viol ation Letter from Q 24	I have to make a living and support my family	I don't think this regulation protects the fish stocks	This regulation is unfair	Other (Specify)
VIO3131-2	LIV3131-2	PRO3131-2	FAIR3131-2	OTH3131-2

## Section 4: Household information

1. During the past twelve months did you or other members of your household REMIND R OF HOUSEHOLD DEFINITION work for pay or engage in any small businesses, crafts or selling activities?

WORK41

1.NO -> GO TO QUESTION 2

2.YES ---> What specific kinds of work for pay or small businesses or crafts or sales would this be? Which members of the household did each activity?

Activity	Do you own this business?	Does this activity pay a regular salary?
ACT421-3	1. No 2. Yes OWN421-3	1. No 2. Yes PAY421-3
	1. No 2. Yes	1. No 2. Yes
	1. No 2. Yes	1. No 2. Yes

2. In the past 12 months have you or your [wife/ husband] farmed crops?

FARM42

1.NO 2.YES ----> FILL THE FOLLOWING FOR EACH FIELD FARMED BY R'S HOUSEHOLD:

Crop	Kilos last harvest IF PICK AND EAT WRITE PE	Proportion Sold	Acquisition: a) inherit b) bought c) rent or loan from relative or loan from non-relative d) rent e) allocated by headman or chief f) other
CROP421-4 OTHC4211-4	KILO421-4	PROP421-4	GOT421-4 OTHG421-4

3. During the past twelve months how many animals were kept by you or your household?

Animals	Number	Animals	Number
Dairy cows COW43		Ducks	DUCK43
Beef cattle CATTLE43		Sheep	SHEEP43
Goats GOAT43		Swine	SWINE43
Chickens CHICK43		Oxen for labour	OXEN43

4. Does your household own an ox cart? CART44 1.NO 2.YES

5. Do you own a motor vehicle or bicycle?

1.NO 2.YES => CIRCLE ONE (FOR LARGEST ONE): TRUCK CAR MOTORCYCLE BICYCLE OWN47 WHATOW47

6. In general would you say that your standard of living is better or worse than five years ago?

RECORD RESPONSE FROM LADDER SIX \_\_\_\_\_ LIVE49

7. Please fill in the following.

What type of water source does your house have?	SOUR410
What type of toilet does your household use?	TOIL410

8. How many houses total do you have at this or any other place? \_\_\_HOUS411\_\_\_

For each house:

Type of wall.	WALL4111-5			
Type of floor	FLOR4111-5			
Type of roof.	ROOF4111-5			
Number of rooms.	ROOM4111-5			

9. What percentage of your family's cash income comes from fishing? \_\_\_\_\_ PERFS412

YOU MAY USE THE ANSWER ABOVE IN QUESTIONS ONE AND TWO TO HELP R ESTIMATE THIS PERCENTAGE.

10. Do you or you spouse have any cash savings that you can call on in an emergency? SAVE413

NO YES ==> If you were forced to live on this savings how long would it last (CIRCLE ONE)  
A WEEK A MONTH SEVERAL MONTHS A YEAR MORE THAN A YEAR  
LAST413

11. If you wanted to, do you know where you could get a loan large enough to buy a cow?

NO YES LOAN414

12. Do you have anyone living somewhere else who sends you money regularly?

NO YES —> MAKE SURE THIS IS REFLECTED IN ANSWER TO Q12



## Section 5: Basic Demographic Information

1. How old are you? \_\_\_\_\_ YEARS
2. Did your father fish? (CIRCLE ONE)
  1. NO
  2. YES ---> Was there a time when fishing was his principal occupation? (CIRCLE ONE)
3. To what ethnic group do you belong? \_\_\_\_\_
4. CIRCLE IF R IS A            1. MAN            OR            2. WOMAN
5. In this household, how many people eat together regularly (WRITE NUMBER ON LINE)  
\_\_\_\_\_ adult men    \_\_\_\_\_ adult women    \_\_\_\_\_ children
6. IF R IS A MAN ASK HIM TOTAL NUMBER OF LIVING WIVES \_\_\_\_\_
7. How many of these wives are included in this household as defined above. \_\_\_\_
8. What is the highest grade of education that you entered? \_\_\_\_\_
9. How many children are you supporting? \_\_\_\_\_ CHILDREN
10. How many days per week does your family eat fish? DAYS
11. How long have you been in this place? \_\_\_\_\_ years
12. Where is your permanent residence? READ RESPONSES, ASK R TO CHOOSE AND CIRCLE RESPONSE
  - a) this village
  - b) a nearby village-> GO TO Q14
  - c) another village in this district ---> GO TO Q14
  - d) outside this district ASK NAME OF DISTRICT: \_\_\_\_\_ ---> GO TO Q14
13. Is this village your ancestral home? (CIRCLE ONE)
  1. NO--> GO TO QUESTION 18
  2. YES--> GO TO QUESTION 18
14. When did you go to your permanent home? (CIRCLE ONE)
  1. LAST MONTH
  3. SEVERAL MONTHS AGO
  4. OVER A YEAR AGO
15. Do you or your husband stay at your permanent residence? 1. NO 2. YES
16. What would you say is the main reason that you come to this place? READ RESPONSES AND CIRCLE THE ONE MAIN REASON, IF R GIVES MORE THAN ONE REASON ASK WHICH IS 'MOST IMPORTANT'
  1. To fish
  2. To buy fish and to sell fresh
  3. To buy fish, process and sell
  4. To farm
  5. Other \_\_\_\_\_
17. Besides your own household REMIND R OF HOUSEHOLD DEFINITION AND WHERE APPLICABLE SAY: [including the households of your other wives] do you have good friends and relatives in this place that you can call on for assistance when you need it?
  1. NO
  2. YES => How many? (CIRCLE ONE) 1 OR 2 3 TO 5 5 TO 10 MORE THAN 10
18. During the past twelve months did you stay (sleep for more than two weeks) anywhere outside this village?
  1. NO
  2. YES---> Please list each place you stay and indicate what activities you do when you stay there.

