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Chapter 12
Community Response: Decline of the Chambo in Lake Malawi's Southeast Arm

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Abstract In Malawi, the multi-gear, multi-species small-scale fishing sector lands more than 95% of the catch and employs over 95% of those participating in fishing, greatly contributing towards poverty alleviation and protein food security for the lakeshore communities and Malawians at large. Over the last two decades, catches of the chambo (*Oreochromis* spp.), the most valuable species in the Southeast Arm of Lake Malawi, have declined. This is a source of concern for the sustainability of the fishery as a whole, and the impact this could have on the dependent fishing communities, given that the devastated Lake Malombe fishery followed a similar trajectory. Fishers are ambivalent as to whether decline of the chambo should be a source of concern, especially if accepting this view would mean agreeing to new regulations aimed at reducing fishing effort. This study analyzes the strategies being used by fishers in response to the changing fishery dynamics as a result of the decline of the chambo. The responses include: investment in cheaper fishing gears; invention of new fishing techniques; introduction of new gear types; geographic and occupational mobility; business and livelihoods diversification; changes in relation to production within fishing units; and introduction of cage culture. Managers and development practitioners need to understand the changes taking place in the fishery in order to formulate appropriate and acceptable solutions, if the fishery is to continue to provide social-economic benefits for the fishing communities and Malawi.

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12.1 Introduction

Since the early 1990s, the estimated landed catch of chambo (*Oreochromis* spp.),[1] the most valuable species from the Southeast Arm of Lake Malawi, has declined. 1995 saw the lowest estimated catch of chambo ever recorded at 690 t compared to nearly 4,000 t at its height in the mid-1980s. The concern is that the demise of the Lake Malombe fishery started with the over fishing of the chambo. Thereafter, fishers switched to the less valuable but still abundant (at the time) *Lethrinops* (kambuzi) spp (Hara 2001). Within a period of 10 years, these other species had also been biologically and economically overfished. The whole fishery has never recovered to its former levels of productivity.

In view of the foregoing, the decline of the chambo fishery on the Southeast Arm over the last two decades has raised fears and concerns that the artisanal fishery of the area could follow the same trajectory as that of Lake Malombe (Hara 2001; Banda et al. 2005). This has great socio-economic implications for the dependent fishing communities in the area, and for other people in the ancillary sectors who greatly depend on the fishery for their livelihoods. The decline of the chambo on the Southeast Arm has increased government concerns about the sustainability of both, the chambo and the fishery as a whole; and most of all, the socio-economic impact this could have on the fishing communities.

The government concerns are such that it officially launched the *National Save the Chambo* campaign in January 2003 that resulted in the formulation of the Chambo Restoration Strategic Plan (Banda et al. 2005; Hara 2006a). To reiterate, the potentially disastrous socio-economic impact of a degraded artisanal fishery on fishers and the dependant fishing communities is epitomized by the devastation of the Lake Malombe fishery, which began with the overfishing of the chambo, the most valuable species, followed by the less valuable species. This could also happen on the Southeast Arm of Lake Malawi.

Are these government concerns necessary? If availability of the chambo has indeed declined, and the species composition of the fishery has changed as a result, how are fishers reacting in order to cope with these changing resource dynamics? How do they view the proposed government solutions?

The findings of this study are that in reaction to decline in profitability of inshore chambo beach seines, fishers have switched to a cheaper gear type (gill nets) and have invented a new method of catching the chambo (kauni), in order to continue targeting the chambo offshore. Other strategies include increased targeting of lower value species namely utaka (*Copadichromis* spp.), kambuzi (*Lethrinops* spp.),[2] and usipa (*Sardinella* spp.) and diversification of business interests and livelihood activities. In addition, the crew members have become more assertive in terms of business decisions, and also in terms of benefit sharing systems and formulas.

[1] Chambo is a general term for three (*lidole, squamipinnis*, and *karongae*) closely related species of tilapine cichlids of the genus *Orechromis* (FAO 1993).

[2] Utaka and kambuzi are haplochromine cichlids (FAO 1993).

As part of the chambo restoration plan (Banda et al. 2005), the government has introduced cage culturing on Lake Malawi as a way of trying to boost chambo production. The decline of the chambo, and attempts to restore the fishery to its former levels of production, present great management challenges as this has to be done while trying to improve or at least maintain the livelihoods of the fishers. Such a management approach calls for the incentivization of participation of fishers in finding solutions and sustainable exploitation practices.

The chapter is organized as follows: The preceding introduction outlines the problem and also summarizes the findings of the study; this is followed by a section on the theories of poverty in relation to human well-being (including Malawi's vision for development), and also small-scale fisheries. Next is a short overview of the role of fisheries in Malawi's economy, and presentation of the case study area and how it fits into Malawi fisheries. The methodology used for the study is then outlined. This is followed by the main section outlining the findings of the study. The last section, following the results, discusses the findings in relation to poverty and livelihoods; and whether the findings pertain to a virtuous or vicious circle in terms of poverty. The last section draws some conclusions from the study.

12.2 Theories of Poverty in Relation to Human Well-Being

Perceptions of poverty vary depending on culture, political ideologies, level of development, religion, and many other factors. In many cultures, "poor" is not just the opposite of "rich" (Rahnema 2007). The term could mean: falling from one's station in life, loss of one's status, loss of one's instruments of labor, lack of protection, exclusion from one's community, being abandoned, infirmity, public humiliation, etc. (Sen 1981; Rahnema 2007; Jentoft et al. 2010). It is with the monetization of economies and societies that poverty has increasingly been defined as lacking what those classified as rich have in terms of money and material possessions. This thinking had been strengthened by concepts that defined poverty on the basis of National Gross Domestic Product and per capita income (for example, the "dollar a day" threshold between being classified as "poor" or "not poor") by the multi-lateral development agencies such as the World Bank (WB) and the United Nations Development Programme (UNDP).

Conceptualization of poverty has, since the 1990s, changed to the use of more composite indices of human well-being such as the Human Development Index (HDI) by the UNDP (2009), as a result of recognition that poverty is multi-dimensional. While the basic necessities vary among cultures and societies, there is a minimum requirement, an irreducible core of absolute necessities, in the idea of poverty.

For the HDI concept, three dimensions are used to measure human development and human well-being: life expectancy, literacy, and standard of living.[3] Within the

[3]It is recognized though that the use of just these three dimensions is not comprehensive enough, since this excludes other important indicators such as gender, income inequality, human rights, political freedom, etc.

