TECHNOLOGICAL CHANGE AND ECONOMIES OF SCALE IN THE HISTORY OF MWERU-LUAPULA'S FISHERY (ZAMBIA AND DEMOCRATIC REPUBLIC OF CONGO)

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Common Property Theory (CPT) has been an easy picking ground for social scientists since Scott Gordon first outlined the economic theory of fisheries and Garrett Hardin developed the analysis into the "tragedy of the commons" in 1968 (Gordon, 1954; Hardin, 1968). In a parody of the theory, criticisms of CPT have become so commonplace that each successive article holds much-diminished academic returns (McCay and Acheson, 1987). In an exceptional case, Ottar Brox, a scholar of the Norwegian fisheries, has launched a qualified defence of CPT. He argues that CPT should be treated as an analytical tool, a Weberian "Idealtypus", which models certain features of the real world to present an idea of reality rather than "real nature". However, Brox points out that the CPT model may blind us to other features of common property regimes. It ignores how local class and power relations mediate resource access since all resource users are assumed to be equal economic agents. Moreover, the tendency to focus on tragedy "prevents one from seeing that commons involve opportunities which are far from tragic for the people involved, but rather necessary for the maintenance of local communities and even national cultures. . . . CPT closes our eyes to the potential of common property to absorb surplus labour, function as a "safety valve" on the labour market and establish a floor under which wages or land rents cannot sink" (Brox, 1990: 232-3).

Brox argues that by distinguishing between "horizontal effort" (changes in the number of fishers) and "vertical effort" (changes in capital investment) we provide greater clarity to the class relations which underpin the economic and environmental process described by CPT. However, fishery biologists associate a different meaning to vertical and horizontal changes in effort. For them, vertical change in effort refers to changes in gear technology that increase catches and horizontal increases refer to an increase in the amount of similar gear that may increase catches. This article demonstrates that changes in technology need not be associated with Brox's changes in capital investment. It argues that the technological changes need not be associated with vertical increase in effort; changes in technology do not necessarily correspond to the capitalization of the fishery.

Distinctions in effort type seem especially appropriate to fisheries in Africa frequently exploited by poor and economically vulnerable social groups, either as fishers, labourers or traders. Small-scale fishing entrepreneurs benefit from easy access to resources that require relatively little labour or capital investment and at present do not have strong traditional or state controls over exploitation. This has led to great increases in the fishing population, that is horizontal changes in effort, with fisheries officials complaining of "overfishing" by locals and leading to socio-political struggles over the introduction of conservation regulations, which, for lack of state capacity in the countryside, are frequently defied by fishers (Aarnink, 1999). Yet fishers in Africa tend to adjust and incorporate technologies and fishing gear changes without necessarily becoming capitalist enterprises. Thus, in contrast to Brox's theory, technological change need not correspond to vertical changes in effort but can also be linked of a growing number of individuals who choose to fish due to lack of alternatives in either salaried employment or agriculture.

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In this article I focus on changes over time in the vertical and horizontal growth of fishing effort in Mweru-Luapula. Over the last century the fishery has emerged as a common resource, which in times of need, such as economic recession and structural adjustments in the 1990s, provides Zambians and Congolese with an informal safety net. In periods of prosperity, the fishery may be an arena of profitable investment; during times of recession, however, the more important function of the fishery has been to provide a means of economic subsistence. In the 1990s the fishery acts as a form of unemployment insurance for those without jobs and without the means to farm (Gordon, 2000).

The Mweru-Luapula fishery is found on the border of Zambia and Democratic Republic of Congo (DRC). It is presently divided between two national administrations and a number of different autochthonous and migrant peoples. The unity of the area is primarily geographic; a valley bounded by escarpments to the east and west. Lake Mweru is some 120 kilometers long and 40 to 50 kilometers wide (a total area of 4 650 km²), fed by the Luapula River. The lake and river form the southern-most section of the vast Congo drainage basin. The population of the valley has grown from about 50 000 in the 1920s to about 400 000 in the 1990s, an increase roughly in proportion to the national populations of Zambia and Congo, with at least 50 000 involved in fishing as gear owners, workers or traders.[1] In the 1990s the south of the valley was so densely-populated that there was little empty land; one village led directly into the next, and vacant land for cultivation could only be found several miles towards the plateau. The most important economic activities were cassava farming and fishing. Cassava farming was essential for local subsistence and fishing for a commercial economy linked to the towns of the Zambian and Congolese copperbelts.

Mweru-Luapula was not an *a priori* open-access common resource. Traditional settlement patterns and rights over resource exploitation had long been established. Certain aspects of these rights were reinforced in the colonial period by the machinations of Indirect Rule in the British case or *dominer pour servir* (“dominate to serve”) for the Belgians. For the most part, however, fisheries officials and expatriate fishermen and traders undermined traditional restrictions to entry by replacing sacred Owners of the Lagoon with secular bureaucratic forms of government. A sudden vertical increase in effort in the 1940s led to the collapse of the lake’s most important species in the 1950s. Yet increased exploitation of a smaller fish allowed for the resurgence of fishing activity from the 1970s. The new fishery was characterized by horizontal increases in effort as migrants from the declining urban areas became fishermen and women with decreasing access to farm land and fertilizer became fish traders.

1. PRE-COLONIAL RESOURCE MANAGEMENT

It is unclear when the first people settled in Mweru-Luapula. They were probably BaTwa, so-called “pygmies”. Archaeological and linguistic evidence suggests iron-working people organized in matrilineal clans migrated into the region between 1 000 and 1 500 years ago. According to oral traditions, they set fire to a vast grass plain, which killed all but two of the original inhabitants who then bestowed the rights of the land to the new settlers. These rights were to be maintained through membership of a secret organization called *ubu-twa*. After the last Twa died, it rained until the plain became a lake so vast that the locusts could not cross it (Cunnison, 1959; Musambachime nd., 1991; Verbeek 1990).

[1] These are estimates based on a variety of sources. Since the fishery is split between two administrations and part of several different districts, it is difficult to compile accurate figures (Gould, 1989: 22-44; Zambia, 1980; Zaire, 1984).

The most significant pre-colonial event recorded in oral testimony was the conquest of the valley by a Lunda lord called Mwata Kazembe in the early eighteenth century. Over the next century he created a powerful empire that traded with the Swahili and the Portuguese on the Indian ocean coast and the Nuclear Lunda to the western interior. He also brought cassava from the Nuclear Lunda, which began to replace millet as the most important crop of the valley. As cassava replaced millet, women became more responsible for farming. Cassava did not require as much fertilizer as millet and thus there was less need for male labour to practise *citemene* agriculture, which had provided the soil with the nutrients needed for millet cultivation. Instead, men were involved in fishing and during the nineteenth century in the ivory and slave trades. Cassava farming and the relative absence of male labour in agriculture distinguished the Luapula Valley from the "Bemba" of the plateau area, traditionally renowned for millet cultivation in citemene fields (Richards, 1939; Moore and Vaughan, 1994).

Despite the reputation of the Eastern Lunda ivory and slave trading kingdom, the more important forms of resource regulation and allocation were decentralized and linked to sacred forms control by local leaders. Matrilineal clan leaders exerted a combination of spiritual and political power over the resources of the valley. They maintained authority over the land and lake through *ubutwa*, which paid deference to the ancestral spirits (*imipashi)* and nature spirits (*ngulu)* of the land and lakes. In the river area where fish spawned and were easy to catch with traps and floating nets, local leaders called Owners of the Lagoon (*Bamwine Kabanda*) marked out distinct areas of control. By prayer and giving libations, they ensured that nature continued to perform life-sustaining miracles such as the spawning of fish. Only after the correct rituals had been performed and the fishery "opened" (*kufungule isabi*) could fishers begin to harvest nature's bounty. It was primarily this form of sacred control that placed certain restraints on resource exploitation, although this was not its primary concern.[1]

In the actual catching of fish, there was little ethic of moderation. Fishermen in canoes caught spawning fish with floating nets in the river. Nearer the rapids and falls of Mambilima, villagers built dams and weirs (*amaamba* sg. *ubwaamba*) and installed traps (*imyoono* sg. *umoono*) to catch fish as the flood waters receded. Traps and nets were to catch everything they came across, like a hen that pecks at every last scrap, as indicated by this popular fishing song:

> You are the hen who searches in the rubbish pits
> look from one side to the other.
> You are the pecking beak of a hen
> that leaves nothing in the way (Musambachime, 1981:53).

Fishermen even attached parts of a hen to their nets to invoke the spirit of a hungry hen. However, although fishermen caught as much as they could, certain technological limitations and ecological conditions checked levels of exploitation. The *kaboko* fibers out of which nets were made were not as durable as nylon and easily broke. Crocodiles and hippos often destroyed nets that took weeks to manufacture. The number of nets and other fishing gear a fisher owned depended on the limited labour he could mobilize and control, and, for this reason, there was little vertical growth in effort in the form of capital accumulation and investment.

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[1] Interviews: Chief Mulundu and Traditional Councillor, Mulundu, 9 Jan. 1998; Chief Lubunda and Traditional Councillors, Lubunda, 8 Oct. 1997; Chief Mununga and Traditional Councillors, Mununga 16 June 1998. Also Musambachime, 1981: Vol 2: 2,13, 25.

2. COLONIAL CAPITALISM

It was only well after colonial "pacification", accomplished in the early 1900s, that new trading networks emerged, based on an entirely novel political economy. The Katangan copper mining concern, *Union minière du Haut-Katanga* (UMHK), had to ensure a steady supply of cheap rations for their recruited workers. They built a road that joined Mweru-Luapula to the fast-growing town of Elisabethville (present-day Lubumbashi). The monetary value of the valley's fish soared as a labour force attached to the new copper mines had to be fed. Entrepreneurs – locals and expatriates generally from Greece and Italy – came to exploit the fishing resource.

In the Belgian Congo (present-day Democratic Republic of Congo), where the administration distrusted African traders, large-scale expatriate traders were the main beneficiaries of the fishing business from the 1920s to 1940s. In Northern Rhodesia (present-day Zambia), however, where colonial control was more tenuous, many African businessmen and fishermen also prospered, and a monetized economy based on Congolese francs spread to both sides of the river. Traders and fishermen were predominantly male, although through barter the female cassava-farming economy was linked to the booming fishery. Moreover, female labour was needed to dry and smoke the fish.[1]

With increasing profitability and commercialization, the fishery became oriented towards the fresh fish trade and dominated by male traders. Ice plants were established next to the river and lake, first in the Congo, but later in Northern Rhodesia. Despite technological innovations in processing, at first increase in effort was horizontal. Predominantly expatriate traders bought fish along the Luapula where many African fishermen, locals and migrants from the plateau areas, had set up camps. They fished with weirs and traps and with nets made out of fibre taken from old motor tyres. Although this represented a certain degree of technological innovation, colonial reports suggest that the number of fishermen increased dramatically. Colonial administrators became increasingly concerned with fishing camps full of "uncontrolled and detribalized natives concentrated for the sole purpose of making money."[2] In the catching of fish, at least, prior 1940 there had been little vertical growth in effort despite the significant growth of capitalized trading ventures.

Traditional restrictions enforced by Owners of Lagoon were undermined. Colonial officials appointed a network of chiefs to exercise power and these did not always correspond to the original Owners of the Lagoons. On the Northern Rhodesian side of the lake, colonial officials selected Mwata Kazembe and his subordinates as colonial chiefs since it was easier for the colonial administration to collaborate with a centralized ruler who would ensure that his subordinates respected and carried out colonial laws. Native Authorities became responsible for the enforcement of fishing regulations, and, most importantly, they received revenue from net licenses. This provided a major incentive for chiefly collaboration regarding fisheries. It was not, however, built on any traditional precedents: Mwata Kazembe had previously not shared the rights and responsibilities of traditional Owners of the Lagoon.[3]

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1 The early history of the fishery is reconstructed through interviews conducted by the author and archival sources based in the National Archives of Zambia (NAZ) and the Archives Africaines (AA) in Belgium. For details see Gordon, 2000: 101-147 and Musambachim, 1981.

2 Kawambwa Tour Report 5/1938, NAZ, SEC 2/872.

3 This process was made possible through the Native Authorities and Native Courts Ordinance in 1929 and the Native Treasuries Ordinance in 1936. In Luapula, the process was accentuated with the appointment of Mwata Kazembe XIV Shadreck Chinyanta who was an educated and appreciated collaborator. Conflict with chiefs, especially Lubunda, Mulundu and Katuta Kambemba, who were subordinated to the Lunda Native Authority but were not traditionally Lunda, were frequent. Colonial policies are recorded in Kawambwa Tour Reports, 1936-1960, NAZ SEC 2/871-886 and NP 2/6/8-17, Lunda Native Government, NP 2/7/13. For conflict between Lunda and other chiefs see "Note on the Bena Mbeba and their Pretensions", Kawambwa District Notebooks, NAZ KSG 3/1. Also Interview with Mwata Kazembe XVIII Munona, Mwansabombwe, 19 Oct. 1997.