Place	Total months at that place	Distance from here (estimate kilometres)	Activities (CHECK ALL THAT APPLY)					
			Fish	Fish Trading	Raise crops	Raise Animals	Run a business	Work for an employer
1								
2								
3								
4								
5								

19. Over the past two years have you spent enough time in this village to be familiar with the fisheries management work of the Village Management Committee

1. No —> TERMINATE INTERVIEW    2. Yes ----> GO TO THE NEXT SECTION



## Section 6: Perceptions of Important Stakeholder Groups

1. How much do you think the Department of Fisheries supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
2. How much do people in this village know about who gives the Department of Fisheries advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
3. How much do people in this village know about how the Department of Fisheries makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
4. How carefully does the Department of Fisheries listen to the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
5. How fairly do you think that the Department of Fisheries treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
6. How much do you think that the *RELEVANT NGO* supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
7. How much do people in this village know about who gives the *RELEVANT NGO* advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
8. How much do people in this village know about how the *RELEVANT NGO* makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
9. How carefully does the *RELEVANT NGO* listen to the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
10. How fairly do you think that the *RELEVANT NGO* treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
11. How much do you think that the District Assembly supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
12. How much do people in this village know about who gives the District Assembly advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
13. How much do people in this village know about how the District Assembly makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
14. How carefully does the District Assembly listen to the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
15. How fairly do you think that the District Assembly treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
16. How much do you think that the Village Headman supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
17. How much do people in this village know about who gives the Village Headman advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
18. How much do people in this village know about how the Village Headman makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
19. How carefully does the Village Headman listen to the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_

20. How fairly do you think that the Village Headman treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
21. How much do you think that the Chief supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
22. How much do people in this village know about who gives the Chief advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
23. How much do people in this village know about how the Chief makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
24. How carefully does the Chief listen to the Village Management Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
25. How fairly do you think that the Chief treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
- MLOS6Q1. How much do you think that the Fishermen's Association supports the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
- MLOS6Q2. How much do people in this village know about who gives the Fishermen's Association advice?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
- MLOS6Q3. How much do people in this village know about how the Fishermen Association makes decisions?  
RESPONSE FROM LADDER ONE \_\_\_\_\_
- MLOS6Q4. How carefully does the Fishermen's Association listen to the Beach Village Committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
- MLOS6Q5. How fairly do you think that the Fishermen's Association treats the people in this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
26. Is there anyone that you see as being strongly opposed to the work of the BVC?
- 1.No                      2.Yes —> Who are these people and why are they opposed?

DO NOT RECORD NAMES, BRIEFLY DESCRIBE WHO THESE PEOPLE ARE AND WHY THEY ARE OPPOSED TO THE BVC.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

## Section 7: Participation in the Co-management Process

1. How carefully do you feel the village management committee listens to people like you?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
2. How do you think BVC members are selected? (DO NOT READ RESPONSES BELOW, DO NOT PROBE, IF R'S RESPONSE DOES NOT FIT WITH A PRE-SELECTED CATEGORY WRITE THEIR ANSWER IN 6.OTHER CHECK ONLY ONE LINE)
  1. THEY ARE ELECTED OPENLY BY THE WHOLE VILLAGE \_\_\_\_\_
  2. THEY ARE SELECTED BY THE HEADMAN OR THE CHIEF \_\_\_\_\_
  3. THEY ARE SELECTED BY THE DEPARTMENT OF FISHERIES \_\_\_\_\_
  4. THEY ARE SELECTED BY THE \_\_\_\_\_ NGO \_\_\_\_\_
  5. THEY ARE SELECTED BY THE (CHECK ONE) HEADMAN/ CHIEF \_\_\_\_\_ DoF \_\_\_\_\_ OR NGO \_\_\_\_\_ AND THEN THIS SELECTION IS APPROVED BY THE VILLAGE
  6. OTHER \_\_\_\_\_
3. How often do you attend BVC meetings?  
RESPONSE FROM LADDER TWO \_\_\_\_\_
4. Were you involved in the formation of the village management committee?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
5. How often do you go on patrol with the BVC?  
RESPONSE FROM LADDER TWO \_\_\_\_\_
6. How carefully do you think that the village management committee listens to women?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
7. How carefully do you think that the village management committee listens to farmers?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
8. How carefully do you think that the village management committee listens to fishers?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_
9. Which fishers does the BVC listen to more than other fishers?
  1. It listens the same way to all the fishers. —> GO TO QUESTION 11
  2. It listens more to \_\_\_\_\_
10. Which fishers does the BVC not listen to at all?  
\_\_\_\_\_
11. How carefully do you think that the village management committee listens to people who do not live all year in this village but only come here to fish?  
RESPONSE FROM LADDER four \_\_\_\_\_
12. I would like you to tell me the other groups the BVC works with and how closely they work with them. AS R TO LIST THE GROUPS HE OR SHE THINKS THE BVC WORKS WITH. WHEN THE LIST IS COMPLETE ASK R TO ORDER THEM FROM THE CLOSEST TO THE FARTHEST AND THEN INDICATE IF THEY WORK VERY CLOSELY, CLOSELY, OR ONLY SOMETIMES.
 

