

# Use of indigenous knowledge and traditional practices in fisheries management: a case of Chisi Island, Lake Chilwa, Zomba

M.D. Kalanda-Sabola<sup>1\*</sup>, E. M. T. Henry (deceased)<sup>2</sup>, E. Kayambazinthu<sup>3</sup>, J. Wilson<sup>4</sup>

<sup>1</sup> Department of Geography and Earth Sciences, University of Malawi, Chancellor College, P.O Box 280, Zomba, Malawi.

<sup>2</sup> Department of Chemistry, University of Malawi, Chancellor College, P.O Box 280, Zomba, Malawi.

<sup>3</sup> Department of English, University of Malawi, Chancellor College, P.O Box 280, Zomba, Malawi.

<sup>4</sup> P.O Box 537, Zomba, Malawi.

## ABSTRACT

This paper presents results of a study, which examined local ecological knowledge and traditional management practices in lake resources management on Chisi Island. A combination of household questionnaires, semi structured interviews with key informants and focus group discussions were used to collect the required data for the study. The paper also includes review of other scientific studies done in the area to validate the survey results. The study found that Chisi inhabitants have developed and maintained some local ecological knowledge and practices that can have significant implications in scientific studies and on the management of lake resources on the Island. The practices included restricted cutting of *Typha*, fishing and access in sacred sites and conservation of *mabawe*. These traditional practices encouraged regeneration and sustainable utilisation of fish. The knowledge systems have been conserved and passed on from generation to generation through religious beliefs, taboos and myths. Some indigenous knowledge systems have been eroded over the past years due to changes in social structures, immigration and advent of new religions, adoption of new resource harvesting techniques and changes in life styles. Although these knowledge systems were not specifically meant for conservation of natural resources, the study argues that to achieve sustainable designs or implementation of natural resource management projects, there is need to integrate relevant existing indigenous knowledge systems that promote conservation of resources.

*Key words: sustainable utilisation and conservation.*

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\*Corresponding author: msabola@chanco.unima.mw

## 1 INTRODUCTION

The world is endowed with a number of natural resources such as lakes which play vital roles in the people's survival. The lakes provide products such as fish which is an important source of proteins and income. About 200 million people worldwide and about 1 million people in the SADC region depend on fishing and fish related industries for their livelihoods (Brown, 1993, 1996, Weber, 1994, GoM, 2000a). About 3% of Malawi's total population are employed in the fishing industry. This 3% includes those people directly involved in fishing as well as those taking part in fish processing and trading activities. Fish is an essential component of the diet for the average citizen, providing more than 70% of the national animal protein (GoM, 2000a, 2000b). This suggests that there is need for sustainable utilisation of these resources. However, these resources are being degraded.

Fish stocks in Malawi water bodies are declining by about 40%, at the very fast rate of between 40-45000 tonnes of fish per year. This has caused a concomitant reduction of 45% in the average per capita fish consumption rate. The per capita fish supply has declined from 14.7 kg per capita per year in the 1970's to less than 7.0kg per capita per year in the 1990's. This decline is partly explained by the use of primitive fishing methods which restrict fishing to shallower areas (GoM, 2000a, 2000b).

Several recent studies stress the importance of including the traditional logic of the local population in addition to scientific logic when dealing with issues of sustainable utilization of resources (Chambers, 1983, Dupre, 1991, Lindskog, 1994, Oliver, 1991). Local

populations have developed both traditional and modern knowledge systems and practices, which govern the management of their resources. Indigenous knowledge (IK) has permitted its holders to exist in harmony with nature allowing them to use it sustainably; hence it is seen as especially pivotal in discussions of sustainable resource use (Mwale & Malekano, 2000). Lévêque (1999) notes that indigenous knowledge and traditional practices may yield new ideas about conservation and management of natural resources and also recognizes inclusion of IK as a new resource management science that could help achieve ecological sustainability.

Johnson (1992) defines IK as a body of knowledge built up by a group of people through generations of living in close contact with nature. According to Johnson, this knowledge includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. This involves an ability to analyse situations and interpret the results; practical experience of tackling problems and perspective of having an overview of a subject or issue. This may mean skill and knowledge of what is good to collect or eat, where best to find particular resources and when and how to avoid resource degradation. Thus, IK builds upon the experiences of the past and adapts to present changes in technology and socio-economics.

IK also includes beliefs that can play fundamental role in maintaining the resources such as sacred forests that are protected for religious reasons. It also includes information on human resources such as local organizations that include kinship groups, council of elders or

groups that share and exchange labour. Thus, scientific research and conservation programmes can benefit from IK.

### **1.1 Value of indigenous knowledge and traditional practices in fish conservation**

In many parts of the world, coastal fisheries are or were managed traditionally by community based systems of property rights and associated regimes of rights and rules that closely reflect social organisation and power structure. Ruddle (1994) reports that several conservation rules were traditionally employed by many communities in the Asia-Pacific region to ensure sustained yields. Some practices designed to conserve resources included live storage or freeing surplus fish during spawning migrations, setting up of closed seasons especially during spawning; placing taboos on fishing areas, reservation of particular areas for fishing during bad weather, size restrictions and in recent times gear restrictions. Some practices are based on ecological rationale such as the imposition of closed season that follow local knowledge about the spawning periods of key fish species and prohibit their capture during such periods.