HDI concept is also the use of the Human Poverty Index (HPI). While the HDI measures the average progress of a country in human development, the HPI measures the proportion of people below a specific threshold in each of the dimensions of the HDI. The HPI thus represents a multi-dimensional alternative to the income (Purchasing Power Parity – PPP) poverty measure. For Malawi, a HPI value of 28.2% ranked the country 90th among 135 countries in 2007 (UNDP 2009). Rahnema (2007, p. 159) reiterates though that "among the various definitions and perceptions of poverty, the common denominator is the notion of *lack* or *deficiency.*"

Malawi is signatory to the 2000 United Nations General Assembly Millennium Declaration. The country undertook to achieve the Millennium Development Goals (MDGs) by 2015 and lists the eradication of extreme poverty as the first and key of the eight goals (GoM 2008). The Government of Malawi defines extreme poverty as "the inability to meet the basic minimum food requirements" (GoM 2008, p. 2). Two targets were set by the government as key indicators for eradicating poverty by 2015: first, reducing by half the proportion of people whose income is less than one dollar per day; and second, reducing by half the proportion of people who suffer from hunger. One of the MDGs relates to ensuring environmental sustainability. The 2008 progress report (GoM 2008) states that Malawi continues to experience various forms of environmental degradation, caused by increasing population growth, poverty, impact of HIV and AIDS, and inadequate alterative livelihoods.

Following the end of colonization in Africa,[4] fisheries have always been linked to economic development and how the sector can contribute towards improving the lives of rural fishing communities (Ferguson et al. 1993; Hara 2001; Hara et al. 2009). As Béné (2003) points out though, there is an almost complete lack of references in the literature on poverty to cases on fisheries. The author attributes this to the nature of scholarship and analysis on fisheries and poverty and the way this attempts to explain the origins and causes of poverty in small-scale fisheries. According to Béné (2003), the relationship between poverty and small-scale fisheries has been explained in two contrasting ways. The first is to say that: "They are poor because they are fishermen;" while the other says that: "They are fishermen because they are poor" (Béné 2003, p. 949).

The first explanation has its origins from Gordon's (1954) classic paper that argued that fisheries are an open access resource, which was powerfully and famously re-interpreted by Hardin (1968) as the "tragedy of the commons." For both Gordon and Hardin, the open access nature of fisheries results in more and more people entering a fishery. Over time, excess effort results in overfishing, depletion of resource rents, and eventually the impoverishment of the fishers.

As Hersoug et al. (2004) point out, this argument has been very strong in fisheries, with both donors and scientists using it to explain poverty in small-scale fisheries. The second idea proposes that fisheries is an employer of last resort, which absorbs those falling out of other economic sectors (FAO 2000). Thus people enter into fisheries because they have no other option. In other words, it is a sector that absorbs those who are poor and have nowhere else to go (they are fishermen because they are poor). This

[4]The majority of African countries gained independence in the 1950s and 1960s.

argument proposes that small-scale fisheries act as a safety net, and closing participation might actually cause poverty (Hara 2001; Jul-Larsen et al. 2003; Jentoft et al. 2010). Thus, the widely accepted and conventional view in fisheries literature is embodied in these twin concepts: "Fishermen are the poorest of the poor;" and "fishing is an activity of last resort" (Béné 2003). Both these concepts convey the idea of small-scale fisheries being a sector characterized by structural chronic poverty (Béné 2009).

Jul-Larsen et al. (2003) demonstrate how these two approaches for explaining poverty might not be necessarily applicable in some of the inland fishing water bodies in southern Africa using Brox's (1990) concepts of *horizontal* and *vertical* fishing effort. Horizontal increase in effort pertains to increased effort as a result of more fishers using the same kind of technology entering a fishery; whereas, vertical increase of effort relates to increased fishing capacity as a result of new and improved technology. Because vertical increase in effort results in increased efficiency, it is regarded as being more harmful than a horizontal increase in effort, which is merely an increased effort of similar type and efficiency.

Jul-Larsen et al. (2003) argue that in most of southern Africa's small inland water bodies, horizontal increase in effort is more common since most fishing communities are not specialist fishers. Fishers enter and exit the fishery depending on opportunities outside fishing. Thus, fishing is usually one of a number of livelihood possibilities. In addition, fishers have flexibility in fishing strategies (e.g., targeting different species according to availability), and migrate geographically in pursuit of better fishing opportunities. Thus, mobility (occupational and geographic) is a key strategy that fishers use in order to overcome fluctuations in fishing fortunes. Jul-Larsen et al. (2003) argue thus that in most water bodies in southern Africa, increase in effort is usually horizontal; and that the increases have not usually been to the extent that this calls for limiting access. The authors further argue that limiting fishing effort in most of these communities might actually be harmful in terms of livelihoods based on adaptive mobility.

Hersoug et al. (2004) caution though that although Jul-Larsen et al.'s (2003) findings might be applicable to most small inland water bodies in southern Africa, Pauly's (1994) argument about "Malthusian over-fishing," and Panatoyou's (1982) argument about small-scale fisheries[5] being characterized by "easy entry and difficult to exit," points to the fact that even horizontal increase in effort can cause overfishing and therefore result in poverty.

12.3 Fisheries in Malawi's Economy

Fish contributes 40% to 50% of the animal protein in the diets of Malawians (Hara 2001; Njaya 2009). Despite its low contribution to GDP,[6] fishing is one of the main sources of livelihoods in the lakeshore areas of the major fish producing water bodies

[5]The two authors used the Asian small-scale fisheries for their analysis.

[6]Since the 1970s, the DoF has been putting out the figure of 4% as the contribution of fisheries to GDP (Hara 2001; Njaya 2009).

like Lake Malawi, Lake Chilwa, Lake Chiuta, and the Lower Shire River. According to Malawi's Department of Fisheries (DoF 2009), the artisanal fishing industry employed about 60,000 fishers (gear owners and crewmembers) in 2008. Over 95% of people were employed in the catching sector with landings of over 95% of the catch. Another 400,000 were estimated to have been working in the post-harvest sector as processors, traders, retailers, and also in the ancillary industries such as boat building and net-making. Given that the average household size in Malawi is five, this means that about 2.3 million people benefit from capture fisheries. Thus capture fisheries contribute substantially to the Malawi Growth and Development Strategy (MGDS) framework through protein food security and poverty reduction (GoM 2006).