On the Belgian side of the river, colonial administrators were more heavy-handed; chiefs had less autonomy and were more reliant on the colonial state. In Mweru-Luapula, at least, the Belgian administration relied on dispersed chiefs, nineteen in total compared to the nine chiefs found in approximately the same area in Northern Rhodesia. When the Belgians attempted to rationalize their administrations in 1933, they appointed chiefs loyal to the colonial administration to head *secteurs*. At the same time, the state bureaucracy became responsible for control over fisheries with the formation of a *fonds poisson* and *mission piscicole* in 1946. These agencies were also responsible for sponsoring more advanced fishing technology, including the sale of nylon nets and establishing a fishing and boat-building school.[1]

The Belgian and the British administrations treated the resource in different ways. For the Belgians, the resource was open to all for exploitation. The British, by contrast, proclaimed the area "Native Trust", meaning that only indigenous fishermen could exploit the resource. The Belgians argued that such a policy prevented capital accumulation and improved fishing methods; the British countered that the development of the fishery should occur at a pace dictated by "native interests." In the Lugardian words of the British colonial official responsible for fisheries:

> They [the Belgians] look over the heads of the Africans; we must try to look through the Native Authorities. They draw no distinction between European and African fishing; we regard the fishery as in trust for the Africans.[2]

From the Belgian perspective, European investment in the fishery was desirable. "If one day the Natives will be able to fish in the lake," the Commissioner of Katanga Province argued, "the Europeans will have shown the way to fish."[3] The choice was between encouraging vertical growth in effort at the expense of undercapitalized indigenous fishermen or accepting a slower pace of vertical growth in effort by prohibiting outside investment in the fishery. The Belgian assumption was that technological innovation depended on the capitalization of the fishery and could not be accomplished by poor African fishers.

During the Second World War when the Allies required Katanga's copper and uranium resources for the war effort, exploitation of the resource increased. The fish of Luapula became even more crucial as cheap rations for urban workers. Africans could not even be trusted to fish. The Belgians encouraged the settlement of capitalized European fishermen who would exploit the fishery to its full potential without the threat of political instability.[4]

There was one environmental obstacle to the development of the fishery – crocodiles. In a fashion similar to the destruction of farms by elephants, crocodiles prevented growth in fisheries technology throughout much of central Africa by destroying long nets and thereby discouraging capital investment in better nets. In 1944 UMHK introduced a bounty for the capture of crocodiles – by 1946, 5 000 crocodile heads and 60 000 eggs were delivered to the administrative posts of Mweru-Luapula. After a few years, the crocodile no longer obstructed fisheries development; the bounty was abolished but numbers of crocodiles never returned to

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1 The creation of the fonds poisson and mission piscicole is documented in Mission piscicole divers and Rapports annuels, AA, IPAC AGRI 14.210-228. For documentation on the appointment and organization of chiefs in Mweru-Luapula see Chefferies Luapula-Moëro Dossiers Kasenga, Pweto, AA IPAC 14.160. Affaires Indigène et Main d'Oeuvre (AIMO) Rapports Territoire Kasenga, 1932-1950, AA RA/AIMO 106, Territoire Pweto, RA/AIMO 162.

2 Director of Game and Tsetse to Member for Agriculture, 13 March 1953, NAZ, SEC 6/372.

3 M. Scholler, Commissiare Provinciale du Katanga, Minutes of the Anglo-Belgian Fisheries Conference, Ft. Rosebery, 29 June 1953, NAZ, SEC 6/13.

4 One of the reasons behind the creation of the fonds poisson and mission piscicole in the immediate post-War years was the recognition that the exploitation of the fishery was so crucial to the mining profits. Mission piscicole, Elisabethville, 1945-1948, AA, IPAC AGRI 14.210

pre-1944 levels.[1] Once crocodiles were no longer an obstacle, fishermen who had the capital, mostly Greeks, could lay bottom-set nets across the lagoons where the Luapula entered Lake Mweru and effectively block the spawning of the most profitable commercial species, the mpumbu (*Labeo altivelis*). Prior to 1947, African fishermen caught most mpumbu as they spawned in the river, after flooding in February and early March. But in 1946-47 catching techniques of mpumbu changed. European fishermen laid their long nets in Lake Mweru from July to December, when the mpumbu gathered at the inlet of Luapula before they spawned. The change is best demonstrated by considering the number of mpumbu purchased by UMHK The high catches between January and March in 1945–46 represent fish caught by small-scale African fishermen in the Luapula River during the spawning season using traditional gear. The trend in the late 1940s, however, was for increased catches in the July to December period, when the mpumbu gathered in Lake Mweru prior to spawning. This represented increased European fishing with motorized boats and nylon gillnets. In 1948 catches during this period far exceeded catches during the previous spawning seasons. In 1949, after the huge lake catches between August and December 1948, the mpumbu did not spawn.

When the number of mpumbu declined, the colonial administrators paid greater attention to the enforcement of conservation measures. Colonial efforts to conserve the fishery pre-date the disappearance of the mpumbu. In 1938 the Belgian administration had introduced a closed season, a restriction on the mesh size of nets, and a tax on nets. Yet all fishers and *commerçants*

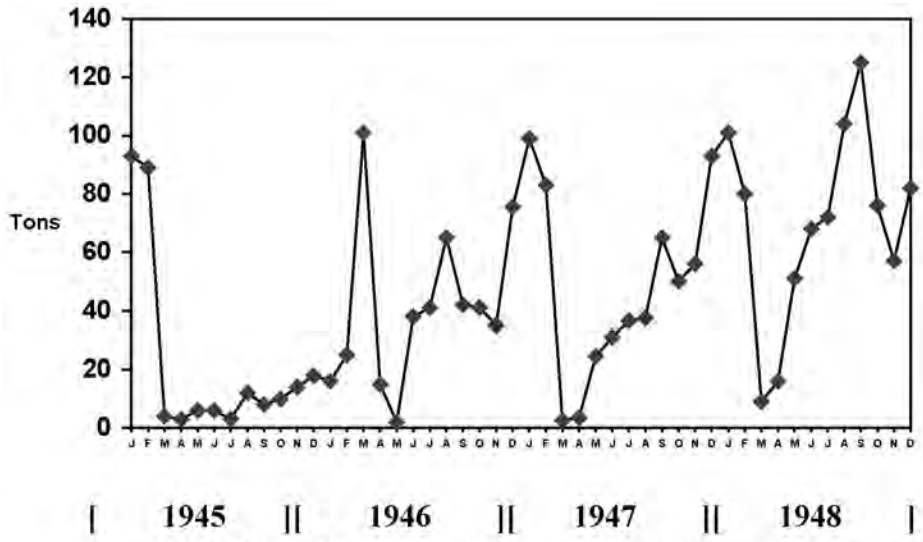

FIGURE 1 *UMHK Purchases of Mpumbu from Mweru-Luapula*

Source: Rapport Annuel, Mission Piscicole, 1947-8, AA IPAC AGRI 51.

ignored these measures over the war years when the Belgians desperately tried to furnish as many fish as possible for their mineworkers. In 1929 the Northern Rhodesian administration had gazetted legislative machinery for intervention in the fisheries, but did not embark on any concrete measures until 1943 when it introduced a minimum mesh size and a licensing system. In 1948, under the advice of the newly-established Anglo-Belgian Fisheries Advisory Board,

[1] Records of crocodile extermination can be found in Dossier Lutte Crocs. Correspondence and Statistics, AA Inventaire Provisoire Archives Venant du Congo belge (IPAC) AGRI 13.042.

the colonial regimes prohibited river fishing from 1 February to 31 March to protect the spawning run; fishing on the lake by expatriates was still permitted. The measures led to much resentment against the colonial states and collaborating chiefs who were called on cooperate in the enforcement of the regulations. In 1952–53 African fishers, who complained that laws favoured the Greek fishermen, rebelled and forced the colonial administrations to prohibit fishing on the lake as well. This was, however, viewed only as political concession to Africans, not an environmental necessity, although it became the basis for the three-month closed seasons implemented in future years. The conservation measures did not prevent the end of the mpumbu spawning run in the 1950s and the disappearance of the fish from Mweru-Luapula by the early 1970s.[1]

The 1940s and 1950s had been a period of unprecedented in capitalization, which, as would be expected, coincided with technological change. Predominantly Greek fishermen, supported by Belgian mining interests, invested in large boats and long nylon gillnets. This rapid vertical growth in effort led to a collapse in the stocks of the most exploited fish, the mpumbu. After the end of the mpumbu's spawning run, the Luapula River lost its importance as a commercial fishery to Lake Mweru. The sudden vertical increase in effort in the lagoon areas, not horizontal increases in effort, had changed the ecology of the fishery. With this change the commercial fishery relocated north to the shores of Lake Mweru and concentrated on the exploitation of pale (*Oreochromis macrochir*).

3. TECHNOLOGICAL CHANGE IN THE CHISENSE FISHERY

Through the 1960s and early 1970s there was a decline in Mweru-Luapula's fishing industry, especially in levels of technological investment. A combination of local and regional factors contributed to the decline. The fishery was not as profitable without the mpumbu, and by the 1960s catches of pale also diminished. Fisheries officials feared the fishery had been overexploited and was no longer a profitable endeavour.[2]

On a regional level, the Congolese mining companies no longer signed contracts with the expatriate fish traders as the mines abandoned their system of partial payment in food rations. In the 1970s, following the collapse in copper prices, urban demand for fresh fish further diminished. A few years later in Zaire, the confiscation of expatriate industries under Zairianization decree of 1973 contributed to the decline of the expatriate-run fishery. Northerners allied to President Mobutu sese Seko, often inexperienced in fishing, took over the businesses of expatriate fishermen and traders.[3] In Zambia, a parastatal, part of the INDECO group, called the Lake Fisheries of Zambia (LFZ), took over the ice plant at Kashikishi and the marketing of fish. They tried to enforce a maximum price and this led to bitter conflict as fishermen were forced to sell their produce at declining terms of

[1] Records of the series of negotiations between British and Belgian administrators and fisheries officials can be found in NAZ SEC 6/5,7,13 and AA IPAC 13.039. A detailed account of the "mpumbu rebellion" based on archival and oral sources is in Gordon, 2000: 148-193 and Musambachime: 1987.

[2] Between 1960 and 1967 production dropped by approximately 1 000 tonnes. It is unclear whether this drop was due to changing patterns in demand or the condition of the resource - probably a combination of both. Zambia, Dept. of Game and Tsetse, Annual Reports, 1960-1967.

[3] Interview with David Lupandula, Kasenga, 17 Dec. 1998. Kabundi-Mpenga Ka'mpeng "La problematique du développement rural au Zaire: Reflexion sur les conditions des masses rurales dans la zone de Kasenga." Memoire, UNILU, 1975-76, 72.

exchange relative to urban goods. Finally, other fisheries, especially Kafue and later Kariba, replaced Luapula as the most important supplier of Lusaka's urban market.[1]

By the late 1970s, only remnants of the colonial fishery were left. With the closure of LFZ in 1979, there were no more ice plants on either side of the river and lake. Traders returned to the dried fish business. On the Congolese side of the lake some large trading and fishing ventures re-established themselves following "retrocession" in 1976, when a few businesses confiscated during Zairianization in 1973 were returned to their original owners. Katebe Katoto, the son of an expatriate trader and Mwata Kazembe's sister, had a lucrative contract to supply the copper mines of Gécamine, formerly UMHK, with rations of fish. From his fishing camp at Mulonde, he dominated the entire northern Congolese side of the fishery. There was a joke that sometime in the mid–1980s Katebe Katoto attempted to buy the entire lake. Mobutu gave the matter some thought, and then replied that while he was responsible for the sale of diamonds and emeralds, only God could sell the lake; Katoto should ask him. But even with divine intervention Katebe Katoto's profits were tenuous.[2] As infrastructure and facilities deteriorated, as the copper price plummeted, and Zambia and Zaire fell into political and economic bankruptcy, the future well-being of the fishery seemed most precarious.