Traditional management practices also exist in Malawi. According to Mwale and Malekano (2000) fishermen in Chembe village (situated in Nankumba peninsula, Cape Maclear, Mangochi District) had always managed to sustain themselves and kept their aquatic resources at economic levels. To avoid fish degradation or depletion, they used different gears seasonally. During the rainy season (November to March) use of nets was not allowed except line and hooks (targeting catfishes), which also

probably caught few fish. After the closed season, their nets targeted only small fish such as *utaka*. This practice was easily followed in the rainy season because people were much involved in farming and fishing was mainly done for relish. Thus, the practice allowed fish such as *Oreochromis shiranus* (chambo) to breed and grow to maturity.

Mwale and Malekano (2000) further report that in Chembe there were restrictions on who could fish from their area. The restriction helped to control the fishing technologies in their area. They report that a particular chief would inspect the fishing gears used for each expedition. The chiefs were also strict on the fish stocks caught to avoid degradation and conserve fish for future generations. These practices were weakened during the colonial era.

According to Chirwa (1996), the colonial government regarded traditional fishing methods as destructive and dangerous designed in such a way that small or immature fish could not escape. They viewed Africans as ignorant people who did not know the ecological effects of their fishing practices. Thus, the fishing regulations were introduced in 1930 to prohibit fishing by traps, weirs and poisoning.

However, the fishing rules did not take into account some sustainable elements and strengths of the traditional fishing methods (Chirwa 1996). This negative approach of handling traditional practices has led to unsustainable controls and resources degradation. For example, fish traps were only used in the dry season and were removed in the rainy season for fear that floods might wash them away. The rainy season is spawning period for

some fish such as *O. shiranus* hence, this practice allowed fish to breed and grow without disturbance. Further, Chirwa (1996) notes that these traps were designed in such a way that fish fly could easily pass through. Similarly, the traditional nets were designed for specific fish species such as catfish implying that other fish species were not caught and hence conserved.

Chirwa (1996) and Mwale and Malekano (2000) stress that it was the adoption of new and imported fishing gear such as nylon gill-nets, trawling nets and narrow meshed beach seine nets which have degraded fish stocks in Malawi. The adoption of these destructive techniques was a response to increased demand for fish. In contrast to traditional fishing gear, these gears were more efficient, required less labour, were easier to operate and also more durable than the traditional nets. This observation therefore suggests that it is advisable to examine the sustainability of IK and traditional practices before destroying them.

The Malawi government's realized through experience that it lacks the capacity to enforce sustainable management of natural resources that includes fisheries. Further, given the financial crisis affecting the country, the government has realized that the top – down imposition of rules and regulations is impractical and undesirable.

To prevent further degradation or reduce resources degradation and conflicts, the Malawi government in 1993 adopted Community Based Natural Resources Management (CBNRM) models and policies, an approach that involves the participation of the local communities

(GoM 1995, 2002, Community Partnerships for Sustainable Resource Management in Malawi (COMPASS), 2000). CBNRM is a central element of co-management.

Pomeroy and Williams (1994) defines co-management as the sharing of responsibility and authority between the government and local community to manage resources. This management system covers various partnership arrangements and degrees of power sharing and integration of grassroots-central government systems. Its members establish and enforce community rules, norms and regulations for resource use with support from central government (Pomeroy 1994). This implies a shift from top-down to bottom-up approach which includes an active participation of the resource users in planning and implementing management programmes, and collaboration with the existing traditional management regimes. This process creates conservation incentives by empowering user groups to reap the benefits of their own restraint. The process also sets policy objectives more in tune with the resource user social and economic needs consistent with sustainable development planning for common property resources (Pomeroy & Williams, 1994). This shift results in lower management costs, improved data reliability, a higher degree of acceptability and compliance and improved social relations among members.

The new Fisheries Act (GoM 1997) put a lot of emphasis on community participation and involvement in the management of fisheries resources. Pomeroy and Williams (1994) note that CBNRM or co-management makes

maximum use of indigenous knowledge (IK) and expertise to provide information on the resource and to complement scientific information for management. According to Redford and Padoch (1992), the indigenous people are often more knowledgeable about plant and animal species, including their identification and ecology. Therefore, for effective co-management, existing traditional management practices and institutions need to be investigated and applied. Earlier studies of Chirwa (1996) and Mwale and Malekano (2000) would provide the needed information on Lake Malawi only because IK and traditional management systems (TMS) are normally site specific.

## **1.2 Value of indigenous knowledge systems to the conservation of Lake Chilwa**

Lake Chilwa is an important ecosystem that supports a variety of valuable lake resources such as fish and waterfowl (Sambo & Munyenembe, 1999). Like most lakeshore populations, the majority of the people in the Lake Chilwa basin rely on these resources for their livelihood. For example, Kabwazi and Wilson (1998) reported that its fishery supports over 180,000 people as well as providing affordable source of protein to the highly populated districts of the southern region of Malawi. Lake Chilwa is therefore an important ecosystem to be conserved or protected.

In 1997 the Malawi government signed and ratified a convention on Wetlands, the Ramsar Convention that made Lake Chilwa the first wetland in Malawi to be registered as a wetland of international importance (GoM 2000a). The mission of the Ramsar Convention is conservation and wise utilisation of wetlands by

national action and international cooperation as a means of achieving sustainable development throughout the world (Ramsar Convention Bureau, 1971, IUCN, 1998). By signing this convention, the Malawi government accepted the wise use concept and other obligations mentioned in the convention.

Because of its advantages over conventional management, the Ramsar Convention also recognizes community participation as an essential tool for advancing the Convention's objective to achieve wise use of all wetlands. Therefore, it calls on all Contracting parties including Malawi, to make specific efforts to encourage this participation and involvement (Ramsar Conservation Bureau, 1999).