Group	Rank Order	How do they work together		
		very closely	closely	only sometimes
13. How carefully do you think that the village management committee listens to fish traders from this village?  
RESPONSE FROM LADDER FOUR \_\_\_\_\_

14. How carefully do you think that the village management committee listens to fish traders that come from far?  
 RESPONSE FROM LADDER FOUR \_\_\_\_\_
- MLOS7Q1. Are you a member of the Fishermen's Association?  
 1.No                      2, Yes
15. Are you a member of the BVC?  
 1.No—> GO TO THE NEXT SECTION                      2.Yes
16. How often does the Department of Fisheries send a representative to BVC meetings?  
 RESPONSE FROM LADDER TWO \_\_\_\_\_
17. How carefully do you think that the village management committee listens to the DoF representative?  
 RESPONSE FROM LADDER FOUR \_\_\_\_\_
18. Are there any decisions that the BVC would never take without the agreement of the DoF?  
 1.No.                      2.Yes-> What decisions would they never take without DoF?
19. How often does the Village Headman sends a representative (or comes himself) to BVC meetings  
 RESPONSE FROM LADDER TWO \_\_\_\_\_
20. How carefully do you think that the village management committee listens to the Village Headman (or his representative)?  
 RESPONSE FROM LADDER FOUR \_\_\_\_\_
21. Are there any decisions that the BVC would never take without the agreement of the headman?  
 1.No.                      2.Yes-> What decisions would they never take without the headman?
22. How often does the chief sends a representative (or comes himself) to BVC meetings?  
 RESPONSE FROM LADDER TWO \_\_\_\_\_
23. How carefully do you think that the village management committee listens to the chief (or his representative)?  
 RESPONSE FROM LADDER FOUR \_\_\_\_\_
24. Are there any decisions that the BVC would never take without the agreement of the chief?  
 1.No.                      2.Yes-> What decisions would they never take without the chief?
25. How often does the village management committee get messages from the association?  
 RESPONSE FROM LADDER TWO \_\_\_\_\_
26. How carefully do you think that the village management committee listens to the association?  
 RESPONSE FROM LADDER FOUR \_\_\_\_\_
27. Are there any decisions that the BVC would never take without the agreement of the association?  
 1.No.                      2.Yes-> What decisions would they never take without the association.

## Section 8: Perceptions of the Benefits and Qualities of the Co-management Program

1. Do you think that there are more fish now because the BVC has been working?

- |   |   |   |
|---|---|---|
| 1. The BVC has made no difference in the amount of fish | 2. The BVC has made a little difference in the amount of fish | 3. The BVC has made a lot of difference in the amount of fish |
|---|---|---|

2. Do you think the village is better off or worse off because of the BVC?

RESPONSE FROM LADDER SIX \_\_\_\_\_

3. Do you think the BVC members agree with each other more or disagree with each other more. How often do they disagree?

RESPONSE FROM LADDER TWO \_\_\_\_\_

4. Do you think the rest of the village most often agrees or most often disagrees with BVC actions? How often do they disagree?

RESPONSE FROM LADDER TWO \_\_\_\_\_

5. How has the number of people punished for violating fisheries rules changed because of the work of the BVC?

RESPONSE FROM LADDER THREE \_\_\_\_\_

6. How has the number of people violating the fisheries rules in this village changed because of the work of the BVC?

RESPONSE FROM LADDER THREE \_\_\_\_\_

7

. Has there any other development in this village that has been helped by the BVC programme?

- 1.No                      2.Yes----> What other development has been helped by the BVC programme?

**Annex 6: Co-management survey sites**

Zone Number	Traditional Authority	Village/Beach Village Sub-Committee
3	Kawinga	5. Mchinguza 6. Mtila
4	Mlomba	7. Khuzumba 8. Zumulu
5	Mposa	9. Mapila
6	Kumtumanji	10. Mtolongo 11. Mchenga
7	Mkumbira	12. Ngotangota 13. Chaoni
8	Mwambo	14. Mbalu 15. Naphali
9	Nazombe	16. Thanga 17. Njalo
10	Mkhumba	18. Chikolizi

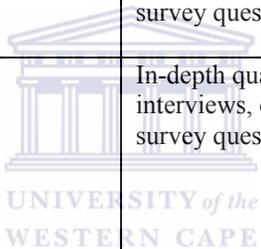
**Annex 7: Identified variables and their operationalisation for the co-management attitude survey**