Fisheries officials continued to argue that levels of exploitation in the lake were unsustainable. There had been no closed season since the lifting of the colonial regulations in the early 1960s. The Mifimbo breeding ground, although formally prohibited to fishers in 1976, was often exploited. The mesh size of nets decreased, especially as state-provided nets became rare. Finally, a decade of limited rainfall had disrupted breeding patterns of the most stable exploited species, pale. Fishermen had to exert far more effort or own many more nets to maintain their previous catches – although the total catch remained at about 8 000 tonnes, the nightly catch per 100 m gillnet steadily declined from around 12 kg in the 1950s to 2 kg in the 1980s.[3]

The decline of the fish resource seemed a typical example of increasing competitive exploitation of a common resource leading to decreasing economic returns. Although the ecological dynamics behind the changes are unclear, in Mweru-Luapula fisherman began to "fish down" in size of fish and exploit smaller species. In the late 1970s women who washed food and dishes in the lake noticed that there was a proliferation of small fish called chisense (*Microthrissa moeruensis*). A fisheries official in 1982 reported that "stocks of this small fish

1 The creation of LFZ is recorded in Fish Marketing Board and Co-ops, Ministry of Lands and Natural Resources, NAZ ML 1/15/36, 39. Also see DoF, Chilanga, Annual Reports, 1965-1971. For conflict between fishermen and LFZ buyers see DoF, Chilanga, Luapula Monthly and Annual Reports, 1976-1979. According to the fixed prices, the real income of fishermen would have dropped by 16 percent between 1964 and 1969. This does not include any changes in catches. (Bates, 1976: 157)

2 Interview with Abraham Soriano, 16 June 1998.

3 Statistics from Zambian Department of Fisheries, Nchelenge (henceforth DoF), Report on Zambia/Zaire joint meeting held on 22 July 1996, 4. Reports of the fishery through the 1970s and 1980s are from DoF, Chilanga, Luapula Monthly and Annual Reports, 1976-1990. Also Service de l'environnement et conservation, Kipushi, Rapports annuels de Zone de Kasenga, 1986-96 (intermittent).

have, of recent, increased tremendously. . . ."[1] Women used pieces of cloth to catch chisense and prepare extra relish to accompany the cassava porridge eaten by their families. But due to the increasing amount of fish and the ease of capture they began to dry the fish and use them for barter and trade. Then, as their profitability became apparent, men became involved in their capture. Veteran fishermen from Lake Tanganyika, familiar with the capture of kapenta (*Limnothrissa miodon*) adapted fishing techniques to catch chisense. They used paraffin lamps to attract the fish at night and then dragged an expanse of small mesh or meshless material through the gathered shoal. With the spread of this technique, a new commercial chisense fishery emerged.[2]

Net fishing continued alongside chisense fishing and new patterns of economic interest and political conflict surrounded the rise of chisense fishery. Established gillnet fishermen had invested in their nets and knowledge of traditional fishing techniques; they did not find it easy to drop all these activities in favor of chisense. New equipment like paraffin lamps and fine mesh material needed to be bought and this was only done through the sale of other fishing equipment. Net fishers hardly earned enough to keep up their present equipment and had no investment capital. Indeed, they relied on patronage networks to access nets on credit, and these credit relationships tied many of them to their traditional fishing practices.[3] Moreover, the best areas for chisense fishing, sandy shorelines, were not always the same as those for gillnetting, meaning that fishers found it difficult to alternate between the two activities. Instead it was men with limited amounts of capital from urban employment who began fishing for chisense. The older migrants to the lake and local fishers who already owned gillnet equipment were reluctant to invest in the new fishery, learn new techniques and relocate their operations; they had a stake in their traditional businesses and many continued with gillnet fishing. Survey data collected near Chief Puta's area in the early 1980s, demonstrates that chisense brought in nearly 30 times more cash than gillnet fishing, although start-up costs were far greater and could only be afforded by 18 percent of all fishermen (Allen and Chileya, 1986: 13).

Interviews suggest that it was predominantly returning migrants to the lake who began fishing for chisense. They had usually acquired a small amount of capital in salaried employment in the urban areas, from fishing in Lake Tanganyika, or from trade, and were willing to invest in new money-making ventures, especially given their precarious positions in the urban economy.[4] Statistical evidence suggests that although these fishers had access to urban capital, they were not considered "foreigners" and more than 90 percent of them considered the fishery as their residence. Yet only 19 percent of chisense fishers owned gillnets, indicating that they formed a new class of fishers (Zwieten *et al.*, 1996). In this sense, the rise of the chisense industry, although dependent on access to capital and new technologies, was connected to growing number of fishers and can be considered a horizontal rather than vertical increase in effort.

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1 DoF, Luapula Province Monthly Report, April-June 1982.

2 Data for the rise of the chisense fishery are from reports of DoF officials and interviews conducted by the author in Mweru-Luapula, Lubumbashi and Lusaka. DoF, Chilanga, Luapula Monthly and Annual Reports, 1976-1994. The first reports of commercial chisense fishing to my knowledge are in DoF Annual Report of 1976, although colonial reports indicated that women caught chisense with cloth long before. Fish Ranger Report, 3/1948, NAZ, NP 2/1/19. The author interviewed fishermen in chisense and gillnet fishing camps. Traders were interviewed in Kashikishi, Mansa, Lusaka, Kasenga and Lubumbashi. A total of 56 in-depth interviews were relevant to the development of the chisense industry. Also see van Zwieten 1996.

3 Jean Philippe Plateau has identified the lack of diversification due to limitations in access to credit as a widespread feature of Africa's fisheries (Plateau 1992: 101). Luapula data are based on my interviews with several older fishers all of whom did not consider changing to chisense fishing. Interviews Gabriel Kunda, Kasikisi, 14 July 1997; Daud Samual Kalaba, Kasikisi 12 Jan. 1998; Kabel Kaoma, Kasikisi, 11 Jan. 1998.

4 Interviews with Bupe Mande, Kabwe Sande, Kavunda Hilbert, Kisamba Claude, Pweto, 12 July 1998; Gabriel Kunda, Kashsikishi, 14 July 1997; Daud Samuel Kalaba, Kashikishi, 12 Jan. 1998; Kabel Kaoma, Kasikisi, 11 Jan. 1998.

Perhaps the most profound effect of the chisense industry was the promotion of an independent class of female fish traders. While fishing was a male pursuit, women undertook the processing of fish – more than 90 percent of the local traders who were also processors were women. Women also became more involved in trade around the fishing camps and with the copperbelt urban areas, forming about half of the rural-urban chisense traders (Zwieten *et al.*,1996). There were two types of female traders in Mweru-Luapula. In a more nuclear-oriented household a woman might process the fish of her husband and husband and wife then traded the fish as a joint endeavor. These types of family businesses were typical of the wealthiest families. More common, though, were poorer households that belonged to extended family or clan networks usually organized according to matrilineal traditions where a mother and her children did not rely on the continued and faithful support of a husband (Poewe, 1976). These women increasingly sought money, primarily for the school-related expenses of their children. Since they did not automatically gain money or fish from their husbands, they had to look for other activities to meet their daily needs. Moreover, cassava farming for profit was increasingly difficult as land scarcity increased and unprofitable as prices fell due to state-sponsored maize (Allen and Chileya, 1986).

Chisense trading was one strategy adopted by poor women who needed to access cash. They bought small amounts of fresh chisense from the migrant fishermen with the little cash earned from other activities, or bartered chisense for cassava that they farmed. Once processed, they sold their dried chisense to urban traders, who at first were predominantly men. The initial capital of these women expanded and many went to the urban areas themselves to trade. Unlike the colonial period, there were no restrictions on women traveling to the urban centers. The chisense industry thereby paved the way for the rise of an independent class of female rural-urban fish traders. By the mid–1980s fish markets were full of female chisense traders. A few brought their profits back to Luapula and invested them in chisense fishing equipment, which would be used by their sons or by employees. They formed about four percent of the chisense fishing population (Zwieten *et al.*, 1996; Aarnink, 1999).

The rapid expansion of this industry transformed economic roles of village members and consolidated new social groups. Men with links to urban areas became the new chisense fishermen and rural women the new processors and small-scale traders. This alliance of capitalist-inclined fishermen and local women adopting a survival strategy was at the base of the new chisense fishery in the villages of Mweru-Luapula. By the 1990s, the fishery produced 30 to 40 000 tons, from three to five times the total catch of the demersal fishery.

Yet these vast catches have had to be distributed between an increasing number of fishers. Presently there are so many chisense fishers that at night it seems as if a city of lights dances on the lake – nearly 7 000 gear owners and 6 000 workers, not to mention those involved in trade (Zwieten *et al.*, 1996). In fact, gillnet fishers have reported increased catches of pale, makobo (*Serranochromis macrocephalus*), ntembwa (*Tylochromis mylodon*) and chituku (*Tilapia rendalli*), probably due to better rainy seasons. Combined with better catches, a new road in Zambia has encouraged a resurgence of the fresh fish trade. Katebe Katoto's operation, for example, has relocated to Zambia and is run by his younger brother Moses Katumbi, and called Tamba Bashila (previously Chani fisheries).

In the 1990s a donor-funded buying agency, Isabi Fisheries, Chani Fisheries, and the DoF began to negotiate over a closed season and attempts to restrict access to the fishery. Influenced by the idea of "co-management", they incorporated several "community" organs in to their programme, including "traditional" chiefs and fishermen's associations. To a certain extent they have succeeded in enforcing the measures in Zambia's major fishing towns and camps; however, more remote camps and most of the Congolese fishery have not adhered to the closed season. Besides limitations on enforcement, the success of the regulations is difficult to measure given their ill-defined biological and economic goals (Aarnink, 1999).[1]

I have argued that changes during the post-colonial period – especially the the rise of the chisense fishery – represented more of a horizontal increase in effort than a vertical one. It has rested on an increase in the fishing population, especially men with urban contacts and women previously involved in agriculture. The chisense fishery relied on new capital-labor relationships, but this has not led to the growth in a capitalist class of fishers who invested in the fishery – although this occurred in certain cases. Instead, a growing number of men and women adopted new techniques and technologies as a livelihood strategy rather than a capitalist enterprise.

4. CHANGES IN FISHING EFFORT

Changes in horizontal and vertical effort depend on different constellations of social, economic and ecological forces. The history of Lake Mweru-Luapula suggests four factors that influenced patterns of vertical or horizontal growth in effort. The first two factors concern the market for fish, the third relates to the broader institutional environment, and the fourth is the interaction between the fishery and other sectors of the economy.

Contracts between fish traders and urban wholesalers who could absorb vast amounts of fresh fish encouraged vertical growth in effort. A purchasing arrangement between UMHK and the Greek fishermen and traders sponsored vertical increases in effort during the 1940s. Katebe Katoto's business in the 1980s was built on his contract with Gécamines. Due to limited refrigeration facilities among urban consumers, the fresh fish trade could not exist without these arrangements. Where such arrangements were absent, the dried fish business prospered, allowing easier access to rural-urban exchange and horizontal increase in effort. With the dried fish trade, local processing techniques limited the growth in effort. Since drying fish required labour and inputs of firewood or salt, the amount of fish that could be processed limited the amount of fish caught. It is not uncommon that fishermen left fish to rot for lack of buyers or processors – clearly to avoid this situation, fishermen limited their catch. Where processing was easier, as in the case of chisense, which only needs sunlight and good weather, local processors could absorb more fish. In this case, horizontal increase in effort was unimpeded by marketing arrangements.

Another factor linked to marketing is transport infrastructure. In the face of other adversities Chani Fisheries emerged in 1991 following the construction of a good surfaced road through the length of the valley. Improved transport infrastructure benefited small-scale producers and traders as much as large scale, or even more. One reason for horizontal increases in effort in the chisense fishery was the surfaced road through the valley. By linking the rural and urban

[1] Details in Nchelenge District Council Files, Nchelenge Fisheries Coordinating Committee (NFCC) 3/14/2.

areas, if other factors prevent vertical growth in effort, infrastructural improvements may lead to greater horizontal than vertical increase in effort.

Thirdly, other institutional and financial factors affected the relative merits of investment in the fishery. Capital was essential, and usually had to be mobilized through bank loans, such as those that the European traders received during the colonial period. During colonialism, once the Europeans had built their boats and bought their nets, they faced few threats of confiscation, destruction or theft – the most serious problem facing the gillnet fishery in the 1990s. By contrast, after the colonial era, the unstable Zairian currency made rural-urban trade difficult since fishermen did not want to be caught with vast amounts of worthless currency. The Zairianization measures of 1973 precipitated the collapse of the commercial fisheries on the Congolese side of the Luapula. Fish marketing boards and co-operatives in Northern Rhodesia and Zambia led to much resentment among fishermen and distrust of government. Price controls, especially maximum purchase prices, had a similar effect, encouraging fishermen to evade the formal economy. Yet an unstable formal institutional environment was not necessarily to the disadvantage of small-scale producers and traders; in some cases informal markets, or illicit ones, were more profitable than formal. For example, presently the most profitable fish trade is with the diamond capital of Congo, Mbuji-Mayi, where sacks of fish can be traded for diamonds. In times of formal economic collapse or economic restructuring, such as DRC and Zambia have experienced in the 1990s, horizontal growth in effort can be expected.

The final factor is the alternatives to fishing. For vertical increases in effort to occur, fishers have to see the potential for greater returns on capital investment in the fishery than can be experienced in other economic sectors. Horizontal increases also depend on alternatives for investment of labor and capital; women who found that farming could not meet their cash needs turned to chisense processing and trading. Men who could no longer find urban employment, used their savings to begin businesses based on the chisense fishery. Horizontal increases in effort are not necessarily characterized by the growth in fishers using traditional methods; increasing numbers of fishers can make use of new technologies as a result of engagement with diverse economic sectors.