The Ramsar Convention Bureau (1971) also notes that local inhabitants' ecological knowledge can make significant contributions to wetland management strategies, especially when blended with the best science. In this recognition, the Bureau concludes that indigenous peoples involvement can, if carried within the framework of action encouraged by the Convention, contribute significantly to maintaining or restoring ecological integrity of wetlands as well as contributing to communities well being and more equitable access to resources.

The conservation of lake resources is a major national concern. Chisi Island is endowed with important natural resources which could be utilised for sustainable conservation and management programme. This study therefore sought to examine and identify existing knowledge and practices with a view to identifying those that could be integrated in scientific and management projects.

The study is premised on the notion that conservation and sustainable resource management could benefit from the integration of what local inhabitants already know and practice and has been demonstrated to be effective.

## **2 METHODOLOGY**

### **2.1 Description of the study site**

Chisi Island was chosen because according to Kayambazinthu (2001 pers. comm.), it is small, supports a lot of natural resources and is famous for indigenous knowledge (IK) and taboos.

#### ***Geographical features***

Chisi Island is located at between 30° 35' and 30° 38' East of Greenwich Meridian and 15° 18' and 15° 21' South of the Equator. It is situated in Traditional Authority Mkumbira of Zomba district. The Island has area coverage of about twenty-one square kilometers and is surrounded by marshes to its west and open waters to its east. It is located at a distance of about five kilometers from Kachulu harbour and about thirty-five kilometers from Zomba municipality (Figure 1).

#### ***Population characteristics***

This Island has 13 villages with a total population of 1591. Males in almost all age groups dominate the population. The total population comprises 884 males and 568 females of 5 years and above. The males make up about 60% of the population and the sex ratio is estimated

at 130 (GoM, 1998). This sex ratio is higher than the average sex ratio, 92 for all the Lake Chilwa districts.

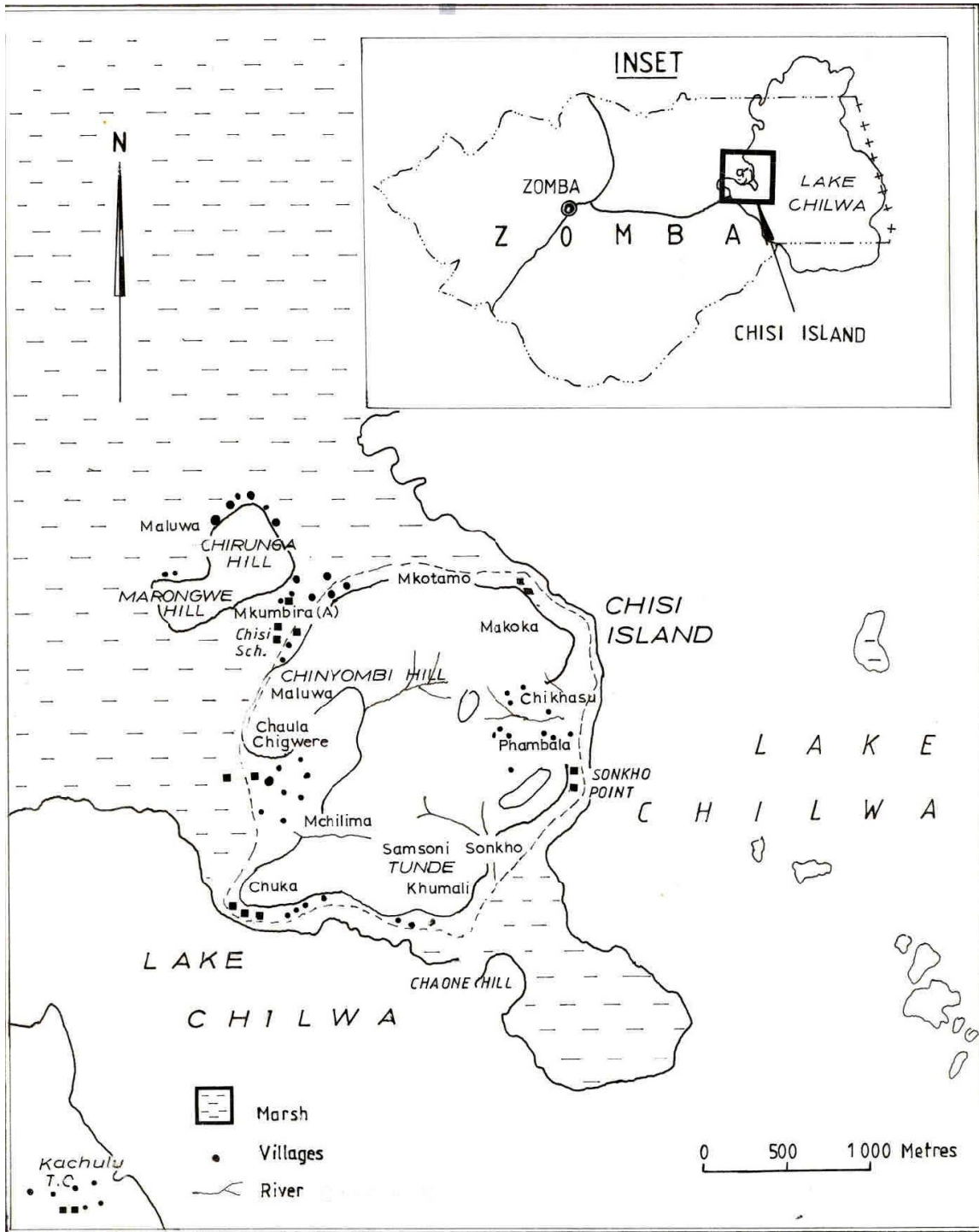
The population is ethnically heterogeneous and culturally similar in being matrilineal. According to Kayambazinthu and Chabwera (1999) the major ethnic group in this site is Nyanja. Chisi Island people originated from Mozambique and they belong to different religions such as the Christianity and Islam. About 93% of the population are Christians, 5% are Moslems, 0.4% belong to other religions and about 1.6% have no religion (GoM 1998).