Type	Variable	Level of Observation			Method of Observation	Operationalisation
		Individual	Village	Fishing Zone		
Demographics	Individual ages	x			Survey questions	Ask age of Respondent
	Size of community		x	x	Documentary research, observation	Estimate population of fishers on a beach or village
	Migration		x	x	Survey questions, documentary research, observation	Magnitude and types of movements by fishers
Variability of Resource				x	Documentation and survey questions	Number of species or fishers involved and the magnitude of fluctuation in their numbers and yearly round. Indicate number of fisheries sectors (traditional and commercial, physical type of resource (swamp, river, open lake, lagoon, estuary, flood))
Support for co-management by DoF and donors			x	x	Observation, in-depth qualitative interviews, documentation	Reasons agency is pursuing a co-management effort
	Age of programme	x	x	x	In-depth qualitative interviews, survey question, documentation	Years programme has been operating
	Relations with Traditional Authorities (TAs)	x	x	x	In-depth qualitative interviews, survey question, documentation	Role traditional leaders (Village Heads and Traditional Authorities) are playing in their own eyes and the eyes of the villagers
	Representation (co-management)	x	x	x	Observation, in-depth qualitative interviews, survey question, documentation	People's impressions of whose interests are represented and questions about whether and how Respondent sees his or her interests represented

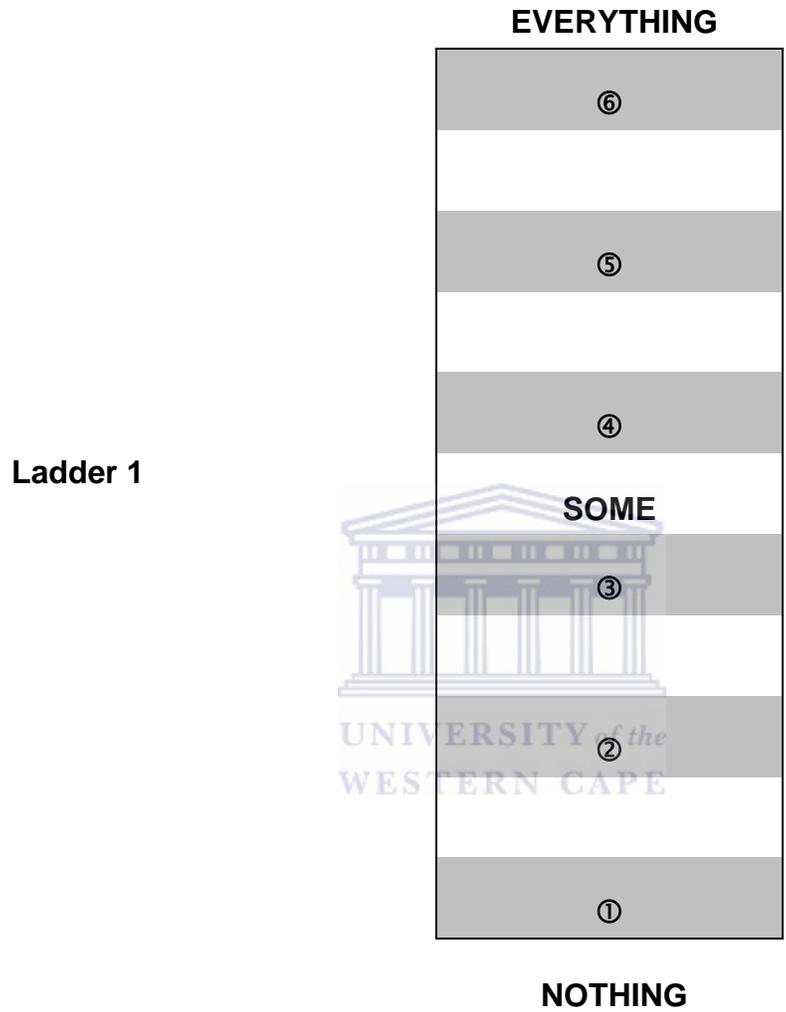
Process Variables	organogram, partners, representative organisation					
	NGO participation	x	x	x	Observation, in-depth qualitative interviews, survey question, documentation	Role NGOs are playing in their own eyes, the eyes of other leaders and the eyes of the villagers their
	Relations with other community based organisations	x	x	x	Observation, in-depth qualitative interviews, survey question	Role other groups are playing in their own eyes, the eyes of other leaders and the eyes of the villagers
	Structure	x	x	x	Observation, in-depth qualitative interviews, survey question, documentation	The pattern of programme interactions across time and space
	Enforcement (frequency of patrols)	x	x	x	Observation, in-depth qualitative interviews, survey question, documentation	How and to what degree is compliance or non-compliance with regulations observed and sanctioned. Ask about both their experiences and those of others
	Types of measures used (formal v informal)	x	x	x	Documentation, in-depth qualitative interviews	What management measures are or were in force and being considered for the future
	Gender	x	x	x	Observation, in-depth qualitative interviews, survey question, documentation	Representation in decision-making processes, functions
	Responsiveness to	x	x	x	In-depth qualitative interviews,	How does DoF respond to fisheries policy initiatives from the local level