5. CONCLUSIONS

With the rise of the colonial regimes, traditional restraints and sanctions on fishing enforced by the Owners of the Lagoons were undermined in favor of a formal state authority carried out by colonial chiefs, administrators and fisheries officials. Vertical increases in effort occurred when expatriate entrepreneurs linked to the Belgian colonial regime invested in the fishery. They occurred during a period of resource regulation and led to the most marked ecological shock when the mpumbu disappeared from the fishery.

With the end of colonialism, state authority in the countryside was eroded and in many arenas collapsed. Since pre-colonial restraints had long been abolished, there were few formal restrictions on who could fish; even though local mechanisms restricted access in the more remote areas, the fishery became more “open access” than ever before, especially in the urban-like fishing towns and camps. This, along with a new local ecological and regional economic

landscape, contributed to horizontal growth in effort. Retired or retrenched urban workers originally from Luapula invested in lamps, boats and meshless nets, and became chisense fishermen. Horizontal increase in effort was largely due to these migrants who returned from the copper mines and joined with rural women who found farming difficult and unprofitable. As long as the chisense fishery offered better opportunities than urban trade or cassava farming, new fishers and traders arrived, despite total yields remaining constant or decreasing per fisherman. This did not however preclude vertical changes in effort – indeed in many senses the chisense fishery, with its alliance of male fishers and female traders, relied on new types of capital-labor relations.

Those familiar with the patterns of development in the fisheries of Norway or elsewhere in the developed world would find this turn of events surprising and contrary to expected developmental patterns. Ottar Brox argues that horizontal increases in effort characterized "the peasant mode of production, subsistence fishing, and frontier phases in the development of the national economy"(Brox, 1990: 233). Vertical growth in effort, by contrast, occurred when investors participated in resource exploitation and dynamized the "stagnant" local economy. This presents an accurate picture of the fishery growth in the developing or developed world. In economies that have experienced long-term decline, such as Zambia and DRC, patterns of effort growth have been rather different. Technological change and commercial activity have not been bound to vertical increases in effort that imply labor-saving investments; instead, an increased number of fishers have made use of technological change and exploited urban markets. In Mweru-Luapula vertical growth – the combination of capitalization and change in gear technology – came and went between the 1940s and 1960s; the more technologically innovative and more commercial sector that has driven the development of the fishery since the 1970s has been characterized by more fishermen rather than more nets per fisherman. Over the last thirty years, as commercial and survival options for Zambians and Congolese have narrowed, horizontal increase in effort has been significant and has contributed to innovations in gear technology.

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THE "LORDS" OF MALOMBE; AN ANALYSIS OF FISHERY DEVELOPMENT AND CHANGES IN FISHING EFFORT ON LAKE MALOMBE, MALAWI

M. Hara and E. Jul-Larsen

1. INTRODUCTION

For the last 15 years or so, in much of the grey literature as well as in the general narratives about the status of freshwater fisheries in Southern Africa, the fishery of Lake Malombe has been considered a crown example of a common tragedy. As has been shown elsewhere (Zwieten, Njaya and Weyl, 2003) the fishery has seen a rapid and considerable growth in fishing effort. Great changes occurred in the period from the 1950s to the 1980s with regard to types of gear used and species targeted. Lately the dominant Chambo (*Oreochromis spp*.) has almost disappeared and total catches have decreased dramatically. This development is very different from the situation on other African lakes. On lakes like Mweru or Chilwa total catches have remained fairly stable despite a considerable increase in fishing effort. These fisheries are analysed in other papers in this publication.

The objective of this paper is therefore to investigate in some detail the characteristics of the effort development on Lake Malombe and to provide a sociological interpretation of the changes. We will do so by distinguishing between population-driven and investment-driven changes in effort. Ottar Brox (1990)[1] defines population-driven growth as increase in fishing effort resulting from increased human participation in fishing. This growth is often characteristic of the frontier phase of the development of national economies. In the context of Lake Malombe, it means increases in number of gear owners and crew members. Investment-driven growth is defined as growth in capitalization and in technological level. In our case this means increase in number of fishing gears per unit, improved technology and/or technological innovations of gear in use. We will demonstrate that until the 1970s, growth in effort was both population-driven and investment-driven, but that population-driven growth probably started to slow down sometimes in the 1970s and that it almost stopped around 1980. Since that time the number of production units has remained fairly stable until in the middle of the 1990s when it started to fall. During the 1970s and the 1980s the growth in effort was almost exclusively investment-driven, i.e. a growth due to accumulation of equipment and technological changes within the existing units. During the 1990s the reduced number of production units has been followed by reduced investments within these units so that effort reduction during this decade has been caused both by less people and less investments.

Our analysis of the sociological characteristics in the Malombe fishery shows that the dynamics behind effort development are quite complicated and only by taking account of the background of the owners and their relations with the rest of the population in general, and with the crew members they hire in particular, can the effort development on Lake Malombe be properly understood. The analysis demonstrates how labour migration options, owners' possibilities to invest in alternative economic activities, as well as their ability to control their labourers and to manage their units, are all factors influencing the effort development just as much as do the volumes and the prices of catches.

[1] What in Brox' terminology is called horizontal change is here called population-driven change, and what he calls vertical change we choose to speak of investment-driven change.

As Brox (1990) demonstrates, investment-driven growth has generally different and often more serious and long lasting sociological effects than population-driven changes. The fishery on Lake Malombe (and on the southeast arm of Lake Malawi) represents one of the few cases known in southern African freshwater fisheries where investment-driven growth in effort – although moderate - has been more important than population-driven growth. It is therefore also the objective of this paper to explain how this development was possible and what seem to be the main constraints confronting further growth of this type. We will show that the investment-driven growth depended completely upon an influx of financial resources from outside. We also show that in the type of economy and production system that prevails around the lake, there are several mechanisms that reduce the incentives and the possibilities for investment-driven growth. Most of them seem to be associated with the particular type of patron-client relationship that exists between boat owners and crew members. Fisheries on Lake Malombe have for the last 25 years or so been dominated by less than 400 boat owners, of whom only 200 remain in the fishery. Within an estimated total population of more than 50 000 people the gear owners, in light of their economic wealth and social influence, are easily seen as some kind of lords. However, their lack of control over their own production units is an excellent illustration of the investment problems reigning in many African fisheries.

1.1 Method

Three sources of data and information have been used in this study: a field survey, relevant literature and archive material, and data from a parallel study on the biological development in Lake Malombe.

The approach used in the field survey was to build life histories of gear owners and crew members. For this, 42 gear owners (22 from the west bank and 20 from the east bank) were interviewed. 15 crew-members were interviewed (six from Malombe west and nine from Malombe east). In addition to interviews, a list, compiled in 1993 by the Fisheries Department, of all gear owners and details of their fishing gear was used to evaluate changes in gear numbers and gear ownership between 1993 and 1999. The Fisheries Department field staff (Messrs Kasuzweni and Thindwa on the west bank and Bezai on the east bank) helped in providing an update of the list. Where possible, the individuals on the list – or their relatives – were interviewed.

The second important source of information was literature concerning the historical political economy of agriculture and fishing in southern Malawi. Four authors – Chirwa (1995), Mandala (1990), McCraken (1987) and Vaughan (1982) – were particularly valuable. Furthermore, official government reports and other archival material relating to the period in question have been used extensively. Finally, the findings about trends and changes in fishing effort is also based on the parallel investigation into the biological explanation for the development of fishing effort within the framework of the same project (Zwieten, Njaya and Weyl, 2003).

1.2 Lake Malombe, its present fishery and the people

Lake Malombe is described as “an impoundment of the outflow of Lake Malawi via the Shire River, 12 kilometres south of Lake Malawi” (FAO, 1993:2). The lake is about 390 square kilometres in area and averages seven metres in depth with a maximum depth of 17 metres. It experiences the same climate regime as the southern part of Lake Malawi. This means that the

influence of trade winds on productivity is paramount. Unlike in Lake Malawi though, rainfall run-off is believed to contribute significantly to the productivity of Lake Malombe. The hydrological parameters of the Shire River are nevertheless crucial for the conditions of the lake. In the early decades of this century the water levels of Lake Malawi were extraordinarily low and the outflow of the lake is reported to have stopped completely around 1915 (McCracken, 1987:417). During the next 20 years there was no outflow from Lake Malawi and the water levels in the Shire and Lake Malombe therefore varied dramatically[1]. It was only after the Bomani floods of 1939 that the water levels became less unstable (Mandala, 1990:6).

On the west bank side, the lake is bordered by the Mpiri Piri hills, which lie within three to seven km from the lake while on the east side it is bordered by the Mangochi hills. On the Southeast banks is the Liwonde National Park. The fishing villages are thus confined within narrow strips of land along the lake on both sides making the population densities very high and the amount of farming land within the village areas very little. This is especially so on the west bank where the population density averages over 500/km² (Bell and Donda, 1993). On the west bank is the main road from Lake Malawi and Mangochi Township to the urban centres of Zomba, Blantyre and Lilongwe. The east bank is very difficult to access. This is especially so in the rainy season as the area then can be reached only through a dirt road that branches off from the Mangochi-Namwera road.

A census conducted by the Ministry of Agriculture (Liwonde, 1998) showed that 8 396 ”farm families” existed in the villages on the west bank while another 2 657 families were to be found on the east bank. Using five persons per household, which is the national average household size, the population in the fishing villages can be estimated at 42 000 people for the west bank and 13 300 for the east bank. The annual rate of population growth in Mangochi district is reported to have been 1.7 percent per year in the period 1987–1998 (Malawi Government, 1999:19).

Our surveys showed that in June 1999, boat owners operated 173 production units – all types included – from the western shores of the lake while 22 units were operated from the eastern shores. Each production unit is owned by one person and the average number of crew members in the units is estimated at ten. Based on these figures, we see that only two per cent of the families on the west bank and less one percent of those on the east bank are owners of fishing units. On the west bank fishers represent no more than approximately four percent of the total population while they constitute less than two per cent on the east bank.

While the figures might underestimate the real numbers of people in the fishery, it is difficult not to view these figures as an illustration of the rather modest role the fishery is playing in the local economy although the total population figure includes children under the age of 15 years and adults over 65 years of age; groups that we must assume to be economically inactive. Furthermore, the figures only say something about the quantity of people involved and nothing about the financial importance of the sector. Nevertheless, they clearly indicate an important aspect of everyday life in Malombe which often tend to be overlooked: for most people fisheries is neither the only nor the most important economic activity.

1 In 1924 it is reported that the lake "dried up almost entirely, with food gardens being planted in large numbers on its bed" (McCracken, 1987:418), while in 1925 heavy rains again led to the flooding of the Lake and people's gardens were inundated as a result.

2. DEVELOPMENT OF THE FISHERIES BEFORE 1950: POPULATION-DRIVEN GROWTH IN EFFORT AND DEVELOPMENTS OF MARKETS

The development of fisheries around Lake Malombe should not be seen in isolation from what has happened in the far more important fishing area constituted of the Southeast Arm of Lake Malawi located less than 15 km to the north. Many of the fishermen exploiting Lake Malombe regularly have been exploiting Lake Malawi as well. In these two areas people are generally of the same origin with the same language and culture. Most of them identify as Yao, a tribe originally from an area east of the Rovuma River in Mozambique. This tribe has dominated the local political structures in the area since the 1860s. The economic tradition of the Yao is one of trade, developed through their long contacts and relations with Arab traders on the East Coast of Africa. The contact with Arabs also greatly influenced the Yao to adopt Islam (Rangeley, 1970). Thus although Christians are found in the area, the great majority of the population are Moslems.

Furthermore, macro-structural factors in the Malombe and Malawi fisheries – both political and economic – have largely been the same. Most of the Malombe area belongs to the same administrative and native authorities as areas along Lake Malawi, with Mangochi town (formerly Fort Johnston) the administrative centre located equidistant from the outlet of Lake Malawi and the inlet of Lake Malombe. The broad lines in the development of Lake Malombe fisheries are therefore the same as those of the southern parts of Lake Malawi. This is also reflected in the literature in which fisheries development on the two lakes tends to be dealt with together.

McCracken (1987) reminds us that commercial fishing in the area is an old venture and not something that started emerging in the 1950s. One of the major events that stimulated fishing for sale on the southeast arm of Lake Malawi is said to have been the need to provide fish to South African soldiers going to East Africa during the First World War. On Lake Malombe it is reported that the flood in 1925 led people to turn to fishing. People's gardens had been inundated and as a result, many peasant farmers switched to fishing or fish trading as a means of raising money to buy food and, for men, also to pay their hut tax. But due to the unstable water levels in the Shire we must expect that extensive commercial fishing in Lake Malombe must have been difficult to perform before the water levels of the river stabilized.

In the 1920s and 1930s European and Indian traders had started to transport fish by lorry from Lake Malawi for sale in Zomba and Blantyre. Partly, this was fish they bought from African fishermen and partly it was their own catches from commercial production units that emerged in Lake Malawi after 1930. Also, a great number of Africans started to engage in fish trade, transporting fish by bicycle (McCracken, 1987). The different groups of traders demonstrated an interesting mixture of competition and collaboration where African traders often represented elements in the bigger trade networks of the Asians and Europeans. Given that the trade route from Lake Malawi runs along the western bank of Lake Malombe, we must assume that an increasing part of its fish was integrated into the same system, even if the centre of the commercial activities was located further north.