#### ***Education***

Literacy levels on Chisi Island is estimated at 87%. This percentage is considerably higher than the average 50%, for the whole Lake Chilwa wetland and catchment area. Only 13% of Chisi inhabitants are illiterate.

#### ***Occupation***

Lake Chilwa basin is characterized by low incomes ranging from zero to MK3,000 per year for 30% of the households except in Zomba urban. Farmers have highest incomes immediately after crop harvesting and fishermen have highest incomes during the fishing season (GOM 2000d). 30% of the Island's economically active group (who are 10 years and above) depend on agriculture, 69% are employed in other employment sectors such as firewood selling and



Source: National statistics Office  
**Figure 1 Map of Chisi Island**

fishing and 1% are unemployed (GoM 1998).

## 2.2 Sample Population

A sample population of 200 households was taken from all the 13 villages found on Chisi Island. The Island has 545 households most of which are semi permanent and others are traditional or temporary. The sample selected for the study may not represent the whole country, all wetlands and even the whole Lake Chilwa Wetland and Catchment area because the study was only concentrated in a small area. Furthermore, IK is site specific. Hence, this sample only represented the population of Chisi Island where the study was undertaken.

## 2.3 Sampling of the study population

### *Systematic Sampling of the households*

The sampling frame was obtained from the National Statistics Office lists of households for the 1998 Population and Household Census. The sampling frame for Chisi Island has 545 households on its list. A systematically selected sample of 200 households was drawn from this frame. This sample reflected the proportion of the total population in each village. The sample was selected at an interval based on the following formula:

$$k = N/n$$

where  $k$  is the sampling interval,  $N$  is the total number of households on Chisi Island  $n$  is the sample size (Burns 1994)

For this sample  $n=200$ ,  $N=545$  and sampling interval  $k=545/200=2.7 \sim 3$

Since  $k$  is 3 therefore every third household from the list was selected. The first household was randomly selected from the first three households on the list. A table of random numbers was used to decide on the starting point. If the  $k^{th}$

household no longer existed in the village, the next household in the line ( $k+1$ ) was included in the sample. After this occurrence, the rest of the households in the sample shifted automatically. In the selected households, all household heads or their spouses were targeted for the survey to capture the views of the middle aged and elderly population.

### *Snowball rolling for sampling the key informants*

Snowball rolling was applied to identify key informants interviewed for specific information. The Traditional authority was used to identify one respondent who helped to identify and locate another key informant. This process continued until 20 key informants were sampled. The key informants were interviewed to supplement and provide in depth explanation on the information obtained from the individual interviews and the focus group discussions (FGDs). The key informants included the Traditional Authority, chiefs, fisheries officer, the oldest inhabitants who included all inhabitants who were aged 60 and above years, and other people who were reportedly, more knowledgeable of the traditional practices and beliefs associated with a variety of resources.

## 2.4 Data collection techniques

Within all the villages the first objective was to identify different lake resources as defined by the local people. The second objective involved gathering indigenous information on the perceived habitats of these resources. Local people were then asked to describe the practices that exist(ed) on the Island and their effect on fisheries management. Fisheries management was targeted because people's livelihood is highly dependent on fishing and thus the local body of



knowledge was expected to be more detailed and accessible than the other resources.

The study used a range of techniques to investigate the existing knowledge and TMS: 200 household questionnaires, four FGDs and 20 key informants' interviews. About 56% of the household respondents interviewed were male and 44% were female. The issues that were addressed in the household interviews were discussed in detail in the FGDs. The household interviews were conducted before the FGDs so that information gathered was individual and reliable for comparison with information obtained from the FGDs. The FGDs were used because the participants were thought to be more knowledgeable of the discussed issues compared to other household respondents. The FGD participants included the indigenous inhabitants and those migrants who had stayed on the Island for more than 10 years and had vast ecological and TMS knowledge. The Traditional authority helped to identify the members. Selection of the FGDs participants was based on their recognised status as fishing experts. The FGDs comprised 10 to 12 participants. Four FGDs, one from each of the social groups (males, females, the oldest members and the youth), were conducted on four separate days due to cultural constraints. In Malawi, rural women speak out their views less than men in meetings combined with men. Care was taken to make sure that no one dominated the discussions. This combination

contributed to a thorough data collection because one method could not provide all the needed information about the respondents. The responses obtained from various data collection techniques were also compared to relevant information documented in the literature. The survey was conducted from 23<sup>rd</sup> October to 9<sup>th</sup> November 2001.

## **2.5 Data analysis techniques**

Quantitative data from the household interviews was coded and analysed using Statistical Package for Social Science (SPSS) software package. Descriptive statistics was used to create frequency tables and percentages showing the proportions of respondents who have knowledge of lake resources, their habits and particular traditional management practices. All qualitative data obtained from the FGDs were compiled and transcribed using line by line coding. The coding involved categorizing all emerging issues into different themes. This analysis was applied to list and describe the lake resources and practices reported on Chisi Island.

## **3 RESULTS AND DISCUSSION**

### **3.1 Identified lake resources on Chisi Island**

The household respondents and FGDs participants identified a total of 15 lake resources (Table 1). The percentages of the respondents do not add up to 100% because responses were derived from multiple response questions.