	participation (DoF and community)				documentation, observation of meetings, survey questions	
	Transparency of co-management	x	x	x	In-depth qualitative interviews, documentation, observation of meetings, survey questions	Are decisions made publicly? Are meetings open? Is the use of funds publicly reported?
	Support for local co-management effort	x	x		In-depth qualitative interviews, documentation, observation of meetings, survey questions	In the eyes of the village does DoF support local efforts with more than talk? This might include legal and material support
	Ladder of co-management activity	x	x	x	Observation, documentation	Where does the project fall on the co-management scale from instructive to informative?
Conflicts	Ethnicity	x	x	x	In-depth qualitative interviews, documentation, observation, survey questions	Degree to which conflicts of these various types are salient within the fisheries of interest. This should include both direct and indirect questions for qualitative respondents. Attention should be paid to who raises what issues to management and why. Survey respondents should be asked about their own personal experiences
	Class or power structures or wealth of gear owners and workers	x	x	x		
	Gear / species	x	x	x		
	Theft	x	x	x		
	Markets	x	x	x		
	Multiple-users	x	x	x		
	Locals versus outsiders	x	x	x		

	and transboundary issues					
Resilience	Legitimacy	x	x	x	In-depth qualitative interviews, observations, survey questions	Expectations of compliance, level of participation, the familiarity and ease with which people respond when asked questions about management, citations of management as justification of past behaviour in neutral questions
	Attitudes towards co-management measures	x	x		In-depth qualitative interviews, observations, survey questions	Attitude scale survey questions about specific measures and their relevance according to the Respondent's perceptions
	Robustness		x	x	In-depth qualitative interviews, observations, survey questions	Evaluations of whether management covers the geographical and biological range of the fishery, speed with which the situation can respond; whether co-management institution allows cooperation with a broad range of other community-based organisations (CBOs); inclusiveness of co-management



**Annex 8: Ladder scales used in the combined survey for the analysis of co-management institutions**



**ALWAYS**

⑥

⑤

④

**SOMETIMES**

③

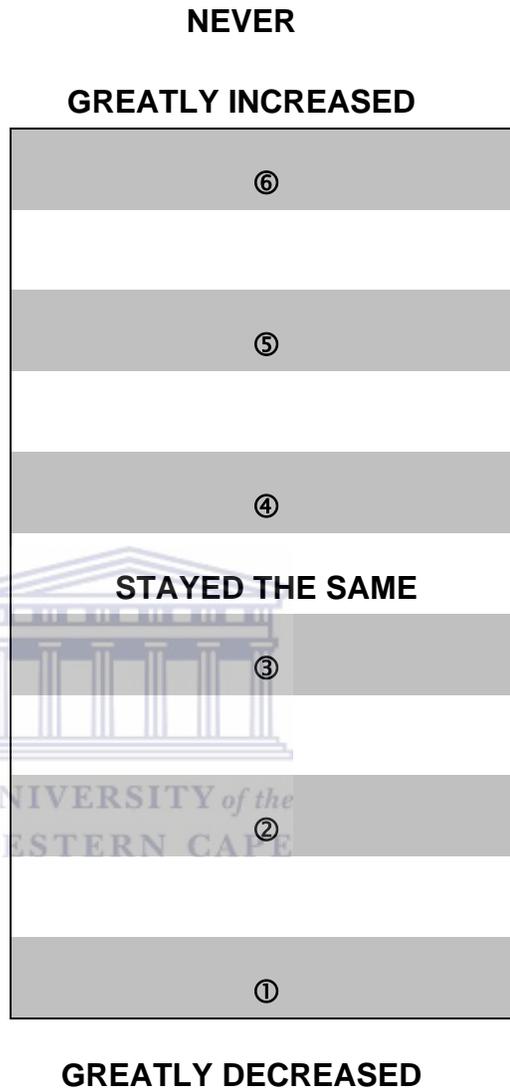
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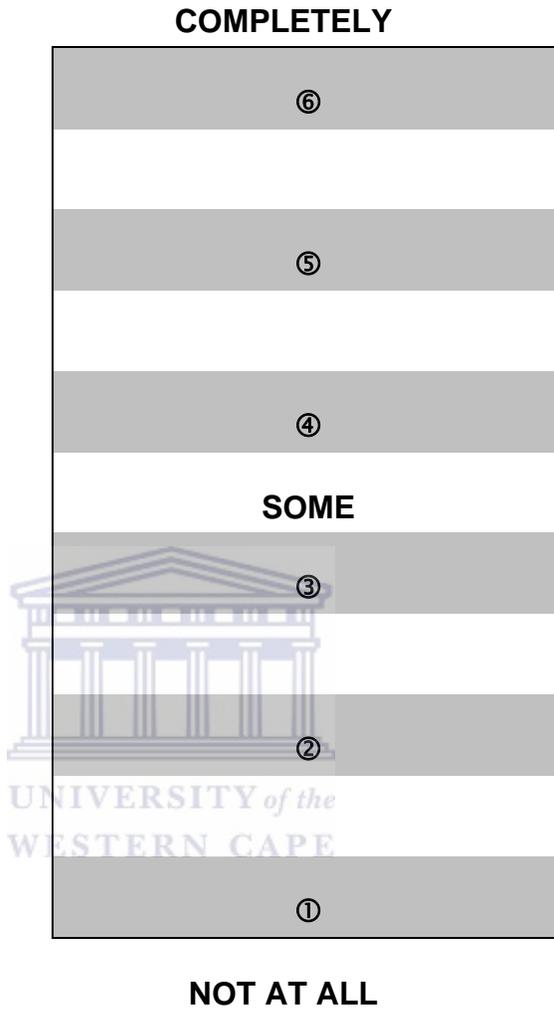
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**Ladder 2**