12.3.1 The Southeast Arm of Lake Malawi

The Southeast Arm of Lake Malawi denotes the right arm (facing north) of the southern end of Lake Malawi (Fig. 12.1). Its total surface area is approximately 2,000 km^2. Although it represents only 8.4% of the total surface area of Lake Malawi, the contribution of the area to total production from Lake Malawi had usually been

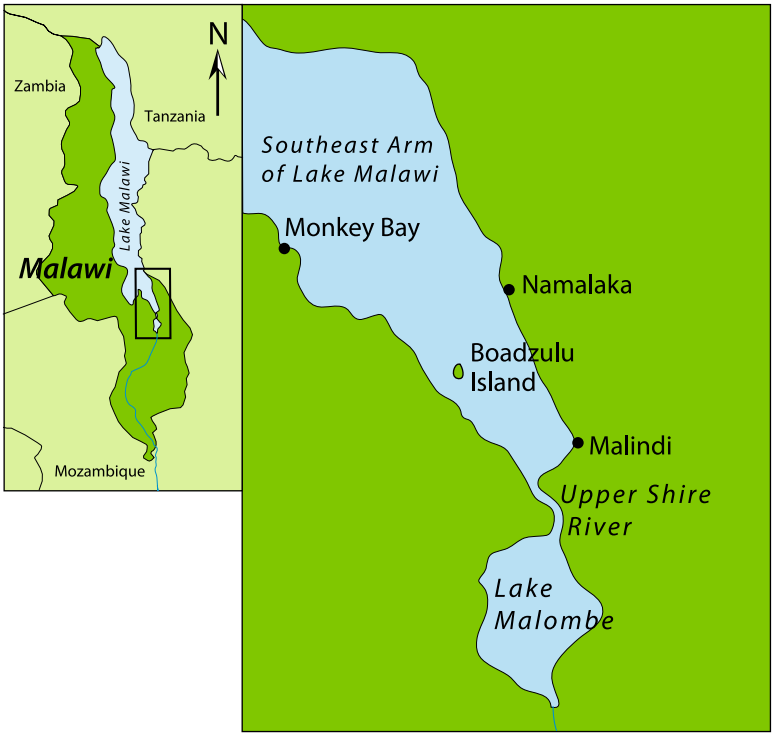

Fig. 12.1 Geographic location of the Southeast Arm of Lake Malawi

between 25% and 35%; while the area's contribution to total national landed catch had averaged over 20% since 1990. Within Mangochi District, the contribution of the area's artisanal sector had grown consistently; and by 1995, the sector accounted for 57% of the estimated landings. The high production of usipa (*Sardinella* spp.) from the area in recent years means that this contribution is even higher, reaching 82% in 2005; and 75% in 2009. It is thus the most productive area of the lake.

Mangochi District, where the Southeast Arm is located, had a population of 803,000 in 2008 (NSO 2008). The estimated density in the district was 191 people per square kilometer, with the density rising to over 500 people per square kilometer along the lakeshore area (NSO 2008).

Rain-fed agriculture is the most important sector in the local economy, with about 66% of the population being employed in the sector as family farm owners and unpaid family farm workers. Under Malawi's land tenure system, smallholder farmers normally hold land under customary tenure,[7] while commercial estates hold land under leasehold tenure.[8] In Mangochi District, customary land constituted 49.9% of arable land, while lease-held farms constituted the remaining 50.1% in 1995. In the same year (1995), there were 156,694 small holder farm households while lease-holders numbered only 650 (GoM/UNDP 1998). Because of this skewed distribution of land and the given population growth, there is an increasing shortage of customary land; so much so that most households in the small holder sector do not have enough land to grow adequate food for their annual needs.

12.4 Methodology

Fieldwork was undertaken between August 2008 and January 2010. Two main sources of data and information have been used for this study. Firstly, structured and unstructured interviews; and secondly, catch and effort data, and frame survey[9] data from the Department of Fisheries (DoF) for years 1977 up to 2007. For the unstructured interviews, 17 gear owners, 50 crew members (mostly as focus groups), 5 village headmen, and 8 traders (including three women traders) were interviewed. The gear owners were selected across all the important gears on the basis of the gear type owned and also their age/experience in the fishery. The crew members were also selected from across all gears on the basis of the main gear types that they were employed in. Also interviewed were six DoF officers in the following categories: Field staff working in the Southeast Arm area; the Fisheries Officer for Mangochi District; and the Director of Fisheries Research at Monkey Bay. Discourse analysis was used to analyze and interpret the views of fishers and DoF staff on what the state of the chambo means to them in terms of conservation of the fishery, and

[7] Customary land is owned by the state, but is left under the supervision of traditional leaders.

[8] Lease held land is under supervision of the government, but is leased out for a period of 99 years.

[9] A frame survey is a count of all gear owners, crew members, fishing gears, vessels, and engines deployed in the fishery. This is supposed to be done once annually.

its continued provision of socio-economic benefits for the fishing communities and other stakeholders. The District Agriculture Officer for Mangochi District, an official dealing with inheritance and wills in the District Commissioner's Office, and the Project Manager and Farm Manager for Maldeco Aquaculture Limited (cage culture production) were also interviewed. Four people (migrants) from the Southeast Arm area but currently working and living in Cape Town were also interviewed. All in all, over 90 people were interviewed during the three field trips undertaken between August 2008 and January 2010.

Malawi's Department of Fisheries' statistics on estimated catch, fishing effort, and beach prices were used in order to look at historical catch and effort trends; landed value and other variables of the fishery in order to look at the changing characteristics of the fishery.

12.5 Strategies for Adapting to the Changing Dynamics of the Southeast Arm Fishery

This section presents the study findings regarding some of the key adaptations and strategies being used by fishers on the Southeast Arm in response to the decline of the chambo (Fig. 12.2), catches, and variability in other main target species. These include: change in target species, adoption of new gears, invention of new fishing techniques, geographic and occupational mobility, broadening the portfolio of economic activities, reliance on remittances from relatives, change in production relations between gear owners and crew members within fishing units,[10] and introduction of lake cage culture.