People had historically been using fish traps, weirs and nets made from *Bwazi or Chopwa* (a fibre from *Poolzolzia hypoleuca*). The 1930s also saw an increase in use of twine from disused bicycle tyres (locally called *Linye*) for making nets. At the same time, the Indian and European (mainly Greek) production units on Lake Malawi introduced manufactured cotton (later nylon) nets. They also introduced new technologies such as beach seines, and from 1938, trawling. If African fishermen only modestly copied these techniques in the years before 1950, we assume that the main

reason was related to a combination of costs and the relatively high efficiency of their traditional gear.

Throughout the 1920s and 1930s, the colonial government made no attempt to stimulate the growth of the fishing industry. This was partly attributable to its policy of keeping Africans as a labour reserve for the European settler estates in the Shire highlands (Vaughan, 1982) and also a deliberate policy that attempted to force or coerce people in rural areas to go into cotton farming at the expense of food crops or other economic activities such as fishing (Mandala, 1990; Vaughan, 1982). The first official reports concerning fishing date from around the late 1920s. Two concerns seem then to have been of importance for the authorities: on the one hand the state of the resource and, on the other, peace and order.

Most important were probably questions related to peace and order. The increasing entry of European and Asian investors into the fishery and the emerging conflicts among various groups of Africans led to increased tensions. Authorities saw it as being extremely important to minimize these conflicts and tensions. Interestingly, and for various reasons, the policies of the government did not favour the foreigners; on the contrary one may say that most of the regulations introduced during this period favoured the position of the African fishermen compared to their European and Asian competitors. While African fishermen were largely left to themselves, a number of restrictions concerning licenses and gear were put on the foreigners (Chirwa, 1995; McCracken, 1987; Hara, 2000). However, this mainly applied in the Southeast Arm since the government had banned non-African fishing on Lake Malombe[1].

The other concern was related to the state of the resources. On this issue the government was ridden by rather paradoxical influences of thought. In the first half of the 1930s, the concerns seem mainly to reflect the well-documented tendency among colonial officers to view African methods of hunting and fishing as detrimental to the ecology and the reproduction of exploited species[2]. This led to the prohibition of most of the African fishing gears such as traps, weirs and poison. These regulations are reported not to have had much effect since local authorities did not enforce them. Towards the second half of the 1930s government attitudes changed and they came to see the non-African fishing methods as being the most challenging ones. This meant that fisheries on Lake Malombe were, to a large extent, left unregulated by officials except for the 1933 requirement to pay fees on canoes, through local chiefs, under the Native Authority Act (Chirwa, 1995:361-5).

The first attempts by the colonial government to stimulate the industry were in the early 1940s following two surveys by British led specialists, one of which had been led by Professor Platt in 1938 (McCraken, 1987). The report had pointed out the crucial importance of fish as the sole major source of animal protein in Nyasaland, since the country did not have good sources of meat. Platt's Nutrition Unit experimented with intermediate fishing technologies for producing fishing equipment and processing fish. But the results of these experiments were largely disappointing. Apparently, the new techniques were less effective than what African fishermen were already using. In the 1940s, the industry was further depressed by the shortage of bicycle tyres due to the wartime restriction on the importation of rubber, which in turn meant a significant fall in the number of traders.

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1 See "A Report of the Fish Ranger's work at Fort Johnston Station" by K.T. Howard 19/12/1962. Ref. no. 20/1/67. MNA 1/6/21/8/P.A.

2 For an analysis of the development of fishing regulations in two British territories (Northern and Southern Rhodesia) see Malasha, 2002 and 2003.

3. THE 1950S AND 1960S: INTRODUCTION OF MANUFACTURED GEAR AND NEW PATTERNS OF INVESTMENTS

The second attempt by the colonial government to stimulate the fishing industry was made in the 1950s and it was more successful. The 1952 Nyasaland Report noted that African fishing was not a purely subsistence activity, but rather an undertaking that had a commercial side to it. Most of what fishermen produced was either sold to local consumers on the beach for people's own consumption or distributed among the members of the fishing crews for their personal needs. Some African fishermen on Lake Malawi who had been using inshore seine nets started increasingly to fish offshore using manufactured gillnets (Government of Nyasaland, 1952:53). It became more and more common for African fishermen to fish on commercial basis and the purchase and use of manufactured nylon nets among this group increased. Seine nets were also increasing in number and becoming longer as fishermen started to clear more and more beaches for their operations. In the 1950s it was still common among African fishermen to use nylon webbing for the bunt only and linye for the outer panels in the beach seines. Bigger nets and seines made it increasingly difficult to operate from dugout canoes and led to the emergence of bigger and more costly planked boats.

A combination of factors stimulated the development of the African fishing industry in the 1950s : the Government introduced a policy of the bulk sell of nylon nets and twine and plank boats to African fishermen; the establishment of the Horris Hickley netting company in 1959 (which became Blantyre Netting Company in 1979) made manufactured nets more and more common; and for the first time, Africans who had the potential were offered loans from the African Loans Board and the Native Development and Welfare Fund for the purchase of improved equipment (Government of Nyasaland, 1953:70-72).

Furthermore, the government introduced a policy that restricted non-African commercial fishermen from operating in Lake Malombe[1]. The arguments against permitting commercial fishing by non-Africans in Lake Malombe were twofold. First, the government feared that commercial fishing would be biologically detrimental to the fishery in such a small lake as Malombe. But, and this is the second reason, it also feared that a non-African presence would cause conflicts between African and non-African fishermen. The Director for Game Fish & Tsetse Control, M. J. Borley under which the administration of fisheries fell, argued that "where the fishermen were heterogeneous and where the standard of the non-native fishery is so far above that of the native as to put it in a totally different class", it seemed politically important to avoid even the risk of overfishing. In such a case, it appeared to him not improper to apply restrictions to the non-native effort as soon as effort and yield data indicated that they were very probably necessary, without waiting for incontrovertible proof that they were essential. Delaying imposition of restrictions and pending incontrovertible proof, entailed the risk of damage to the basic economy of the native fisherman through circumstances quite outside his control. Borley argued that if deterioration had resulted from delay in introduction of controls, the disadvantage of impaired race relations and political feeling would have been added to straightforward economic loss.

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[1] See letter from 1957 by A. Dickinson to M.D. Benders Esq. rejecting commercial fishing licence application for Lake Malombe by Benders. MNS19-4-4R / 3646 and letter of 31 August, 1957 by M.J. Borley, Director of Game, Fish & Tsetse Control, Fort Johnston to the his Chief Secretary on commercial license application for Lake Malombe by R.E. Hochschild. MNA 16-3-3F / 3645.

Finally, the creation of the Federation of Southern and Northern Rhodesia and Nyasaland in 1953 led to the lifting of the wartime ban on fish exports and allowed the large-scale purchase of fish for export mainly to Southern Rhodesia (Government of Nyasaland, 1962:81-82).

What we see emerging first in the southeast arm of Lake Malawi but also in Lake Malombe during the 1950s is a process that clearly differentiates between two groups; new African commercial fishermen on the one hand and, on the other, those who continued to fish mainly for their own consumption and for local barter. McCraken notes that in the 1950s, already, "perhaps the most remarkable feature of African fishing was the emergence of a small group of "big time" capitalist fishermen who employed labour on a regular basis and invested in imported nets and boats" (1987:427). Under this commercial orientation, group ownership of equipment was abandoned and instead nets and boats became private property of owners most of whom left the day-to-day control of the fishing to a son while they supervised the drying and selling of fish on shore. The 1962 Fish Ranger's report noted that there were 30 active African commercial fishermen on Lake Malombe[1].

However, this process is explained not only by changes in government policies. According to the same report, of the 30 commercial fishermen, only seven had obtained government loans of 200 to 300 pounds sterling. The rest had raised the money needed from elsewhere. With reference to the situation in the Southeast Arm, Fisheries Officer A.D. Sanson stated in 1956 that: *"Since 1950, there have been a few Africans who have attempted to set up fisheries on a real business basis. I think I am right in saying that not one is originally a fisherman himself. They are all African business men, some from other parts of the country and some belong to this part of the country and have spent most of their lives in South Africa or Southern Rhodesia and have come back to set up business. Local fishermen are employed. There are no co-operative fishing concerns; every one of these businesses is being run by one man*[2]*."* The growth in labour migration through organized recruitment agencies such as the Witswatersrand Native Labour Association (WENELA) to South Africa, but also to other places, were hence one important factor. It strengthened the processes which led to a more commercial fishery and in turn caused more and more of those who returned to invest their savings into the industry.

Finally, fish trading among Africans continued to increase. Partly because of the comparatively low wages and poor conditions that prevailed on settler tea and tobacco estates in the Shire Highlands, people started to take up fish trading in increasing numbers as it was more lucrative. Also it gave them an independence which wage labour denied (Vaughan, 1982). In addition to this, the price paid to peasants for cotton did not compensate them fully for their labour. African traders had started moving their fish by lorry, often teaming up with other traders to hire a lorry for the transport of their individual consignments. By 1962, there were an estimated 400 fish buyers in the Lake Malombe area[3]. This indicates that the investments required for entering fish trade must have been considerably lower than those required for commercial fishing. But despite the reported existence of 13 traders for every commercial fisherman, the reports of the Commission of Inquiry into the Fishing Industry clearly show that fishermen often experienced sale

[1] See "A Report of the Fish Ranger's work at Fort Johnston Station" by K.T. Howard 19/12/1962. Ref. no. 20/1/67. MNA 1/6/21/8/P.A.

[2] A.D. Sanson's statement in Record of the meeting of the Commission of inquiry into the fishing industry held at the courthouse, Fort Johnston, 8 and June 1956. (MNA/COM/9/3/1).

[3] See "A Report of the Fish Ranger's work at Fort Johnston Station" by K.T. Howard 19/12/1962. Ref. no. 20/1/67. MNA 1/6/21/8/P.A.

problems, particularly during the rainy season[1]. Fishing in Lake Malombe was concentrated in the northern part of the lake and landings on the west bank due to good access to roads and markets in that area. The few fishermen that fished on the east bank transported their catch by boat to Mtundu and Nkupekupe on the Upper Shire and to the north-west part of the lake.

4. THE 1960s AND 1970s: GROWTH IN EFFORT; MORE PEOPLE, MORE GEAR AND TARGETING OF NEW SPECIES

Whereas in the 1950s it was still common to use *Linye* for the outer net panels of the seine nets, the African commercial fishermen increasingly dispensed with the use of local materials in the 1960s and started to use nylon nets exclusively, thereby improving the efficiency of their operations. Furthermore, the use of static gillnets was abandoned in the late 1950s as these nets frequently were either destroyed by crocodiles and or stolen if left fishing over night. Instead, people started fish driving, locally called *chiombera*[2]. This was practised both during day and at night. Fish driving is reported to have been introduced in 1959[3] and within a few years, became the most common technique in Lake Malombe. Normally a net of as much as 1 000 yards long was set in a circle and a powered boat steamed round inside the circumference, with crew members beating the water to drive the fish into the net. This technique resulted in enormous increases in catches, fuelling further the commercialization of the fishery. In addition, government introduced a policy of shooting crocodiles to lessen the problem of net destruction. According to the 1962 Fish Ranger's report, all the 30 production units of the commercial fishermen were motorized (the common type of engine they used was the "Seagull" 102 long shaft).

Sensing that they could increase their catches further by using gillnets as active gears like commercial trawlers on Lake Malawi, most gillnet fishermen started to trawl their gillnets using two boats and outboard engines. Used in this way, it was necessary to increase the depth of nets. Thus gillnets used as a *tolora* (trawler) or *kandwindwi*, (named after the trawler operated by the MALDECO Fishing Company on Lake Malawi) increased from 24 or 40 to a depth of 80 meshes[4].

With the commercially valuable Chambo in abundance and increased numbers of migrant returnees, the use of the seine nets became more and more prevalent in the 1960s and 1970s. At their height of operations, around 1980, seine nets had grown in size up to 1 000 metres long. While the 1962 Fish Ranger's report indicate that there were five Chambo seine nets operating in Lake Malombe, the Director of Fisheries Frame Survey figures show that the number had increased to 27 by 1981 (Zwieten, Njaya and Weyl, 2003)[5]. The increased use of the seine net also saw the invention of the Chalira, a small seine net with small mesh sizes that was operated behind the bigger seine net in order to catch the fish that usually escaped from the larger seine as it was pulled close to the beach.

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[1] See e.g. statements of Fred Sinclair, Glab Khan, Amos Charles and Crispo Gwedela in Record of the meeting of the Commission of inquiry into the fishing industry held at the courthouse, Fort Johnston, 8 and 9 June 1956. (MNA/COM/9/3/1).

[2] Chiombera had been developed on Lake Malawi and it was already in use there by the time it was introduced on Lake Malombe.