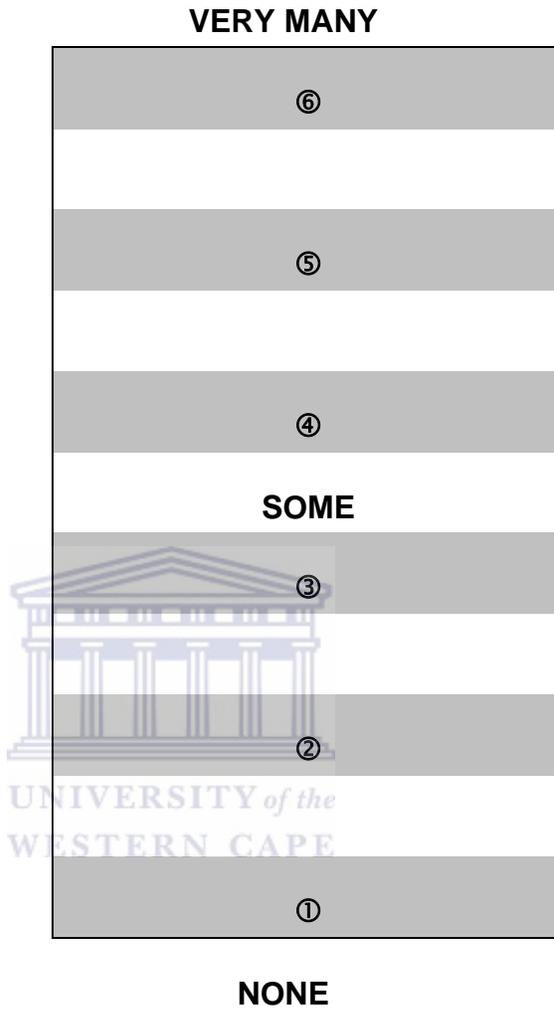
Ladder 3



Ladder 4

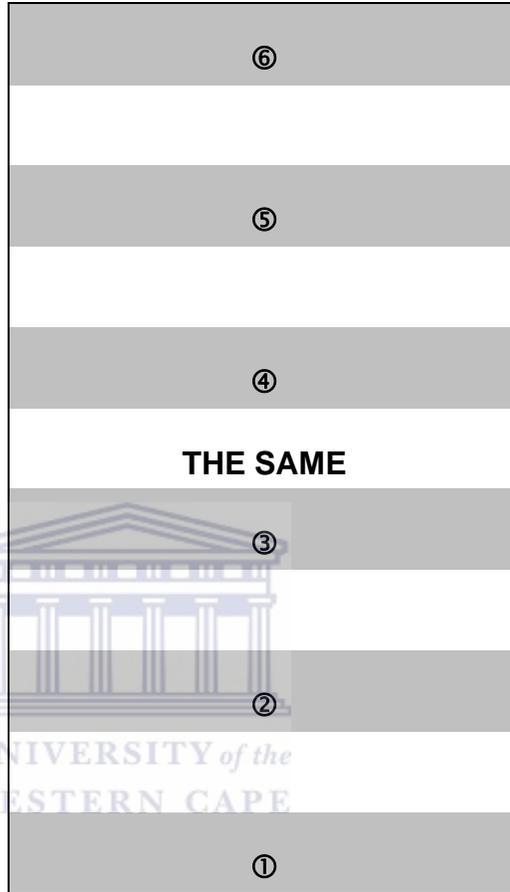


Ladder 5



Ladder 6

VERY MUCH BETTER

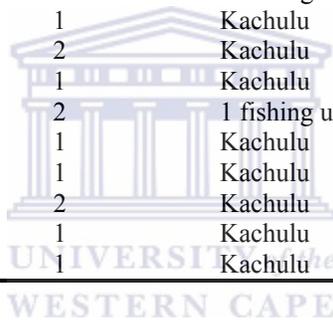


VERY MUCH WORSE



### Annex 10: List of migrants compiled in April 2007

<i>Name of fisher</i>	<i>Number of Nkacha seine owned</i>	<i>Place of operation</i>
Nampulu	2	Both at Kachulu (Lake Chilwa)
John Chainjile	1	Returned to Lake Malombe
Ladu Witness	1	
H. Kalichero	1	
J.B. Mayele	2	1 fishing unit at Kachulu and another on Lake Malombe
Wisiki Ayatu	1	Kachulu
Thomas Douglas	3	2 fishing units at Chapola and 1 at Kachulu
Daudi Bamusi	2	Both at Chapola (Lake Malombe) which were moved from Kachulu
Haji Frag	2	1 fishing unit at Kachulu and another on Lake Malombe
Moffat Wecha	2	1 fishing unit at Kachulu and 1r on Lake Malombe
Lajabu Kachepea	7	4 fishing unit at Kachulu and 3 on Lake Malombe
Usumani	1	Kachulu
Kasimu Alli	2	Kachulu
Saidi White	1	Kachulu
Gama	2	1 fishing unit at Kachulu and 1 on Lake Malombe
Ali Mbeyani	1	Kachulu
Tenesi Sumaili	1	Kachulu
Bonali	2	Kachulu
Auvi	1	Kachulu
Raitala	1	Kachulu