**Table 1** Identified lake resources

Resource	Species (Scientific name)	Local name	Percentage
Fish			100
	<i>Oreochromis shiranus chilwae</i> ,	makumba	
	<i>Barbus paludinosus</i>	matemba	
	<i>Clarius gariepinus</i>	mlamba	
False bulrush	<i>Typha domingensis</i>	njeza	87
Hippos	<i>Hippopotamus amphibious</i>	mvuwu	83
Waterfowl			76
Fulvous whistling ducks	<i>Dendrocygna bicolor</i>	chipiyo	
White-faced whistling ducks	<i>Dendrocygna viduata</i>	chipiyo	
Reed cormorant	<i>Phalacrocorax africanus</i>	mpipi	
Lesser moorhens	<i>Gallinula angulata</i>	nthutuwiri	
Lesser gallinule	<i>Porphyrio porphyrio</i>	nadititi	
Spur-winged goose	<i>Plectropterus gambensis</i>	sekhwe	
Pink-backed pelican	<i>Pelecanus rufescens</i>	chikovili/vuo	
Great white pelicans	<i>Pelecanus anocratalus</i>	chikovili/vuo	
Little egret	<i>Egretta garzetta</i>	kakowa	
Cattle egret	<i>Bubulcus ibis</i>	kakowa	
Yellow billed egret	<i>Egretta intermedia</i>	kakowa	
Grey headed gulls		nkhalakata	
		mabawe	62
Snakes (lowland swamp viper)	<i>Atheris superciliaris</i>		50
Floaters	<i>Aeschomene pfundi</i>	mabungwa	
Sedge	<i>Cyperus articulatus</i>	mlulu	49
Hippo grass	<i>Vossia cuspidate</i>	duvi	25
Reeds	<i>Phragmites mauritianus</i>	bango	22
Soft-shelled turtle	<i>Cylotheria frenatum</i>	nombo	13
Nile cabbage	<i>Pistia stratiotes</i>	chipiri	2
Hornwort	<i>Ceratophyllum demersum</i>	kakombwe	2
Water hyacinth	<i>Eichornia crassipes</i>	namasipuni	1

The reported species for other resources were obtained from the FGDs and these agree with Wilson (1999), Mfuno and Mhango (1998), Kabwazi and Gulule (1999) and Phiri *et al.* (1999) findings. This suggests that the local people know which species are available in their area therefore scientific studies can apply this

knowledge when creating and updating the Island resources' inventories.

### 3.2 Perceived location of lake resources on Chisi Island

Table 2 shows the reported habitats of the lake resources. The percentages of the household respondents do not add up to 100% because they were derived from multiple response questions.

**Table 2** Percentage of respondents for each lake resource and its habitat

Resource	Habitat			
	Open water	Lake shore	Mabawe	False bulrush
Fish	99		14	58
False bulrush		91		
Soft-shelled turtle		13		
Hippos	83			
Waterfowl	59			59
Snakes	42			43
Floaters		38		
Sedge		52		
Hippo grass		30		
Reeds		26		
Nile cabbage		2		
Hornwort		2		
Water hyacinth		1		

The reported habitats in Table 2 concur with those documented by Kabwazi and Gulule (1999) and Wilson (1999) but the respondents provided the exact locations of the resources in the specified habitats. Local knowledge of exact zones may relate to how the inhabitants utilize those specific zones. For example, based on this knowledge fishermen know where to find specific fish species. Through the male FGDs, fishermen reported that *Oreochromis shiranus chilwae* is found in *Typha* and open water, *Barbus paludinosus* mostly in river mouths and *Clarius gariepinus* in marshes. This finding agrees with Hipwell (1999) observation that natives provide remarkably accurate diachronic data for particular localities and specific stocks of animals and plants because their understanding has often been built over many centuries of systematic observation, whereas conventional science is comparatively new. Earlier studies on the Island did not involve the local people who could supply them with much information. Scientific studies take long periods of time and use a lot of money to study a single phenomenon which could

be easily known from the local resource users.

### 3.3 Traditional management practices for the lake resources

The respondents reported that in the past decades there were no defined management practices for the lake resources. Conservation of fish was done through application of some traditional practices and religious taboos or beliefs or myths. However, it was learnt from the key informants that observance of most of the practices was not meant for conserving the resources although they played that role. The practices were meant to please their spirits or to meet their livelihood using locally found resources. Johnson (1992) notes that spiritual explanation often conceals functional ecological concern and conservation strategies. The FGDs participants reported that practices are not static. Some practices are being devised or adopted to cope with the changing economic needs. This subsection presents

the reported practices some of which are destructive to the environment.