12.5.1 Change in Target Species, Introduction of New Technologies, and Migration

For most fishers who can invest in the fishery (gear owners), the chambo remains the primary target species because it remains the most valuable species (Table 12.1). As the profitability of *chambo beach seines*[11] declined (the most profitable chambo fishing gear in the 1980s to early 1990s), gear owners disinvested from beach seining and switched to gill nets and chilimira nets (Fig. 12.3). Thus, the increase in the number of gill nets (by 517% between 1990 and 2005), and chilimira nets on the Southeast Arm from the mid-1990s into this millennium; while at the same time, the number of chambo seine nets declined (Table 12.2). Gill nets are cheaper in terms

[10] A fishing unit refers to a complete array of the equipment and persons with the skills necessary to undertake a fishing enterprise. Usually, a unit comprises of the gear owner (who owns the capital equipment – the vessel, net, and engine) and the crew members.

[11] The chambo beach seine is a rectangular net cast using a boat and then pulled to the shore from two ends by two groups of gang members (numbering between 10 and 30), one on each side (FAO 1993; Hara 2006b).

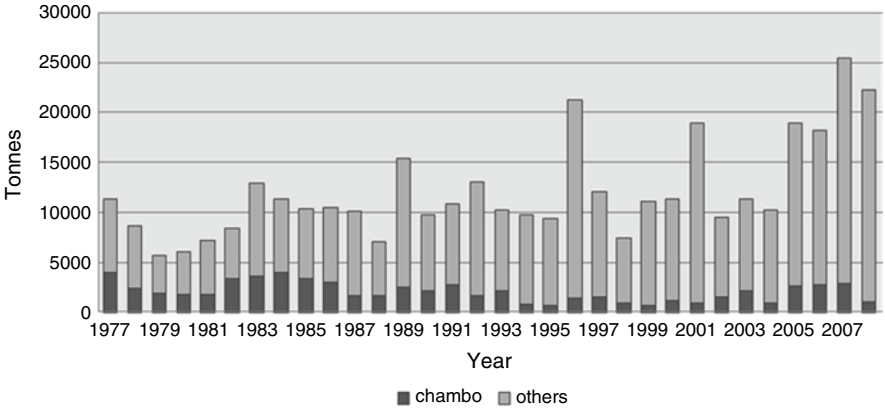

Fig. 12.2 Estimated catch for chambo and other species for the Southeast Arm (Source: Department of Fisheries, Lilongwe, Malawi)

Table 12.1 Estimated total annual catch (to the nearest ton) and landed value (in millions Malawi Kwacha (MWK))[a] for selected species and for selected years from Southeast Arm (Source: Department of Fisheries, Lilongwe, Malawi)

	Chambo		Kambuzi		Utaka		Usipa	
Year	Catch	Value	Catch	Value	Catch	Value	Catch	Value
2004	933	98.9	1,319	44.8	1,620	64.8	2,376	99.2
2005	2,646	365.1	1,672	76.9	4,336	186.4	3,203	176.2
2006	2,829	432.8	997	55.8	1,566	95.5	4,365	309.9
2007	2,882	631.6	1,572	108.5	2,215	166.1	8,237	593.1
2008	1,135	265.6	2,054	183.0	2,068	170.1	11,271	1,246.6

[a]1 USD = 150MWK (from http://www.xe.com accessed on 03/04/2010)

of required capital investment and also in terms of amount of labor requirements. The problems with regard to night set gill nets are first of all, destruction of the nets by trawlers; and second, increased theft thereby requiring crew members to stay out on the lake throughout the night to guard the nets.

Another critical development during the 1990s was the invention of *kauni fishing*.[12] This is a method of catching the chambo offshore by the use of the *chilimira*[13] using light attraction. This meant that as catches from beach seining declined, the chambo has mainly been targeted using either gill nets and/or kauni. Therefore, the increase in chilimira nets during the 1990s (Table 12.2) was partly

[12]In local (Chichewa) language, Kuwunika means lighting. The fishers on the Southeast Arm have termed the method of catching the chambo at night using the chilimira by attracting it to light as kauni.

[13]The chilimira is a conical shaped, open-water seine net first invented for catching utaka (FAO 1993; Hara 2001). By lining the bunt with a mosquito net, it can be used for catching usipa. The chilimira is operated from two boats by a total of nine crew members.

Fig. 12.3 A Chilimira seine being brought-in after a throw on Southeast Arm of Lake Malawi. Operated from two boats, the net is thrown in a wide semi-circle and then slowly pulled in a surround bagging motion from the two boats until the two boats come together. This photo shows one boat and one of the net ends (Source: Mafaniso Hara, 2009/11/02)

as a result of its use for catching the chambo. When the DoF discovered that fishers had invented kauni, the knee jerk reaction was to ban the method on the basis that the small mesh-sized[14] chilimira was catching undersized chambo. Fishers are adamant though that kauni does not catch undersized chambo, since most of the offshore chambo are adult.

A third major strategy by fishers has been to increasingly switch to less valuable, but still abundant, species such as utaka (*Copadichromis* spp.), usipa (*Sardinella* spp.), and kambuzi (*Lethrinops* spp.) as availability of the chambo declined (Table 12.1). Thus, the last 15 years or so has seen a dramatic increase in catches of usipa and to a lesser extent utaka (Fig. 12.2). The switch to these other species is also evident from the increase in the number of chilimira nets (the gear used to catch these species) by over 90% during the 1990s (Table 12.2). Thus, whereas the chambo used to be the main species caught from the Southeast Arm, other species have increased in importance in recent years. The increase in the number of chilimira nets has thus been as a result of the invention of kauni and also the increased targeting of usipa and utaka. In terms of versatility, this means that the chilimira can be used to target three species (usipa, utaka, and chambo) by simple technical adaptations to the same net.

[14]The minimum legal mesh size for gillnets and beach seines, the two gears meant to target the chambo, are 95 and 90 mm, respectively; while minimum mesh size of the chilimira is 25 mm (FAO 1993).

Table 12.2 Number of gear owners, assistants and gear units on the Southeast Arm counted during the frame survey (Source: Department of Fisheries, Lilongwe, Malawi)

	Number counted during frame survey							
Year	Gear owner	Assistants	Gill nets	Kambuzi seine	Chilimira seine	Chambo seine	Nkacha	Hand line
1990	979	6,655	1,685	157	378	52	0	1,138
1991	867	6,107	1,671	130	352	47	0	649
1992	1,090	7,025	2,383	183	381	43	1	622
1993	1,101	7,329	2,470	177	331	44	29	303
1994	1,226	8,062	2,416	119	475	32	43	1,413
1995	1,290	8,027	2,822	171	465	22	50	1,309
1996	1,153	8,268	2,566	89	512	25	17	365
1997	1,327	10,056	3,322	102	577	36	41	76
1998	1,337	9,069	4,554	100	689	24	12	201
1999	1,268	8,686	4,440	56	542	19	70	138
2000	No Frame Survey							
2001	1,716	10,167	9,432	57	572	7	83	18
2002	1,368	10,237	6,711	35	569	5	109	77
2003	1,693	10,796	9,612	60	539	6	89	46
2004	No Frame Survey							
2005	1,486	9,257	10,390	18	521	7	91	680

Utaka and usipa vary geographically in terms of abundance and availability. It is common therefore for chilimira fishers to migrate around the Southeast Arm, or even to other areas of Lake Malawi in pursuit of good usipa or utaka catches.