**Annex 11: Relevant key policy and legislative frameworks for the Lake Chilwa wetland and catchment area (Adapted from Njaya and Chimatiro 1999)**

<b>Policy/Act</b>	<b>Objectives/focus area</b>	<b>Areas of common interests or divergent interests</b>
National Environmental Policy (1996)	In response to the Rio de Janeiro's Earth Summit under Agenda 21, the Government of Malawi formulated the Environmental Policy was formulated. In terms of fisheries, it aims at managing fish resources for sustainable utilisation, production and conservation of aquatic biodiversity	<ul style="list-style-type: none"> <li>• Reducing erosion and siltation in the Shire river</li> <li>• Minimise pollution from processing industries in Blantyre City or Lower Shire</li> <li>• Maintaining biodiversity</li> </ul>
National Fisheries and Aquaculture Policy (2001)	The primary objective of the National Fisheries and Aquaculture policy is "to enhance the quality of life for fishing communities by increasing harvests within safe, sustainable yields"	<ul style="list-style-type: none"> <li>• Maximizing fish yields and promote fish conservation in participatory fisheries management arrangements</li> <li>• Establishing and sustaining the co-management of fisheries resources between the Fisheries Department and key stakeholders</li> </ul>
Fisheries Conservation and Management Act (1997)	The focus is on sustainable utilisation of fisheries resources and aquaculture development. Central to this is the Local Community Participation (Part III) of the Act that articulates the need for community involvement in the management of fisheries resources in Malawi	<ul style="list-style-type: none"> <li>• Participatory fisheries management</li> <li>• Licensing of fishing gear</li> <li>• Registration of fishing vessels</li> <li>• Fishing rules under international waters</li> <li>• Aquaculture development rules</li> </ul>
National Forestry Act (1997)	Among others, it aims at identifying and managing areas of permanent forestry cover as protection or production forest in order to maintain environmental stability; to prevent resource degradation and increase social and economic benefits. In addition the Act aims at promoting community involvement in the conservation of trees and forest reserves and protected areas	<ul style="list-style-type: none"> <li>• Reducing erosion and siltation in the Shire river</li> </ul>
Water Resources Policy (1994)	The policy aims at ensuring that all citizens of Malawi have and will have and will continue to have convenient access to water in sufficient quality and quantity; provide water infrastructure and services that will underpin the economic development of all sectors of the economy and preserve and enhance	<ul style="list-style-type: none"> <li>• Enhance aquatic riparian environments</li> <li>• If not properly managed, water abstraction may affect water levels in the river thereby affecting aquatic life such as fish</li> </ul>

	aquatic riparian environments.	
Irrigation Policy	The irrigation policy aims at promoting social and economic development through irrigate agriculture that is sustainable over time, economically justified financially viable, socially acceptable and technically sound without causing unacceptable impacts on the environment.	<ul style="list-style-type: none"> <li>• Ensures food security for the Lower Shire basin population</li> <li>• Promote riverbank cultivation of crops. This increases soil erosion and siltation if not properly planned</li> </ul>
Land Resources Policy/Act	The Land Resources Policy and Act are under review. At present land is being governed by the land Act (Cap 15.01), the Customary Land Act (Cap 59.01) and the Registered Land Act (cap 65)	<ul style="list-style-type: none"> <li>• Soil conservation measures, good habitat planning and proper farming methods reduces soil erosion and siltation</li> </ul>
Inland waters Shipping Act (195)	For vessel inspection and registration	<ul style="list-style-type: none"> <li>• Does not recognise dugout canoes and small boats in terms of safety measures</li> </ul>
Agriculture and Livestock Development Policy (1995)	Among others, the policy has emphasis in the following areas: increasing agricultural productivity, encouraging agricultural diversification, and increase food production by irrigation and drought resistant crops.	<ul style="list-style-type: none"> <li>• Proper farming methods reduces soil erosion and siltation</li> <li>• However, cultivation of crops along river banks promotes soil erosion and siltation thereby affecting spawning grounds of fish</li> </ul>
Parks and Wildlife Act	This Act aims at ecosystem management through sustainable harvesting of sustainable yield and the need to preserve rare and endangered species and biotic communities.	<ul style="list-style-type: none"> <li>• Conserves biodiversity in which case threatened bird species are conserved for future generation</li> </ul>
Decentralisation Policy (1996)	The Policy objectives are to: create a democratic environment and institutions in Malawi for governance and development at the local level which facilitate the participation of the grassroots in the decision-making; eliminate dual administrations (field administration and local government) at the district level with an aim of making public service more efficient, more economical and cost effective; and to promote accountability and good governance at the local level in order to reduce poverty	<ul style="list-style-type: none"> <li>• Promotes accountability and good governance at the local level</li> <li>• Facilitates the participation of the grassroots in the decision-making</li> </ul>
RAMSAR Convention	Promotes wise use of natural resources with the involvement of the user community	<ul style="list-style-type: none"> <li>• Has principles of community participation in natural resource management especially for birds</li> </ul>

## Annex 12: Construction of migration and wealth scales

### *Migration scale*

For analysis of the data, I worked out migration and wealth scales based on the co-management attitude survey despite the complexity in measuring the degree to which households in rural areas are not native to the place where they are being interviewed. Basically, the migration scale had six parts:

- (a) The response to question (Q1), “Is this village your ancestral home?” If the answer is “yes” the respondent is scored 0 on this and all other migration scale questions, hence 0 on the overall scale, but if the answer is “no” the respondent scores 1 for this question.