[3] See "A Report of the Fish Ranger's work at Fort Johnston Station" by K.T. Howard 19/12/1962. Ref. no. 20/1/67. MNA 1/6/21/8/P.A.

[4] The first person reputed to have started using this technique on Lake Malombe was a Mr. Khan in 1973 who employed Maija as his head of crew. Later Maija left the employment of Khan to buy his own gillnets and fish on his own.

[5] Since the DoF figures start in 1981 and since they show a steady decline through the 1980s and 1890s, it is not improbable that the maximum number of chambo seine nets may have been even higher.

The 1960s and 1970s also witnessed the emergence of a seine net targeting new species: the so-called "Kambuzi seine net". Like the Chambo seine it is operated from the beach, but has smaller meshes and was initially about half the length of the Chambo seine. It was meant to target Kambuzi[1] like so many of the other gears used in Lake Malombe, the Kambuzi seine net had been developed in the Southeast Arm long before it emerged in Malombe. It is interesting to note that fishing for Kambuzi began well before the stress on Chambo became noticeable. An important reason for this is that in the 1950s, the tea and tobacco estates in the Shire Highlands (Thyolo, Mulanje, Zomba, Chiradzulu and Blantyre) had instituted a tenant labour system (McCraken, 1987) and they required cheap food for their tenants. Kambuzi was seen as one of the ideal food items. During the 1960s, Kambuzi also came into increasing demand among the low-income groups in the growing urban areas and there also proved to exist an export market to Southern Rhodesia. In addition to the stress on Chambo, caused by increased fishing effort, it seems that the increase in demand for fish and the growing consumer acceptability of smaller species also fuelled the expansion of the Kambuzi fishery. At the beginning of the 1980s, the demand for Kambuzi must have been high since the Department of Fisheries figures of estimated catch show that there existed between 60 and 70 Kambuzi seines in Malombe in 1981 (Zwieten, Njaya and Weyl, 2003).

The 1960s and 1970s continued to be good years for labour migration to South Africa, and to some extent also to Rhodesia, resulting in an increasing number of successful returnees who were willing to invest in fisheries. Except for the returnees, little is known about the relationship between work migration and economic activities at home. However, more recent information – including life stories collected for the present study – indicates that specific networks between migrants and some of their relatives remaining at home, developed in this period. These networks served to transmit and invest remittances from the migrants before the migrants decided to return to their home area for good, thereby rendering work migration even more effective in economic terms. Fisheries Department Frame Survey figures show that by the early 1980s, the number of owners of fishing units had reached around 230 (Zwieten, Njaya and Weyl, 2003).

The speed of the technological changes during these two decades also indicates that another important social process must have taken place simultaneously. Towards the end of the 1970s, it had become exceedingly difficult to operate at a subsistence or small-scale basis. In the Chambo fisheries, various types of active catch methods such as *chiombera* and *tolora*, as well as Chambo and Kambuzi seining, requiring heavy investments in the form of costly nets, out-board engines and planked boats had completely taken over from the passive methods practiced earlier. With this noticeable increase in investment-driven growth of effort we must assume that the catch rates for the older passive gears must have diminished, rendering the low investment fisheries very difficult to sustain, to say the least. It is therefore reasonable to assume that the great majority of the 230 boat owners in 1981, constituted the type of commercial fishermen that A.D. Sanson described already in 1956 (see citation above).

In his study of the development of access rights to fishing in the southeast arm of Lake Malawi W. C. Chirwa concludes, "*while no single group won the contest for access rights and control, the traditional leaders were the greatest losers as they failed to use their political position to block the success of other groups*" (1995:377). In the context of Malombe, where the African commercial fishermen did not have to face competition from non-African fishermen, they

[1] Kambuzi is a local name for a group of cichlids, mostly of the *lethrinops* genera.

were much more successful in asserting full access rights than were the African commercial fishermen on Lake Malawi. But, they were successful at the expense of those who were unable to follow suit in the race for new and more effective fishing gear. The new and extended fishing units required an extensive use of labour, but the people recruited to work as crews were often different from those who had just lost their access rights due to lack of investment capability. By the end of the 1970s the fishery in Malombe had to a large extent lost its role as a "commons" and since then the "Lords of Malombe" succeeded in establishing some sort of control over the fish resources in the lake.

However, the control of access exercised by the commercial boat owners has many aspects. The increased need for labour could not be fulfilled by recruiting labour from within the family as had been the convention until then. In the beginning it seems as if crew-members from outside the families were compensated through some sort of direct payment. McCracken (1987) shows that already in 1956 owners had considerable problems related to the control of their crews. Some owners then blamed crew members publicly for theft of catches and misuse of equipment. Towards the end of the 1970s, the pay structure changed to a share system based on 50 percent of the catch allocated for the investments and the other part for the labour. With minor modifications and variations between the different gear types, this system remains in use to the present.[1] The new system resulted in increased earnings for the crew members. Since their earnings depended on how much they caught, this gave an incentive for crew members to work harder and fish longer hours. Day and night fishing using gillnets became common. To what extent this shift altered the power relations between gear owners and crewmembers or solved the reported control problems of the gear owners will be discussed below.

The commercial gear owners also invested in the marketing of fish. It has been reported from the late 1950s that many gear owners had bought or intended to buy their own trucks and pick-ups[2]. Using these, they could move their own catch and also buy from their fellow fishermen, cutting out the middlemen. As fish sold retail at more than 100 percent mark-up, such forward integration further increased the earnings of commercial gear owners (Hara 1993). The growing urbanization in Zomba, Blantyre and Lilongwe in the 1970s and 1980s also acted to increase demand for both Chambo and Kambuzi. But contrary to what happened in the fisheries where the investments of some excluded the participation of others, investments in the trade system never excluded the participation of small-scale traders operating from bicycles and various types of public or private transport. Given that by using bicycles and pubic transport fish could be sold in a much dispersed and often inaccessible hinterland of small villages and regional towns but also in big urban centres, the trade system continued to remain decentralized and open to a wide range of people. In the early 1990s, an estimated 3 000 fish traders operated on the southeast arm of Lake Malawi, the Upper Shire River and Lake Malombe. Of these, approximately 50 percent concentrated their activities in Lake Malombe (FAO, 1993).

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[1] According to our information the system was brought about in the gillnet sector by default. In order to attract competent crew members while operating with a disadvantage of having no engines, Messrs Nkongwa and Wadi Ali from Ntundu offered to pay the crew members half of all the profits accruing from the sell of the wet fish in the late 1970s. Within a few years, all gear owners were forced to adopt this system through the claims of all crewmembers.

[2] See statements of Fred Sinclair, Glab Khan, Amos Charles and Crispo Gwedela in Record of the meeting of the Commission of inquiry into the fishing industry held at the courthouse, Fort Johnston, 8 and 9 June 1956. (MNA/COM/9/3/1)

5. THE 1980s

5.1 Reduction of Chambo catches and technological changes

Fishing effort on Lake Malombe had increased dramatically during the 1970s: in 1981, on a water surface of 390 km², 230 gear owners hired 1 400 crew members fishing from 350–360 planked boats and operating more than 100 km of gillnets, 27 Chambo seines and between 60–70 Kambuzi seines (Zwieten, Njaya and Weyl, 2003: Figures 11 and 12). Most of the boats were motorized. Total catches in the early 1980s fluctuated between 7 000 and 12 000 tonnes of which 6 000 to 9 000 tonnes were Chambo (Zwieten, Njaya and Weyl, 2003: Figure 1).

The 1980s saw both a decline in nominal catches of Chambo as well as in its relative importance of the total catches. By the early 1990s, Chambo catches had been reduced to around 1 000 tonnes while the total catches remain close to what they were a decade earlier. During this period we also observe great changes in technology and catch methods. By 1990 the amount of gillnets had been reduced to 45 km and only six or seven Chambo seines are reported to remain in the fishery. On the other hand the number of Kambuzi seines tended to grow in the first part and later started to fall so that the number of seines in the early 1990s remained somewhat lower compared to what it had been early in the 1980s. Also the use of outboard engines became more and more rare and by 1994 there were no engines left in the Malombe fishery (Fisheries Department, 1995).

The big change in the fishery for Kambuzi came when the *Nkacha* net was put into common use in the first part of the 1980s. Already in 1976, a Lake Malombe fisherman, Mr Galimbe Paudala, invented this new gear and fishing method which targeted Kambuzi in the open waters of the lake. But most of the fishermen only seem to have adopted the method and start using the Nkacha after the Chambo catches began to fall in the 1980s[1]. Until 1983 the number of Nkacha nets remained well below 50, but thereafter the number increased rapidly and in 1991 there were 180 such nets in Lake Malombe. Since the Nkacha was an open water seine, this meant that the fishers could fish all over the lake. Quickly, the Nkacha became the most important fishing gear as almost all gear owners switched from Chambo and Kambuzi seines to Nkacha nets. The number of gear owners and assistants did not grow much through the 1980s. Some additional gear owners seem to have been able to establish themselves, and in the early 1990s they are reported to number around 300, but the number of crew members remains stable (Zwieten, Njaya and Weyl, 2003: Figure 11).

The development of fishing effort in the 1980s represents something new in Lake Malombe. While effort from the early 1950s to the late 1970s had been growing as a result of increases in number of fishermen and in investments, the 1980s experience a noticeable reduction in the population-driven growth of effort. Besides, the new investments which continue to flow into the fisheries are no longer just added to already existing investments. It could have been expected that the Nkacha net would come as an addition to already established practices but instead they are used to substitute the previous investments in order to target new species in new environments. This change is a simple reflection of the disappearance of the Chambo, it

[1] Because it targets Kambuzi and looks similar to a Kambuzi seine net in terms of the gradation of its mesh sizes from the bunt to the wings, the Nkacha net was mainly referred to as *Khoka la Kambuzi* (Kambuzi seine net) in the early years. The name Nkacha only came into common use as referring to a separate gear from the Kambuzi seine in the late 1980s. This causes some problems in tracing the exact change process from Kambuzi seines to Nkacha nets.

does not make much sense to continue to chase a species which has become impossible to capture and this is the reason for giving up the Chambo gear[1]. Whether the change from gillnets and Chambo or Kambuzi seines to Nkacha nets represents an investment-driven increase of fishing effort is hard to say since it is difficult to compare one fishing method to another[2]. Nevertheless, there can be little doubt that although the investments and the technological development very much continued, the fishing effort tended to stabilize during the 1980s when it comes to investments.

5.2 Reduced recruitment of fishermen: the role of 'lords' and crew members

We must also ask to what extent the reduced recruitment of gear owners and crew members that took place in the 1980s reflected changes in the biology of the lake (reduced catches of Chambo as well as reductions in overall catch rates), and/or to what extent they were directly caused by social changes that took place, in particular the emergence of the new elite. The question is whether the stabilization in the number of operators was caused by economic incentives to leave the fisheries when signs of heavy fishing pressure emerges or whether it was the economic influence in general of the "lords" and their dominance in the fishery in particular that made them able to control – and even deny – individual's access to the resources of the lake so effectively, quite irrespective of whether the individuals wanted to participate as co-owners or as crew members. To answer these questions we need to investigate thoroughly who came to constitute this elite, how it was reproduced and what opportunities and constraints the elite faced in its daily economic operations.

To become a gear owner, especially a seine or a Nkacha net owner, means to have made it to the top of the social profile in Malombe. Only a couple of hundred individuals, out of a total population of more than 50 000, find the means to invest in a fishing unit. In the 1950s we saw how the Fisheries Officer in Mangochi linked the emergence of the first African commercial fishermen on Lake Malawi to businessmen from other parts of the country and labour migration returnees who invested their savings in fishing material. On Lake Malombe the emergence of commercial fishermen took place some years later and shows a slightly different picture. The authors interviewed a small number older people who had established themselves as gear owners in Malombe in the 1960s. These interviews indicate that very few "foreigners" seem to have invested in the Lake Malombe fisheries. Primarily labour migrants originally from Mangochi district started to invest in Chambo seine nets, in boats and in outboard engines, even if some local businessmen and retired civil servants also emerged among them.

It is important to notice that those constituting the elite today, only very rarely are the same individuals – or representatives of the families – that formed or constituted this elite 30 or even 20 years ago. Among the 42 gear owners interviewed, only three or four of them had been owners in 1980. Twenty four of them report that neither their father nor any of their uncles had owned fishing gear. However, this does not mean that the remainder – 18 of the interviewed gear owners – are sons or nephews of commercial fishermen, nor does it mean that they

[1] FAO (1993) points out that the use of small mesh Kambuzi seine nets along the shores was also one of the major factors for the decline in the Chambo as these caught juvenile Chambo, contributing to growth overfishing. In addition, fishermen point out one of the causes of the decline of the Chambo was the Nkacha net. As the lake is very shallow, the Chambo used to breed all over the lake. The operation of the Nkacha required the removal of vegetation from the bottom which destroyed the habitat on the whole of the lake extensively (see also Zwieten, Njaya and Weyl, 2003).