Notably, gear owners usually have more than one gear type, which can be deployed on the basis of availability and profitability of a specific fishery/species. This multiple gear ownership by individual gear owners can be discerned from the fact that while the total number of gear units in the fishery increased by 385% between 1990 and 2005, the number of gear owners only increased by 50% during the same period (Table 12.2).

The official figure of assistants (crew members) counted during the frame survey needs to be corrected by putting the number of crew members deployed in each type of gear into context. If we take the figures for the latest year available, which is 2005 (Table 12.2), the official number of assistants counted was 9,257. The following are the numbers of crew members that are deployed in each unit for the five main gear types: 2–4 (average 3) per unit in gill nets; 6–20 (average 13) per unit in kambuzi seines; 10–30 in beach seines (average 20); 9 in chilimira; and 8 in nkacha. Fishers further stated that usually, each chilimira and nkacha unit has at least two sets of crew members at a time. Using the average (or actual) number of crew members that are deployed in each unit for the five main gear types, Table 12.3 shows the total estimated number of crew members employed for each gear type, and therefore, the estimated total number of crew members employed for the five main gears.

Contrary to the official figure of 9,257 assistants therefore, 40,000–45,000 crew members is the more likely number of crew members that were actually employed in the five main gear types in 2005 (Table 12.3). Using the same formula, about

Table 12.3 Estimated total number of crew members employed on the Southeast Arm in 2005 (based on total number of units of each gear type, and average number of crew members per unit)

Gear type			Total crew members
Gill nets	Total units	10,390	31,170
	Average crew members/unit	3	
	Total crew members	10,390×3	
Kambuzi seine	Total units	18	234
	Average crew members/unit	13	
	Total crew members	18×13	
Chambo Beach Seine	Total units	7	140
	Average crew members/unit	20	
	Total crew members	7×20	
Chilimira	Total units	521	9,378
	Average crew members/unit	9×2	
	Total crew members	521×9×2	
Nkacha	Total units	91	1,456
	Average crew members/unit	8×2	
	Total crew members	91×8×2	
Total			42,468

15,000 crew members were employed in these gears in 1990 based on gear numbers in Table 12.2. This means that whereas the official figures show that the number of crew members increased from about 6,600 in 1990 to around 9,300 in 2005 (by about 39%), most likely the number increased by over 180% (from around 15,000 to between 40,000 and 45,000).

Recent years have also seen an increased number of *nkacha*[15] nets (Table 12.2). This gear targets kambuzi. An additional positive factor for the nkacha seines is the space left by semi-commercial pair trawlers, which mainly target kambuzi. Out of the seven semi-commercial pair trawlers that were licensed to operate on the Southeast Arm, only two have been in service in the last decade. Most of the nkacha nets currently operating on the Southeast Arm have migrated from Lake Malombe following the decline of the kambuzi fishery in Lake Malombe. Despite attempts to ban the use of the nkacha net on Lake Malawi by the DoF (on the argument that it had caused the destruction of the Lake Malombe fishery), the deployment of the net has increased. Nkacha fishers argue against the ban by pointing out that it is not possible to convert the nkacha to gears that have historically been used on the Southeast Arm such as the chilimira, since its configuration is totally different. They further pointed out that the nkacha is used to target the kambuzi rather than utaka or usipa and therefore is occupying a separate and different niche within the Southeast Arm fishery. The crew members also pointed out that their skills are around fishing using the nkacha, rather than other gears.

[15]The nkacha net is a rectangular net first invented in Lake Malombe to target the kambuzi in reaction to decline of the chambo in that lake. Its design is based on the kambuzi seine net. The special aspect of its operation is that one of the crew members has to dive to tie the two sides of the net together so that it forms a bag like a purse seine net before the net is pulled to the surface from two boats.

While fish traders also note with concern that the chambo has declined, they also see some positive aspects with regard to increased targeting of the other species. For the traders, the utaka, usipa, and kambuzi are easier to process, store, and transport (since these are usually dried) than fresh or smoked chambo. The low-income consumers in the urban areas where the fish is mostly sold also prefer the dried fish since this is cheaper and is also easier to store, given that most consumers do not have refrigerators.

12.5.2 Production Relations Within Fishing Units

In most instances, the gear owners do not go out fishing, rather they employ crew members. The way gear owners and their crew members relate to each other in a fishing unit is an important factor in gears operating on the Southeast Arm. This partnership has evolved from being based on wage employment in the 1970s and 1980s, to the sharing of proceeds from fishing based on agreed formulas in specific gear types (Hara and Jul-Larsen 2003; Hara 2006b).

In recent years, there have been further changes, especially in favor of crew members. What is clear is that crew members have increasingly asserted themselves within the fishing units when it comes to business and operational decisions. As examples: They insist on being involved (through their representative) in the auctioning of the catch to the highest bidder when the catch is landed. They demand that the gear owner provides them with breakfast or money in lieu of breakfast (they call this money *ya ndege*[16]), before they can go out fishing in the morning. They have a large say as to what species to target (whether chambo or utaka or usipa), when using the chilimira nets. Whereas with the chilimira, the gear owner still subtracts the daily operational expenses, in the nkacha net, the crew members refuse these deductions so that the sharing is based on the gross revenue. In the nkacha, therefore, the gear owner has to pay for all the operational costs for fishing. In choosing the buyer for the catch, the crew members stated that they started to insist on being involved in finding the highest bidder for the catch in order to counter practices of price collusion between the gear owner and the buyer that they claim had become common. Crew members also insist on being paid their portion of the share immediately after the sell of the catch rather than on a weekly or monthly basis as it used to be in former times (Hara and Jul-Larsen 2003).