- (b) The response to Q2. Where is your permanent residence? (a) this village (b) a nearby village (c) another village in this district (d) outside this district

A response of (a) or (b) is scored 0. A response of (c) is scored 1 and (d) is scored 2.

- (d) The response to the following qualified by the response to Q2:  
Q3. Do any of your wives (or does your husband) stay at your permanent residence? (a) No (b) Yes

A response of (c) on Q2 and (b) on Q3 is scored 1, a response of (d) on Q2 and on Q3 is scored 2.

- (d) The response to the following again qualified by the response to Q2:  
Q4. When did you last sleep at your permanent residence? (a) Last week (b) Last month (c) Several months ago (d) Over a year ago

A response of (c) on Q2 and (b) on Q4 gets 1, (d) and (b) respectively get 2, (c) and (c) get 2.5, (d) and (c) get 3, (c) and (d) get 3.5 and (d) and (d) get 4.

- (e) Q3 and Q4 are also combined. If Q3 is (b) then (b) on Q4 is scored 1, (c) on Q4 is scored 2 and (d) on Q4 is scored 3.

- (f) Finally, the response to the following question:  
Q5. During the past twelve months, how many times did you stay (sleep for more than two weeks) anywhere outside this village?

A response of 0 is scored 0, 1 or 2 scored 1, 3 or 4 scored 3 and 5 or more scored 4. If the respondent answered (a) or (b) to Q2 they also score 0 here.

### *Wealth scale*

Similarly, I created a wealth scale based on ownership of household assets and cash remuneration that the households get regularly. The questions are in Annex 5, Section 4. I standardised the scores by using the "desc" command to create Z scores. Transformation of the data involved "recoding" the variables to give a 'wealth' score with three parts: poor ( $<0$  to 0), rich (0 to 1) and very rich ( $>1$ ). Therefore, the wealth scale had the following basic parts:

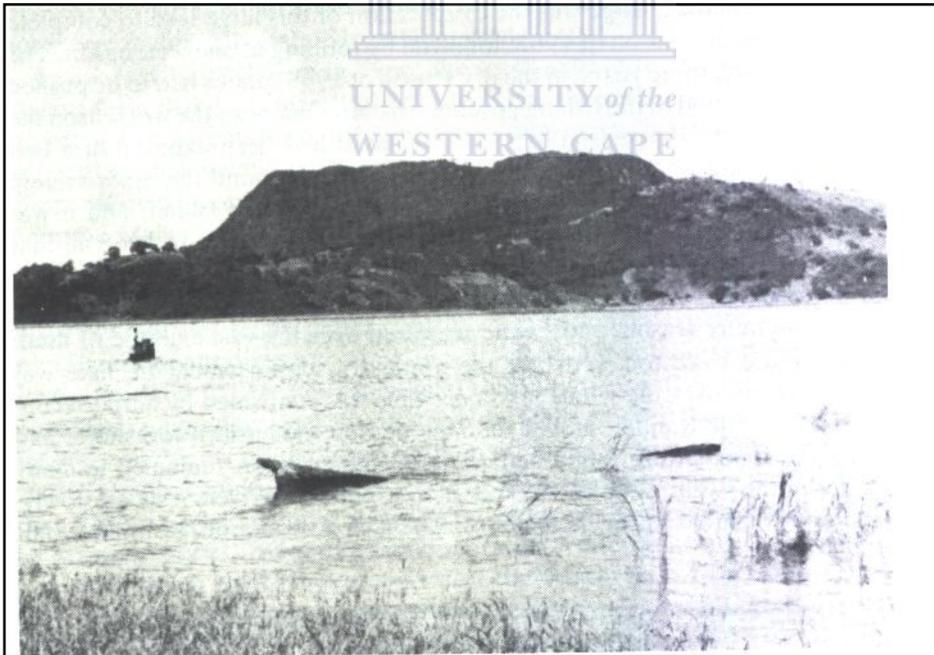
- (a) The amount of savings measured by the following questions:  
Do you or you spouse have any cash savings that you can call on in an emergency?  
NO YES => If you were forced to live on this savings how long would it last?  
The scores were as follows: a week 2, a month 4, several months 6, a year 8, more than a year 10
- (b) A scale based on the number of houses, roof material and floor type of the respondent's houses.
- (c) Whether or not the respondent was receiving regular cash remuneration from someone living elsewhere
- (c) Whether the household owned animals (cattle, ox, sheep, goats, swine, and chicken)

All of these constituent questions or scales were standardized and summed to create the wealth scale.

**Annex 13: Photos showing Lake Chilwa recessions in 1969 and 1995**



Lake Chilwa recession in 1968/69 (Kalk et al., 1979)



Lake Chilwa refill in 1969 (Kalk et al., 1979)



Photo showing the 1995 Lake Chilwa recession as (Chiotha, 1995)



Photo showing water level recovery in 1996 after the recession – photo taken at the same place as shown above (Chiotha, 1996)