### 3.4 Use of traditional gear

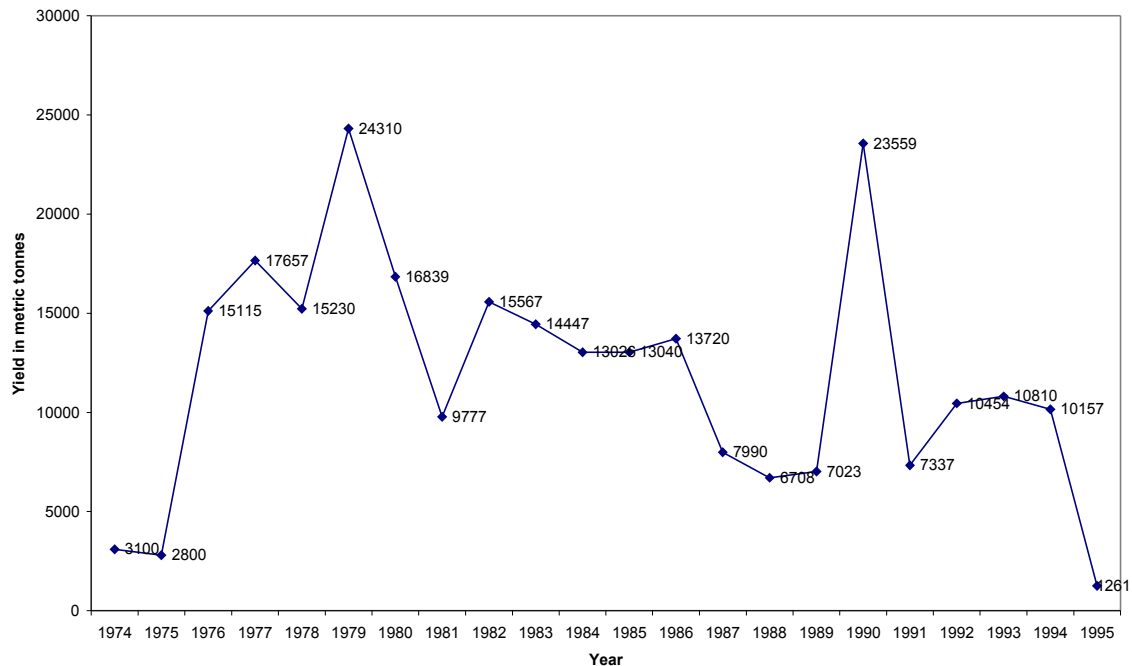
About 75% of the household respondents reported that in the remote past fishermen used traditional gear (to catch fish) such as fish traps (mono), spears (momba), hoe handles, sticks and locally made fish hooks (mbedza) and gill nets (ukonde). These gears are selective in nature compared to seine nets. This finding agrees with the findings of Nkhoma (2001) who documented the nature, fishing methods, type and size of fish caught by these gears, their advantages and disadvantages.

From the FGDs it was discovered that each traditional fishing gear is designed from an intimate knowledge of sublacustrine topography and habits of the targeted species. Similarly, Lévêque (1999) reports that for many generations fishermen have developed a huge variety of fishing gear, made with local materials and adapted to the ecological behaviour of the targeted fish species. He gives an example of basketwork fish traps, which are selective for both size and species and adapted to the diversity of fish, capture possibilities under particular environmental conditions. From the present study, the fishermen reported that fish traps are designed for *Oreochromis shiranus chilwae*, which feeds and breed in the *Typha domingensis* (permanent swamp found in the Lake Chilwa dominated by the bulrush and found in almost pure stands). The fishermen further reported that fish traps designed

for *O.s chilwae* differ from those meant for *Barbus paludinosus*. Fish traps for *O.s chilwae* have big spaces.

The traditional gill nets for *O.s chilwae* had holes two to three inches wide in diameter. Small fish were not caught, if caught, were immediately returned into the lake. This practice encouraged full growth of the fish. Similarly, Hipwell (1998) gives an example of Samifa fjord fishers whose gill nets were designated to allow biggest fish to escape, ensuring survival of a healthy breeding stock. This suggests that this gear can catch few of the small fish species hence, contributing to their conservation.

However, it was learnt from the FGDs that the majority of the fishermen no longer favour most of the gears, which helped to conserve specific fish species. When contacted, the fishermen reported that financial hardships force them to opt for seine net, a modern fishing gear with small mesh size and which catches large amounts of fish as compared to the traditional fishing gears. The FGDs participants reported that apart from lake recessions, this change of behaviour poses a threat to fish resources. Although fisheries recover after the lake's recessions, fish yields were reportedly declining. Figure 2 shows the estimated total annual yield from Lake Chilwa for all the fish species, for a period from 1974 to 1995. The total fish catch ranges from 1,261 metric tonnes (in 1995) to 24,310 metric tonnes (1979) (Kabwazi and Wilson 1998).



**Figure 2** Estimated total annual yield from Lake Chilwa – all species (1974-1995) (adapted from Kabwazi and Wilson 1998)

This result agrees with Kabwazi and Wilson (1998) report that one of the reasons for the decline of fisheries in Lake Chilwa is through use of inappropriate fishing gear especially very small net mesh sizes. Thus concurring with Kawanabe *et al.* (1999) observation that as a result of changes in socio-cultural character, many customs and traditions of long settled lake societies are being lost and forgotten. The vulnerability to change of such old cultures parallels the known vulnerability of the natural environments of the ancient lakes and their endemic faunas to anthropogenic impacts.

### 3.5 Restricted fishing and cutting of *Typha* in sacred sites

About 21% of the household respondents, FGDs participants and key informants reported that traditional leaders over two

decades ago restricted fishing in sacred sites. The practice originated from their ancestors and this was not meant primarily for fish conservation. No fishing was done around Chaone and Chidyamphiri Islands (Figure 1) in fear of spirits. For instance, the key informants reported that Chaone was visited only when the chiefs led by Village headmen Khumali and Sonkho went to offer sacrifices to their ancestors when fish was scarce. If fishermen dared to go there, they got lost mysteriously. They further reported that sometimes the people could meet mysterious human beings or their boats could be mysteriously stopped for hours or days around these areas hence people were afraid of the spirits. The fear of the spirits helped to conserve fish in sacred sites. Village headman Chigwere made an account of two white geologists who came in 1971 on the Island to conduct mineral exploration on Chaone

hill. The Village headman warned them of what they might meet on the hill but they did not listen to him. These two met the mysterious human beings on the hill whose presence terrified and forced them to abandon the expedition. This incident increased fear among the people of the sacred sites. However, geological reports on studies done on the Island around the reported period do not include the incident.