In gears such as the chambo seine nets, gang members sometimes demand prepayment before they can operate the net (Hara 2006b). All in all, gear owners complained that crew members had become too powerful and are increasingly acting as if they are shareholders. Crew members argued that they were simply making sure that they got properly remunerated for their hard labor by demanding and insisting on a fair share of the catch proceeds. The crew members also pointed out that being

[16]Ndege means airplane. The context is that they need to eat before they can fly (go out fishing).

a crew member is not proper employment, since earnings vary from day to day on the basis of catch size, and the price of the catch (which depends on supply and demand and many other factors). They further argued that tenure as a crew member, within a given fishing unit, is very insecure and transient. For example, the gear owner might decide to suspend fishing, or the gear might get damaged and fall into disrepair due to weather and/or other factors that can instantly result in this source of income and livelihood being pulled away from under one's feet.

What has also become common is that most seine nets have more than one set of crew members per gear/fishing unit. This means that the number of days that a crew member goes out fishing is not for a full month. As far as crew members are concerned, therefore, it is important that they maximize earnings whenever they go out fishing.

12.5.3 Vulnerability

The issue of maximizing earnings by crew members also relates to how vulnerable they are to both short-term and major mishaps due to lack of easily convertible assets (those that can be sold in an emergency) and/or savings. Bad weather for a number of days, for example during the winter months when the *mwera* winds (southeast trade winds) are prevalent, can mean no source of income for those days. One of the major mishaps is when something happens to the fishing gear. This could be due to theft of the gear, wearing out of the gear, confiscation of the gear by the Department of Fisheries, or the death of the gear owner.

In case of the death of the gear owner, the relatives of the gear owner usually suspend fishing until the issues of inheritance have been sorted out. If there are disputes among the relatives, this means that the suspension of fishing can take even longer. This can mean that all of a sudden, a crew member and his family have no source of income. In most instances, the family members of the deceased gear owner sell the fishing gear and share the money, meaning that the gear changes hands. Crew members are not guaranteed employment by the new gear owner.

Wives are particularly vulnerable to the death of their gear-owning husbands. Thus, unless the gear owner had a will, the wife (or wives since in most instances gear owners practice polygamy) and relatives enter into dispute over inheritance and/or sharing of assets. In the past (even currently if the widow is not well informed), the usual practice had been that the male side relatives of the deceased gear owner grabbed all the assets including fishing implements, leaving the widow and her children destitute. In recent years, the government has developed legal provisions meant to protect spouses and their children in the case of the death of the husband/father. This means that even if the deceased husband did not have a will, the widow can take the matter to the Traditional Authority for settlement, if this cannot be settled within the family. If the widow is not satisfied with the outcome at the Traditional Authority level, then she can take the matter to the District Commissioner (DC). According to the provisions of the new Inheritance Act, the wife (or wives) of the

deceased get 65% of the assets, and the man's male side relatives get 35%. Because of disagreements among those entitled to the estate of the deceased, the usual solution among the disputants is to sell the assets and share the money.

12.5.4 Diversification of Livelihood Profiles

Whereas most fishers used to rely almost solely on fishing and used to use income from fishing to buy food and other necessities, there has been an increased diversification in terms of businesses among gear owners, and sources of livelihoods among crew members. Most gear owners diversify into other businesses in order to spread their risks. The range of businesses they go into are cash-crop farming, building and running rest houses, public transport, keeping livestock (especially cattle), etc. (Hara and Jul-Larsen 2003; Hara 2006a). This way, investments are moved around a number of business portfolios, depending on the farming season and profitability of a specific business type at a given time.

12.5.4.1 Farming

For crew members, the most important alternative source of livelihoods is farming. Because of the high population density along the lakeshore area, there is very little land for farming along the lakeshore. Therefore, most households have increasingly acquired farming land further upland, between five and ten kilometers away from the lakeshore area. The provision of subsidies for fertilizer by the government in the last 5 years has helped improve productivity of small-scale farmers and thus improved household food security. In contrast, during the 1990s, the government was forced to strictly implement the Structural Adjustment Programme (SAP), and subsidies had been withdrawn resulting in exorbitant prices for fertilizer.

For those who have acquired or inherited customary wetlands next to the lakeshore or rivers, they usually establish dimba gardens[17] for vegetable and dry season maize production. Dimba gardens have thus become a very common sight on the shores of the Southeast Arm. Domestic animals (cattle, goats, chickens, ducks, rabbits, etc.) are another important source of household protein and income.

12.5.4.2 Other Livelihood Activities

Petty trading is another livelihood activity that has become increasingly common (Hara 2006a). Although the main centre for this type of trading is Mangochi Township, vending is increasing in rural areas also. Young men are also taking up

[17] Dimbas are small-scale cultivations for vegetables, bananas, sugar canes, maize, and other agricultural crops along the lake or rivers using water from the lake, rivers, or wells dug for irrigation.

transportation of people using bicycles as a livelihood activity, both in and around Mangochi Township and in rural areas.

12.5.5 Remittances from Relatives

Migrant relatives working in urban areas or outside the country usually send money back home, especially during times of need or stress. Apart from money, relatives in South Africa also send back goods that can be converted into cash such as vehicles, televisions, stereos, and bicycles, etc. Those interviewed said that such remittances were particularly important in times of stress or disaster such as when there is a death in the family (funeral expenses), for taking care of a chronically ill family member, or when households run out of food.

Regarding foreign migrant labor, especially to South Africa and former Rhodesia (present Zimbabwe), this used to be very common among most young people from Mangochi. In fact, most of those who became successful gear owners in the 1970s and 1980s had raised the income for investing into fishing from foreign migrant labor (Chirwa 1995; Hara and Jul-Larsen 2003). Following independence in Zimbabwe (1980), and the end of Apartheid in South Africa (1994) though, these countries have had to prioritize jobs for their own people; meaning that they put a stop on organized importation of unskilled labor from other countries. In addition, it has become very difficult and expensive to obtain a Malawi passport. Thus, although some people still go to South Africa for job hunting, they enter that country as tourists and simply overstay on their month-long visitor's visa, having chanced on a job. The recent 2008 xenophobic attacks on foreigners in South Africa (especially those from other African countries), have made potential migrants more circumspect about going to South Africa in search of jobs.

12.5.6 Chambo Cage Culture

One of the strategic actions suggested under the Chambo Restoration Strategic Plan (Banda et al. 2005) is production enhancement. This has included the introduction of Lake Cage Cultures[18] for chambo on the Southeast Arm, and other areas of the lake. In line with this, cage culturing has been introduced on the Southeast Arm as one of the technological innovations to enhance production and therefore supply of chambo. MALDECO, the only commercial fishing company in Malawi, which operates from a base on the Southeast Arm, are the fore-runners in the introduction of this technology. They plan to introduce over 150 cages on the lake, most of which will be located on the Southeast Arm. This would enable them to produce over

[18]This is a form of aquaculture practiced in the Lake. A cage is suspended in water, fingerings are introduced in the cage, fed artificially, and then harvested for sale when they reach the required size.