[2] With reference to the conceptual framework in fisheries biology it would probably be more correct to talk about 'fishing mortality' in this case.

inherited their fishing gear. Only three or four cases are known were a presently active boat owner is the heir of a commercial fisherman. What this tells us is that the elites are not a fixed and stable group, but rather an assembly of those individuals who at any time have been successful enough to achieve a certain financial status adequate enough for investment in fishing, which many of them may lose again or, if they do not, may be dissipated at the time of the death of the person. All the life-stories indicate a pattern which is common in rural Africa; economically wealthy people are almost without exception "self-made". One of the main reason for this is that inheritance rules often are ambiguous and fluid and a source for serious conflicts (Berry, 1993). Matrilineal descent, like we find in Yao society, often complicates the principles of inheritance further. Common practice[1] is often that a person inherits the estate of his/her uncle, that is the person's mother's brother. Even then, it is usual that the equipment will be sold and money shared among the deceased person's family (sisters, father and mother) other than being left to a nephew to continue with fishing. In this way, the family avoids in-fighting for the estate. Apparently, even in cases where the deceased gear owner had expressed the wish that his children should take over his estate, it is common for his father or uncle to over-ride his wishes and take over the estate, unless the deceased had backed his wishes with a written will. Only 13 percent of the gear owners registered in 1993 and who had deceased before 1999 had left their equipment to their sons. In such cases, the sons were old and strong enough to assert their claims to their father's estate or their father left the gear in their hands well before they died[2]. The problems connected to the inheritance of gear have also led to some unintended consequences regarding ownership. In order to avoid the dissipation of assets in the inheritance process, ten women, either wives or sisters of the deceased, have managed to postpone the inheritance process and to establish some kind of control over the fishing gear. It is unclear, however, how and when the first female gear owners emerged. As will be shown below the female owners are under severe constraints and it is therefore improbable that they will constitute an important economic part within the elite.

Since inheritance is not an option, those who want to become boat owners have to find other means and these means prove to be fairly similar to what the first commercial fishermen used[3]. In most cases it means finding a source for accumulation of capital outside the fisheries. In the 1980s the most common options remained migrant labour savings, credits or loans and fish trading. The contract system to the South African mines continued but ended towards 1985 and also the migration directed towards the 'informal' sector – in South Africa as well as in Zimbabwe - started to show signs of stress. It was still possible to find interesting sources of income even if it was much less attractive than it had been in the past decades. The reduced opportunities, which have continued into the 1990s, can be observed in general social changes in the Upper Shire area. More than a reduction in emigration it has resulted in an increase of migration failures. A very high percentage does no longer achieve any measurable success in their quest to earn and save money for re-investment back home.

Fish trading seem also to have been a good alternative to labour migration in the 1980s. Sources of credit or loans could also be an option. In the 1970s and 1980s certain shop owners

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1 In most cases, the Yao custom is used to dispose of a deceased owner's estate and in this context, most of the estate is supposed to go to the nephews, his sisters' children. Being so many of them, the usual solution to dividing the estate within the family is to sell the items and share the money.

2 In one case we observed that one son managed to appropriate his fathers fishing material, but in that case he sold it and invested the money outside fishery.

3 In 1999, a new Nkacha net would cost about K100 000 (approx. US$2 300) while a good used net would cost about half that amount. The cost of the net represents approximately 75 percent of the total costs of the unit.

and the Blantyre Netting Company were sometimes willing to offer nets on loan to potential gear owners. Accumulation of savings as a crew member seems to be very difficult and only four of the 42 owners interviewed refer to this type of savings as their source of starting capital. Earnings are limited and receiving them in small daily instalments under the pressure of social and economic needs of an extended family system does not encourage savings which would require decades.

If it is difficult to become a gear owner, it is not necessarily easier to remain one once you have established a fishing unit. The management of the unit and its labour in particular has been found to constitute the main critical factors. Managing crews in commercial fishing units in Malawi has never been an easy task. The first entrepreneurs loudly complained to the Commission of Enquiry in Fort Johnston in 1956[1] about how they in various ways were fooled by their crews who sometimes destroyed equipment or stole fish they had caught. This is in no way an uncommon feature in African fisheries. On the contrary, the direct control of labour is often reported to be critical[2] particularly since norms and rules that regulate owner/crew relations are seldom shared. On Lake Malombe we found that, despite the seeming economic power of the 'lords', their ability to control the crews are often restricted. Some crews have over the years ascended their position to one that resembles that of shareholders. Sometimes they decide on the timing of work, the recruitment of new crew members or the sale and price of fish without consulting the owner. Despite the introduction of a share system in the 1970s some crews have later stopped contributing towards payment of operational and fixed costs for the unit, meaning that these are now solely borne by the gear owner.

The reasons behind the paradox of a numerically limited and economically strong elite with restricted power over their own employees are complicated and can only partially be dealt with in this work. The owners' problem is that few sanctions exist that do not hurt them as much as it hurts crew members. Owners can withdraw their nets and boats from operations in order to force changes or they can dismiss their crew and recruit new ones. In both cases the owner risks serious losses as a result of thefts, malpractices or inexperienced fishermen. Besides, the relationship between owners and crew members is not a single-function one, but complex and strongly embedded in the wider socio-cultural framework of the Upper Shire region. Sometimes one finds that crews are able to mobilize general support among the population preventing the owner's possibilities to employ new crews, or they organize and manipulate boycotts of specific owners who they claim are engaging in practices thought to be inconsistent with agreed norms and practices.

The owner/crew relationship proves even more complicated and in some cases the influence and power of the crews are found to serve the interests of their masters. One distinct feature of the 1993 survey of owners is the absence of non-local investors; that is of investors who do not claim to be from the Malombe area. Only a handful was identified, despite the fact that owners, crews and even individuals not participating in the fisheries, all claim that access to the lake is open to everyone. Thorough investigations showed that access regulation to a large extent was exercised by crews who put extra restrictions on the operations of 'foreigners'. It was reported that the outside boat owners seldom were allowed to inspect the catches of their

1 See e.g. evidence of Crispo Gwedala cited by McCracken (1987:426-7).

2 Labour control is a somewhat neglected issue in the literature on African fisheries, but in agriculture and other sectors it is widely referred to. Scholars like S. Berry (1993) are claiming that the lack of labour control may constitute the most important constraint to rural economic growth in rural Africa.

boats at landing and that all maintenance and repairs were under the control of the crews. This kind of owner could chose between appointing a local person to look after his interests or simply wait and receive his share from the crew after they had taken theirs. As a result, very few foreign gear owners are able to run a profitable fishing business. One may say that the barriers for "foreigners" entering fishery in Malombe mainly centre around their lack of inside knowledge about local rules and a certain general reluctance among local people to accept "foreigners" as boat or gear owners. This gives fishing crews possibilities to increase their influence. The same kind of cultural barriers were reported to apply towards the few women boat owners. They must contend with negative social and cultural perceptions to their participation in the fishery in what is a largely Moslem community.

This brief presentation of owner/crew relations demonstrates the complexity of factors influencing the effort dynamics on Lake Malombe. The reduction of Chambo catches is arguably part of the explanation for why the growth in number of owners stabilized during the 1980s. However, the reduced possibilities to accumulate wealth through labour migration were also important. The incapacity among the elite to convert economic power into direct social control indicates that their economic power were less important than what could be expected in explaining the reduced recruitment of owners. On the other hand, an increased power among the crews – mainly used to struggle against the owners – seem to have effectively prevented recruitment of new groups of owners, thereby indirectly supporting the interests of the same owners. As for the stabilization of crew members this is also affected by reduced catches and technological changes from Chambo and Kambuzi seines to Nkacha nets.
However, the increased power of crew members is also a factor which strongly influences crew recruitment. As shown, the owner's possibility to successfully manage his fishing unit is closely related to his control of the crew. But control of the crew is obviously related to the number of individuals to control. The owner has therefore a strong incentive in keeping the number of his employees as low as possible.

6. THE 1990s: STOP IN INVESTMENTS AND REDUCTION OF FISHING EFFORT

The 1980s saw dramatic changes in catch composition of the fishery on Lake Malombe, although the total biomass remained fairly stable in the lake. This picture changed again in the 1990s when total catches decreased from approximately 10 000 tonnes per year in the beginning of the decade to 3 000 tonnes per year in the period after 1995. The large share of the catch is Kambuzi, while Chambo has almost disappeared and now only constitute 200-300 tonnes per year. Parallel to this reduction we also see a clear reduction in fishing material such as boats and Nkacha nets. Chambo and Kambuzi seine nets have almost disappeared. Only the number of gillnets shows a modest growth in the 1990s (Zwieten, Njaya and Weyl, 2003: Figures 1, 11 and 12). The development in terms of gear owners and crew members is more unclear. The frame surveys of the Fisheries Department show an increase of owners in the 1990s. This increase was faster than what was observed during the 1980s; from approximately 300 owners in 1990-1991 to more than 400 owners in 1999 (Zwieten, Njaya and Weyl, 2003: Figure 11). These figures stands in clear contrast to the results of an update in 1999 of the 1993 gear owner register. This update shows that of the 332 gear owners that were recorded in 1993, 210 (more than 60 percent) had left the fishery by 1999. Meanwhile 73 new gear owners had

joined the fishery, making it 195 gear owners operating on Lake Malombe in 1999 (see Table 1)[1].

TABLE 1. *Summary of the June 1999 updated information on the Lake Malombe 1993 gear owners' register*

Gear units	1993	1999		
		Left fishery	*New entrants*	*Balance from1993*
Gillnets	40			18
Nkacha	246			91
Chambo seines	3			0
Kambuzi seines	45			13
New entrants				
new gear			16	
used gear			57	
Left Lake Malombe				
died		30		
migrated		54		
sold gear/other reasons		126		
Total	**332**	**210**	**73**	**122**

It is difficult to explain how the big discrepancy between these two sources of data has emerged. Part of the explanation is probably that the 54 units, which according to table 1 have migrated and that for the great part now operate on the southeast arm of Lake Malawi, still are accounted for in the frame surveys. This accounts for about half of the discrepancy. Nevertheless, the accuracy of the update and a series of parallel indications supporting its results make us conclude that the number of gear owners operating on Lake Malombe has been considerably reduced since 1993 and that the number even may be lower than what it was at the start of the 1980s.

The frame surveys referred to by Zwieten, Njaya and Weyl (2003: Figure 11) state that the number of crew members has remained stable. The 1993 registry does not provide data on crew members, but given that the number of owners is believed to have fallen, one could assume that the number of crew members also has decreased. However, this is not necessarily the case. As the number of seine nets and Nkacha nets has declined, the owners have tried to compensate and to maximize effective fishing time by hiring an increased number of crews which are fishing consecutively within the same unit. In the late 1990s most Nkacha units had two and some even had three crews each and the number of crew members per owner is therefore probably higher in 1999 than what it was at the beginning of the decade.

There can be no doubt that the dramatic decline in catches is the main reason behind the decline in investments and fishing effort. While gear owners bought second and third units in

[1] One possible explanation may be that while the frame surveys include any person owning hooks, lines or some nets, the 1993 gear owner's register has concentrated on the wealthier.

the 1980s, it has become increasingly difficult to own and manage more than one net. Very few people in the 1993 registry have increased the gear they own. In most cases, those who had two or more Nkacha nets have either sold one or combined the two to make one. Most owners of Chambo seine nets who have either migrated to Lake Malawi or retired their nets. A good number of the Kambuzi seine nets were converted into Nkacha nets in the early 1990s or the units migrated to Lake Malawi. The few seine nets remaining on the lake are based at the outlet of the lake just outside the Liwonde National Park where they seem to benefit from the protection of the Chambo provided by the park.

However, the decline in catches does not explain the particularities of the reduced fishing effort in terms of the relative importance of changes in number of owners and crew members compared to the changes in volumes and quality of the fishing gear. In order to understand these particularities the constraints found to influence decisions and operations of the owners are important. Many of these constraints continued to prevail and were aggravated in the 1990s. All the sources for accumulation of external funds have become more difficult to access. Legal labour migration to destinations outside Malawi is no longer an option, even though various types of "informal" and very risky travels to the neighbouring countries are reported to continue to help potential newcomers. The update of the 1993 register shows that most of the 73 new entrants report that they obtained their capital from migrant labour savings in South Africa or Zimbabwe. Fish trade has lost much of its potential due to the fall in catches. It takes more and more time to gather a large enough consignment to take to the market so that traders make fewer trips. Since Kambuzi has less value than Chambo, trade in Kambuzi is unlikely to generate surplus capital. Whereas shop owners and the Blantyre Netting Company were willing to offer nets on loan to gear owners in the 1970s and 1980s, they have become more and more reluctant to provide such facilities in the 1990s. The ability of loanees to repay has declined due to declining profits and the sources for credit or loans have virtually disappeared and where they exist the interest rates are high and security difficult to provide.[1] As demonstrated in Table 1 the result is that new entrants more and more rely on buying used equipment.