Village headman Khumali further reported that fishing along these sites was done only when there was famine associated with fish scarcity and no one was allowed to fish more than one fish. Village headmen Khumali, Sonkho and Tchuka regulated this practice, which prevented over fishing and allowed fish species to repopulate. These traditionally protected sites served as undisturbed fish breeding and growth sanctuaries. They acted as replenishment zones from which stock might migrate into adjacent areas and had the potential to provide insurance against management and or recruitment failures elsewhere. Village headman Khumali further reported that breaking the taboos against over fishing led to expulsion from the Island. This sanction acted as a severe incentive to force people follow the rules and regulations.

The key informants reported that apart from restricted fishing, no *Typha domingensis* were cut around Chaone and Chidyamphiri hills hence these contained plenty of *Typha* that conserved a lot of fish. Thus concurring with Kabwazi and Wilson (1998) report that the extensive *Typha* swamp which comprises 1/3 of the lake provides a safe refuge for fish especially juveniles. However, at present these sites are encroached; the restrictions no longer form the basis of fisheries

management. The fishermen in the male FGDs reported that restricted fishing in sacred sites has been weakened due to high influx of migrant fishermen who never observed the rules and this action forced the original inhabitants to neglect the practice. This suggests that if these sites were still kept around Chisi Island, probably fish catch would not decline. Village headman Khumali believes that this practice is no longer observed because the present generation regards this management technique as primitive. He also reported that current generations have little fear for spirits. The Village headman's observation tends to support International Institute of Rural Reconstruction (IIRR) (1996), which has noted that spiritual beliefs affect resources management. He believes that through their various denominations (Christian or Muslim), which never existed in the remote past, people have learnt to no longer fear the spirits. Kayambazinthu *et al.* (2001) support this finding that influx of alien religions brought about changes in the local institutions.

However, when contacted in their FGDs, the youth and the middle aged respondents denied this allegation. The youth blamed the older generation that they do not pass on the knowledge of these practices to them. The older people do not also observe these practices to set an example to the young generation. This report tends to agree with Village headman Khumali's report that the village headmen stopped offering sacrifices on Chaone in 1974. This finding suggests that there are weakening links between grand parents and grand children. This supports Gupta (1999) and Langill (1999) observation that IKS are being eroded due to breaking down of

traditional communication networks; the elders are dying without passing their knowledge to children.

### 3.6 Restricted cutting of 'mabawe'

About 32% of the household respondents reported that the people on Chisi conserve *mabawe* (the grass growing in the open waters) for various reasons. The grass is primarily conserved because it acts as safety nets when there are waves on the lake. Further, the stems of this grass (just like *Typha*) are encircled by algae, which is fish feed thus, are regarded as very important sites for fish. This belief supports Wilson (2002 pers. comm.) report that fish farmers are now encouraged to fill their ponds with bamboos for the same reason. The belief further supports Azim (2001) discovery that rows of bamboo sticks placed in a pond about half a metre improve yields. Just like *Typha* and *mabawe*, the sticks serve as a breeding ground for periphyton (algae, bacteria, plankton and other organisms), on which fish thrive well. The sticks discourage poachers since they make it difficult to overfish and trials in India showed that Indian carp and *Tilapia* performed well, with yields increasing by 70 to 80%. According to Wilson (2002 pers. comm) by providing a substrate area similar to the pond water surface, both autotrophic and fish production can be doubled up to 5,000 kg per hectare per annum. Lake Chilwa has a production of 159 kg per hectare per year. This production makes it one of the most productive fresh water bodies in Africa. The high productivity is driven by a high growth rate of extensive *Typha* swamps (25 to 30 tonnes biomass per hectare per year (Kabwazi and Wilson 1998, and GoM 2000d). Similarly, Fryer (1999) report that fishermen on Lake Malawi have recognized as 'utaka' a guild of

zooplankton-eaters that appear around rocky prominences on the lakebed. Their knowledge about utaka is complemented by biologists' discoveries concerning the fishes' feeding habits. This shows that the local fishermen on Chisi Island are repositories of much knowledge of the feeding habits of the fish that provide them livelihood. Hence if the traditional knowledge and practice concerning *mabawe* and *Typha* are incorporated in the designing of co-management programmes on the Island, fish production will improve. However, 27% of the respondents stated that seine nets destroy this very valuable grass indicating a conflict that needs to be addressed.

### 3.7 No fishing when the wife was pregnant

From the key informants it was learnt that over two decades ago a husband could not be allowed to fish when the wife was pregnant. This was probably meant to keep the husband home to support his wife but the respondents reported that people feared that the person would bring misfortunes on the fellow fishermen. They would fail to catch fish if one in that situation came to fish. From the FGDs it was learnt that family planning is rarely practised on the Island hence this implied reduced number of fishermen on the lake and little pressure exerted on the fish. This practice no longer exists due to increased population and competition with visiting fishermen from other lake areas such as Lakes Malombe and Malawi, thus adversely affecting the fish resources. This result agrees with Kabwazi and Wilson (1998) report that increase in number of fishermen and hence fishing pressure on finite stocks is one of the main causes for the recent

decline and collapse of fisheries in Malawian lakes.

### 3.8 Forbidding use of traditional medicine in fishing

It was reported from the male FGDs that in the past decade chiefs restricted fishermen from using poison or traditional medicine such as latex extracted from *Eurphobia tirucalli* (nkhadze) when catching fish. Tough sanctions followed if one was caught violating the rule. This practice aimed at huge hauls of fish catch. The chiefs learnt from their ancestors that fish caught by this practice was tasteless and not real. This belief spread on the Island and people waned the practice. Although it was scientifically false, this belief helped to conserve fish because this practice could contribute to declining fish catches hence unsustainable. However, it was reported that at the time of the study some fishermen followed this practice. The key informants reported that this change in fishermen behaviour is probably due to expanded market of the fish. They can sell their fish to distant markets such as Zomba and Blantyre market. The practice has also increased due increased numbers of visiting fishermen who in earlier year had restricted right to fish on Chisi beaches.