3,000 t of chambo annually at full production. As of 2009, MALDECO had 53 cages in the lake, and had harvested over 600 t of chambo in that year.

According to the Department of Fisheries, the cage culture technologies will eventually be made available to other private investors, and also communities. Regarding communities, the thinking is that villages along the lake could get involved in cage culturing, with the economic benefits being shared among the defined village communities. However, up to now, no communities are participating in cage culture activities. A number of concerns had been raised about cage cultures by fishers and other people interviewed, such as: the fact that fishing communities do not have the capital required to invest in such technologies; fishing communities do not have the technical knowhow for producing fingerings and then culturing them to market size in lake cages; communities lack the institutional and organizational set-up required to run such ventures as a business; and the environmental impacts of cage cultures have not been adequately assessed. For the artisanal fishers on the Southeast Arm, one of the concerns expressed was the issue of competition for fishing space out on the lake. Given that almost all the main fishing gears that are used by the artisanal fishers on the Southeast Arm are offshore, the increasing appropriation of space for fish cages could result in increasing contestation for space out on the lake between fishers and cage culturing.[19]

Therefore, an important consideration regarding the introduction of this technology is whether cage cultures would be acceptable to the majority of current and potential fishers to the extent that they would be willing to accept the trade-offs between loss of fishing grounds, and the benefits that will accrue from cage cultures instead. Also, it is not clear to village headmen how village communities will be organized for cage culturing. One possibility could be the formation of village fishing cooperatives, which could be used as the vehicle for funding and management of cages belonging to a village or area. The point is that currently and historically, investment in fishing has been by individual gear owners. Cooperatives have never been used.[20]

Communities would also have to learn to take a long-term view of benefits from such ventures, since it takes up to 3 years to produce a commercial-sized chambo through cage culturing. Therefore, apart from the technological challenges, there are issues of the institutional arrangements, the issue of funding for capital investments, and the possible environmental impact of cage cultures on capture fisheries over the long-term. All these issues would have to be resolved if community cage culturing is to become a reality, and one of the viable solutions to the decline of the chambo on the Southeast Arm.

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[19] In addition to artisanal fishers, the semi-commercial and commercial trawlers also operate in the offshore areas of the lake.

[20] Although farmers' clubs (for provision of farming inputs and extension services by government and NGOs) are used in the agricultural sector, fishermen's cooperatives have never been popular. Fishers are very individualistic in terms of sourcing capital for investment into fishing and sharing formulas for benefits within fishing units. Besides, fishers launch from and land anywhere they want. They also need to follow good catches, and therefore migrate whenever there is need to. Thus, they do not limit themselves to specific areas or landing sites. This system of operation makes cooperatives unworkable in the fishing sector in Malawi.

12.6 Fishing for Profit and Livelihoods: Virtuous or Vicious?

The basis of concerns about the decline of chambo on the Southeast Arm fishery is that this spells out the decline of the fishery as a whole. This will have great socio-economic impact on the fishing communities in the area, just like the collapse of the fishery in Lake Malombe has had on the fishing communities in that area. The question to answer first is whether the chambo fishery has indeed declined to such a level to be a cause for concern. The last recorded stock assessment of the chambo fishery was in the early 1990s by the Chambo Fisheries Research Project (FAO 1993). The stock assessment suggested that the biomass for the chambo on the Southeast Arm was 9,883 t. Based on this, the Maximum Sustainable Yield (MSY) was computed at 3,510 t (FAO 1993, p. 40). If this is the only official and authoritative figure that we can use, then it is fair to say that based on the estimated catch figures, the landed catch for chambo from the Southeast Arm has been below this suggested MSY for most of the last 20 years (Fig. 12.2).

The high catches in the years 2005–2007 (Table 12.1) were the result of large catches in the northern part of the Southeast Arm, the Makanjira area. Fishers from that area point out that these good catches were mainly from the Mozambican waters just north of Makanjira, where Malawi fishers are fishing. The Mozambican area in question has very low population because most people moved away from rural areas during the civil war in the 1970s and 1980s. The waters had therefore been largely under-fished. Thus, the good catches of chambo that can still be obtained are from that area.

For the gear owners and crew members, the initial manifestation of this decline, was the decline in profitability of the main gear that was being used to catch the chambo in the 1970s and 1980s – the chambo beach seine. Fishers had experienced this change very quickly on the fishing grounds, and had to adapt to the changing biological dynamics of the resource in order to maintain and sustain their fish businesses and livelihoods. They have adapted to this by disinvesting from the more expensive chambo seine nets that had become unprofitable to operate, to use the cheaper gill nets. Also, they invented a new, more profitable method – kauni. In the context of both the increased switch to gill nets and invention of kauni, fishers realized that while there were less chambo available inshore, they could still catch chambo profitably offshore using gill nets and kauni. Because the chambo remains the most valuable species, fishers still use every possible means and method to catch whatever chambo can be caught, in order to cash in on its value.

The Department of Fisheries has blamed the decline of the chambo on growth and recruitment overfishing caused by use of illegal gears, fishing during the closed season, destruction of habitats, and increased fishing effort (FAO 1993; Hara and Banda 1997; Banda et al. 2005; Hara 2006a). The destruction of inshore habitats cannot solely be blamed on fishers though. Since the 1980s, there has been a boom in construction of hotels and private cottages on the Southeast Arm. In most instances, the hotels and cottage owners remove vegetation from the inshore areas in order to create clear and clean areas for recreation.

The contention that part of the blame for the decline of the chambo is due to increased fishing effort assumes that the argument put forward by Jul-Larsen et al. (2003) about the resilience of fisheries in most small water bodies in southern Africa to increased fishing effort[21] does not apply to the Southeast Arm. On the Southeast Arm, there has been an increase in both types of effort. In terms of horizontal effort, there had been an increased number of fishing gear units by over 300% between 1990 and 2005. Gill nets contributed the most (by over 500%) (Table 12.2). The increase in gear units has also meant a large increase in the number of crew members by at least 180% (Table 12.3).

In terms of horizontal fishing effort, therefore, there were increases in both the number of gears and also fishers in the fishery. The concept of horizontal increase in effort would argue that the increase in effort involved an increase in the type of gears (gill nets and chilimira) that were already in use in the fishery. Therefore, these could not have been harmful because it was an increase in the same type of effort. There is also a possible argument about "Malthusian" overfishing. The entry of so many crew members, and deployment of so many gears (even though of similar type) intensively fishing day and night in such a small area could be harmful. There has also been the case of vertical increase in effort on the chambo through the deployment of a new and more efficient type of gear that targets the species offshore – the kauni.

Even if increased effort (both horizontal and vertical) has contributed to the decline of the chambo fishery, other factors such as destruction of habitats argue against putting the blame on increased effort alone. Until more and thorough investigations are undertaken, it cannot be said conclusively what factors have contributed to the decline of the chambo the most, and by how much. Just like the chambo, there is little scientific data and information of the biology, stock size, species interactions,[22] and other important factors of the other major and important exploited species (utaka, usipa, and kambuzi) for informed management decisions. The concerns and management actions that have been, or are being currently proposed by the DoF, such as the banning of kauni and nkacha, are thus mainly on the basis of the precautionary principle (FAO 1996).

From a livelihoods perspective, the decline of chambo beach seines and kambuzi beach seines has meant more crew members being employed in the fishery as a result of increased number of gill nets and chilimira nets. If we assume that each of the crew members' earnings benefit households of an average of five people, then the total number of people benefiting directly from the fishery had increased almost threefold from about 75,000 (14,940×5) in 1990, to over 210,000 (42,468×5) in 2005.

[21] Because most of the time the increase in effort is horizontal rather than vertical (Brox 1990).

[22] All the four species (chambo, kambuzi, usipa, and utaka) are planktivorous. While both the chambo and kambuzi are bottom feeders, the chambo mainly feeds on bigger particulates (compared to the kambuzi). The usipa and utaka are pelagics. The usipa is more off shore in open waters, while the utaka live more near shore. Although there are likely to be interactions among the various species, their feeding habits differentiate them into separate niches, thereby lessening competition (M. Banda, personal communication, 10 January 2010).

It is from this perspective that for crew members, the demise of the chambo might not be viewed so negatively. For gear owners, the increased use of chilimira nets has enabled them to spread fishing business risk across three main target species – chambo, utaka, and usipa. Therefore, gear owners are also ambivalent about the decline of the chambo – i.e., whether it is a bad thing or not. For gear owners and crew members, the chilimira is a versatile gear that can be deployed for catching the most profitable species at any given time, allowing flexibility in terms of business and livelihood opportunities.

As Mr. Yezayeza Nkhwazi (a chilimira gear owner based at Kela beach, Mwawa village on the Southeast Arm) put it:

> Mmene wa perekera Mulungu ndi momwemo
>
> The nearest literal English translation of this statement is:
>
> God decides what and how much to give. We just have to accept what he gives.

This philosophical and enigmatic statement sums up the often expressed attitudes of most fishers when asked whether the chambo fishery has declined and if this is a problem. For them, it is not for anyone to determine how much fish they catch. It is God's will. Sometimes God gives and sometimes God keeps it for them for another day. This philosophical attitude has many meanings. It is a refusal to accept that there are less fish out in the lake than in the past. It is demonstrating denial to take responsibility for any possible overfishing. It brushes aside government calls for limiting fishing. It can be viewed as a resignation to the situation. It can also be real belief that there is no problem with the fishery.

Thus, whether the existing fishing practices and level of effort on the Southeast Arm is virtuous or vicious in terms of providing sustainable socio-economic benefits, depends in the end, on which side of the coin you choose to see. For the Department of Fisheries, the current fishing practices on the Southeast Arm are unsustainable, and therefore will eventually come back to haunt the fishers. For fishers, the fishery continues to provide fishing profits, livelihoods, and socio-economic benefits, thereby alleviating poverty. What the future holds is in God's hands.

12.7 Conclusions

The Department of Fisheries continues to use technical (input) regulations (mesh size restrictions, closed seasons, closed areas, and minimum sizes of chambo) rather than output regulations for management. Even if fishers were using the correct and legal types of gears and adhered to regulations, it is unlikely that the use of technical and input regulations alone can result in sustainable utilization of a fishery (FAO 1984). Some levels of limits on the output from the fishery have to be used in combination with input regulations. This is partly historical, since the fishery was seen as one of the key sectors for rural development (Hara 2001). It was, therefore, left open access in order to encourage those who could invest in fishing. This has resulted in

engrained attitudes about the fishery being open access.[23] It has also resulted in chaotic organization of catching and landing activities, in that fishers launch and land wherever they want. This makes control of fishing activities and enforcement of regulations difficult and expensive.

The way the fishery is currently organized calls for a strong form of a cooperative management system based on use of participatory research, participatory data collection, and peer enforcement. Such a management system could probably provide the most workable solution to the problem of a poorly resourced Department of Fisheries that can never be present everywhere at all times to undertake the duties under its current mandate. The fishers also need to understand and accept that it is in their own best interests to ensure the biological and economic viability of the fishery into the future (God helps those who help themselves). Continued viability would entail accepting and putting into place measures that could control fishing effort, rather than thinking that the fishery has boundless capacity to absorb any levels of fishing effort. In addition, this would entail fishers taking up and taking on tasks and responsibilities that have hitherto been viewed as being the sole responsibility of the Department of Fisheries.

An idea that has been broached is the introduction of some kind of rights-based system, a move away from the present open access system. This aims at developing a sense of responsibility for, ownership of, and stewardship for the fishery within fishing communities. In this context, the Department of Fisheries is seriously thinking of dividing the lake into zones, and putting these under the responsibility of the traditional authorities directly adjacent to each area (A. Bulirani, personal communication, 15 April 2009). While such a system presents serious practical and political challenges in a fishery largely based on offshore fishing, and the way the sector is currently organized, the debate and consultations between government and communities that this has initiated can only be a good and positive development.

The role of the Southeast Arm fishery and its ability to provide profit and livelihoods for the majority of people in the area and beyond is of paramount importance. This brings into sharp focus the need to conserve the resource into the future so that it continues to provide socio-economic benefits for fishing communities and the nation as a whole. This is the dilemma that the fisheries managers, fishing communities, and development planners have to grapple with.

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[23] Although local level controls exits, in principle anyone can buy a net and start fishing. The annual license fees are part of revenue collection, rather than as a management tool.

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