### 3.9 Closed season for fishing

Closed season was recently introduced in 1997 as a present management technique for fish. It was reported from the FGDs that this is not a traditional management technique for fisheries. This closed season, biologically aims at giving room for restocking. Introduction of this rule led to the establishment of beach village committees (BVCs) on the Island. BVCs are forms of leadership and representative groups elected to act as the state's

partners in the co-management regime. They act as the 'mouth piece' of the fishing communities, and as a channel of communication between the fisheries department and the fishermen. The BVC composition includes elected members from all the villages they represent and traditional leaders such as chiefs, village headmen and group village headmen. The traditional leaders act as patrons of the committees but do not make decisions for the group. The understanding was that these elected bodies would be more representative, democratic, accountable and efficient in fisheries management (Chirwa 1999). Hence, these were entrusted with the responsibility of disseminating information on regulations to fishermen and to oversee the compliance with the regulations. During the same period, measures during dry-up of the lake to maintain fish stocks for later re-population of the lake by imposing complete ban on fishing in all stream inlet areas around the lake and rules on appropriate fishing gear, minimum landing sizes for various species (Engholf *et. al.*, 1998) were cited as management techniques for fish during normal periods and when the lake dries up. For instance, all respondents stated that seine nets are not allowed during the closed period, which starts on 1<sup>st</sup> December and ends on 1<sup>st</sup> April. This finding agrees with Phiri *et al.* (2001) who reported that the use of beach seine was prohibited during the closed season and use of an open seine net (nkacha) was prohibited throughout the year. The people know the benefits of such regulations. For example, from the FGDs it was reported that there is abundant fish soon after the closed season.

About 94% of the household respondents stated that village headmen restrict



fishing in river mouths and pools close to Chaone hill when the lake dries hence people rely on vegetables for their meals. Perhaps this is a traditional way of ensuring fish repopulation when the lake recovers. Biological studies also show that both swamp and open water fish species breed and grow in lagoons and mouths of rivers during Lake Chilwa recessions (Kabwazi and Wilson 1996).

However, the respondents stated that BVCs were very effective only in the first two years. (Phiri *et al.*, (2001) report that by February 1998, seven gears had been confiscated by various BVCs) hence compliance of the rules is difficult. The problems contributing to failure of the BVCs vary.

The respondents cited problems such as corruption of the Traditional Authority and the fisheries department (28%). This finding agrees with Kayambazinthu and Chabwera (1999) who report that corruption by chiefs was one of the problems affecting resources management in the Lake Chilwa area. Other problems included small fines charged (5%), and no incentive such as salary for the BVCs members (8%). Phiri *et al.* (2001) also view lack of incentives as a problem. An interview with Chaone and Maluwa BVC members confirmed these allegations. When seine nets are confiscated, the BVC take the offenders to the chief and the fisheries officers. These people were entrusted to charge fines. However, these officials sometimes receive bribes from seine nets holders and let them free or they charge them very small fines, which they pay without problems and go back to fish. This practice discourages the BVC members.

The government also imposed the closed season on the people. This is another reason for non-compliance of the rules. Fishermen readily subvert management systems that do not involve them (Weber 1994). Non-compliance of the management techniques has affected negatively both the fishermen and the status of the fish resource. The FGDs participants reported that seine nets are very destructive because they catch large quantities of non-target species, every size of fish and other water organisms, some of which may be disposed of, as wastes or thrown back into waters often dead or dying. Therefore, use of seine nets during the closed season implies that fishermen destroy fish eggs and catch young fish. This practice reduces the potential catch in Lake Chilwa and has serious economic implications. For example, a small fish, which only fetches about MK3, could if left for another six to nine months have grown to a size worth for example, MK20. This perception may be compared to fish farming – stocking with “fingerings” which are grown for four to six months and then harvested (Wilson 2002 pers. comm.).

#### 4 CONCLUSION

The study aimed to examine local people's ecological knowledge and practices in lake resources management. The study found that Chisi inhabitants have developed and maintained some local ecological knowledge and practices that can have significant implications in scientific research and on the management of lake resources on the Island. The knowledge systems have been conserved and passed on from generation to generation through religious beliefs, taboos and myths. However, changes in social structures, immigration and advent

of new religions, adoption of new resource harvesting techniques and changes in life styles have weakened these indigenous knowledge systems. Although these knowledge systems were not specifically meant for conservation of natural resources, this study suggests that such knowledge can be incorporated in scientific studies and in implementation of co-management programmes.

Line ministries or Non Governmental Organisations should incorporate some of the traditional practices that lead to sustainable management of resources and discourage those that lead to resources degradation. For example, practices such as use of some traditional fishing gear such as fish traps and hooks for fishing, and conservation of *mabawe*, should be encouraged because they promote sustainable utilization of fish. Restricted fishing around sacred hills should be re-established because this practice contributes to regeneration of fish. This can be achieved by sensitizing the local people on the ecological and economical value of such sites. Furthermore, the local people should be given incentives to adhere to the practice.

Other traditional practices that promote degradation of resources need to be discouraged. For example, use of poisonous plants in fishing should be discouraged because it leads to degradation of fish and other water organisms. Integration of sustainable management practices and discouragement of destructive practices will help achieve Ramsar wise utilization objective on the Island.

## 5 ACKNOWLEDGEMENTS

The authors acknowledge DANIDA for funding the project, Chisi inhabitants for

their cooperation and all people who contributed to this work throughout the study period.

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