The control of the "lords" over their crews has continued to weaken, and the owners have had to pay a stiff price for the introduction of more than one crew into their units. Due to the sharing of the material a crew no longer accepts any particular responsibility for the care of the equipment. Abuse and the careless use of equipment are reported to have become common in many cases. With the decline in catches the mobility of crew members between fishing units has increased and the feeling that crew membership is *ganyu*[2] has become increasingly entrenched. The lack of long term tenureship in a unit adds to the problem of responsibility and appropriate use of equipment.

The rules and norms regarding owner/crew relations have certainly not become clearer or more consistent over the last years and the management problems have increased, partly as a result of the increased number of employees. Until the 1990s most gear owners processed their catch before selling it to traders, thereby doubling their earnings. The crew members' share was based on the price of the wet catch. They only got their share after the gear owner had sold the processed fish for the week in question. Crew members allege that most gear owners sold the

[1] Loans tend to be very expensive. Commercial banks and the Malawi Rural Finance Company charge over 52 percent annual interest for their loans in 1999.

[2] Daily piecework.

catch to themselves at a very low price, thereby reducing their share. Some also did not give them their share as agreed at the end of each week or after the sell of a particular consignment. Due to such malpractices by gear owners, the crew members started pushing for changes to the system. If the gear owner wanted to process the catch, he had to compete with other potential buyers. Secondly, crew members decided that they would get their share immediately after the sell had been conducted. Thus gear owners who wanted to practice forward integration had to compete with other buyers (fish traders) for "their own" fish. Increasingly, traders bought the fish direct from the crews and processed it on their own other than buying processed fish from gear owners. For many gear owners, this meant an end to forward integration. Those who had bought pick-ups to market the processed fish in the cities sold their vehicles or deployed them for other businesses such as hiring them out to fish traders or for the transportation of people (*matola*). This brought about a fundamental change in power relations between gear owners and crew members. Whereas before the gear owners would take over the catch from the crew as soon as it was landed, nowadays he stands by as traders bid against each other for the fish until the highest bidder is found. The going price has to be agreed between him and the crew. The insistence by crew members that they get their share immediately after the sales have been conducted has also added to his short-term cash flow problems especially after catches declined in the 1990s.

For the owner the system presents a catch-22 situation; it can be difficult to save enough money to carry out major net repairs needed. At the same time, a net in poor state is not as efficient as one that has been properly maintained. The crews usually do not agree to forego their share of the money for a few days so that the gear owner can use accumulated funds for such expenses. The practice of many crews has become to abandon the net and to seek another owner if the net is not productive anymore. Thus if the gear owner cannot save enough money from his share of the catch or cannot borrow money for repairs elsewhere, the result will be that the net will continue to decline in quality and eventually, the crew members will abandon it if the owner does not suspend the operations before that happens. Inability to keep up with repairs leading to decline in productivity has been one of the major reasons for suspending fishing or complete wear out of nets, leading many owners to divest from the fishery. An added factor is that whereas the net owners in the 1970s and 1980s would subtract the operational costs such as money for fuel, twine for net repairs and breakfast for the crewmembers, the latter demanded that the sharing should be based on gross sells other than nets sells. Thus, the gear owner has been left with the sole responsibility for all the costs (capital and operational). As if this is not enough, the share proportions in the Nkacha have been changed to 45 percent for the gear owner and 55 percent for the crew members, since the diver (mtiwi) gets 10 percent of the gross sells before the sharing is done. The gear owner must also contend with increasing theft of fish or gear components by crew members as most Nkacha units started to deploy more than one crew to a unit.

One of the few possible responses from owners has been to revert to less capital-intensive gears than the Nkacha nets. Less expensive gear usually can be operated by smaller and fewer crews and the gear owner thereby is better positioned to exercise effective control over his employees. The modest increase in numbers of gillnets, longlines, handlines and traps in the fishery in the late 1990s (Fisheries Department, 1999) may have been caused by such considerations, but the problem remains that the catch rates for these types of gear remain very low.

As already mentioned, many of the management and control problems have been amplified by the lack of commonly shared rules, values and norms among owners and crew members. But it is probably also correct to say that, during the 1990s, the crew members have increased their control in terms of operational decisions and pricing of the catch and that many gear owners have lost much of whatever control they may have had earlier regarding these decisions. Those who in terms of economic wealth seemed to emerge as the lords and the elite of Malombe have at present far less influence regarding their own production units than what could be expected. This is an important factor explaining why so many owners, over the last years, have decided to leave the fishery.

However, in order to leave the sector people must also have alternatives. This seems never to have been a problem on Lake Malombe. The Yao are historically traders and business people (Rangeley, 1970) and this seems to define the attitude of the gear owners towards fishing. Fishing is not an occupation they are culturally or emotionally tied to. A fishing unit is considered an investment that must pay back in terms of profit; otherwise they will seek to sell it and invest their money in something considered more promising. Table 1 indicates that out of the 210 owners who left fisheries after 1993, 126 are still economically operational in the area. Some have moved into other business activities such as tobacco farming[1], or run minibuses or pick-ups for transporting people. Others again have built houses in Mangochi Township or in some larger villages where they consider the demand for rooms to rent to be high.

Such switches in economic activities are not necessarily very difficult or risky. Contrary to what has often been assumed the commercial gear owners have never exclusively relied on the fisheries in Lake Malombe for their incomes. On the contrary the life stories of gear owners demonstrate that all of them are involved in a range of different economic activities and that diversification always has been considered the best strategy. In addition to commercial agriculture, people transport and renting houses it is common for gear owners to run shops, maize mills, beer halls, local video cinemas and/or rest houses and to invest in cattle and in *dimba* gardens (Mandala, 1990). The various businesses are supposed to support one another and secure stable access to cash. Forward integration of the fishing business into fish trading used to be popular strategy among the gear owners, but fish trading has declined as an option. Most of them say it is hardly profitable anymore as the fish has become too expensive, especially after the crew members started to intervene in the pricing of the fish.

The shift in focus from fishing to other economic activities is also to some extent a self perpetuating process. The more the attention of a boat owner is directed towards other businesses, the less time he has to follow up and control his fishing crews. Many gear owners or ex- gear owners emphasized this dilemma and insisted that there exist a limit for how much time that can be spent in other activities before the fishing business starts suffering. The analysis of owner/crew relations demonstrates that many boat owners crossed this limit in the 1990s. It seems as the wealthiest among them decided to give up the fishery while those who can not afford larger investments in other sectors continue to operate as gear owners.

[1] Tobacco farming among smallholders was first allowed in 1990 through the initiation of a pilot project in many parts of Malawi (Peters, 1999).

7. CONCLUSION

What makes effort development on Lake Malombe particularly interesting is what took place after 1950. Before this time, fishing effort was mainly characterized by population-driven changes, and the development seems to have been fairly similar to what has been the case on many other southern African lakes. However, from that time the investment-driven changes grew progressively in importance and in the 1980s it came to dominate the effort development completely. Zwieten, Njaya and Weyl (2003) show the serious effects this growth has had on the environment and the biology of the lake. Although not a proof, the case of Lake Malombe is an indication that investment-driven growth of effort, under such conditions, is more of an environmental and biological challenge than population-driven growth of the type observed in so many of the other water bodies of the region.

The case also demonstrates how the investment-driven growth as such caused the gradual reduction in the population-driven growth on the lake. The increased efficiency of the Chambo seine nets reduced the catch rates of the gillnets and other more conventional gear to a level where the operations of the latter became almost impossible. Thereby, a new group of "lords" managed to appropriate the access to the lake at the expense of other and less wealthy segments of the population. This effect is well-documented in many parts of the world when investment-driven changes of effort start to dominate in the development of a fishery (Brox, 1990).

However, as interesting as the effects of investment driven changes are, the findings connected to factors constraining investment driven changes to occur. First, the analysis shows how intimately related the investments in the Malombe fisheries have been related to economic opportunities external to the fisheries. Not only was it labour migration to countries abroad that facilitated accumulation of money and thereby initiated the investment processes. This is already well documented in the literature (McCraken, 1987), but our analysis also shows how important the flow of externally generated wealth has been to keep the investment level going. At least on Malombe it seems as if neither the seine net fisheries for Chambo or Kambuzi, nor the Nkacha net fishery, ever became able to sustain the actual level of investments observed in the 1970s and 1980s. More money was probably floating into the fishery than out of it, and this explains the high turnover rate in terms of gear owners. The reasons are not to be found in pure economic considerations connected to the volumes and the prices of catches. On the contrary, evidence exists showing how the potential profit margins were good for a long period of time. The main problems are more to be found in the institutional arrangements which are found to dominate in the Malombe fishery in particular and in the Upper Shire society in general. Unclear rules and norms regulating the life of extended families and social security networks makes it very difficult for people to make the savings required to keep a relatively capital-intensive operation going. Even more important is that the same lack of clarity is found to dominate in the regulation of owner/crew relations. Symptomatically, there is strong distrust between owners and crews and this leads to an extended need to control each other. Beside the reduced catches in the 1990s, the problems connected to the owner/crew relations are probably the most important factor explaining why so many owners have left the fishery in recent years. The Malombe society is in no manner unique regarding these sociological characteristics and similar phenomena are increasingly being reported from many rural communities in sub-Saharan Africa. This is why this case study is particularly instructive when it comes to understand why investment-driven growth of effort so seldom seems to take place in the fisheries of southern Africa.

Finally, the Malombe fisheries also show how inter-connected African artisanal fishery is to all other kinds of economic activities, both rural and urban. It adds to demonstrating the weak empirical foundation behind some popular and widespread representations about African fishermen being marginalized people and African small-scale fisheries being a "last resort". In Malombe we have shown it to be the opposite: the most influential fishermen are found in the richest segments of the community and their decisions always reflect their assessment of the earning potential of the fishery on the one hand against other economic activities on the other.

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MARKET DEVELOPMENT AND INVESTMENT "BOTTLENECKS" IN THE FISHERIES OF LAKE KARIBA, ZAMBIA

Ragnhild Overå

1. INTRODUCTION

When Lake Kariba was created through the building of a gigantic dam across the Zambezi river in 1958 for the production of hydro-electric power, the fishery that evolved in the new and large water body was anticipated to become a major benefit for the Tonga people in the area. The relocation of 36 000 Tonga that became necessary as a result of the inundation of the Gwembe valley created many problems.[1] Nevertheless, a thriving fishery did develop, which created new livelihoods for a large number of both Tonga and migrant fishermen and fish traders on the Zambian side of Lake Kariba.

Four decades later, fish marketing continues to be in the hands of small-scale traders and fishing is conducted in unmotorised dugout canoes or "banana-boats". The fishermen constantly adapt to the environment and improve their fishing methods according to their acquired experience. However, apart from a shift to nylon nets and smaller mesh sizes, very few technological or institutional changes resulting in more efficient and profitable fish production have taken place since the creation of the lake. Not even in the semi-industrial Kapenta fishery – opened in the early 1980s and largely owned by white businessmen – have investments and technological growth "taken off". In light of recent research on the biology and ecology of Lake Kariba where no serious depletion of fishery resources is indicated (Kolding, Musando and Songore, 2003), this lack of investment may seem puzzling: given the relatively favourable resource situation in Lake Kariba one would, at least according to conventional common property theory, expect individuals to maximise profit through investment in technology and more efficient organization of production.

In order to understand the causes behind this apparent "lack of development", this paper situates the fishery of Lake Kariba historically, socially and economically (i.e. in the context of its market), and thereby discusses the "bottlenecks" (Brox, 1990) that impede investments, institutional development, and technological growth in this fishery. As it will appear, a capital extensive and technologically simple fishery is a necessary and rational adaptation to the type of context, or "imperfect market", in which Lake Kariba is located. Under the prevailing Zambian economic circumstances, over-capitalization of this fishery is not a threat. It is thus argued that rather than focussing on the regulation of fishing methods, public funding of fisheries management would be better spent on facilitating and securing a fair access to the lake's resources.

1.1 Fisheries investment and contracts in an uncertain environment

In most African fisheries, fishing effort is characterised by often dramatic fluctuations over time. As Jul-Larsen *et al.* (2003) make clear, fluctuations in the fisheries of Lake Kariba have mainly been observed in what Ottar Brox (1990) calls horizontal changes in effort. This relates to changes in such factors as the number of fishermen, the number of nets, and the frequency and spatial extension of fishing trips. In Lake Kariba population-driven changes, as we prefer to call them, have largely been related to migration processes and developments over time in

[1] Of the total of 56 000 Tonga who were relocated, 36 000 belonged to the Northern Rhodesian side (Scudder 1985:14).

other economic sectors than fishing. Furthermore, Brox distinguishes population-driven change in effort from changes in factors such as fishing technology, capital investments, labour organization and concentration of gear units per owner. Such vertical (Brox, 1990), or investment-driven, changes in effort have hardly occurred in Lake Kariba fisheries. Though some capital-intensive enterprises have been observed, they are very few and they have not lasted long. It thus remains to be explained why effort dynamics in Lake Kariba continues to be largely population-driven.

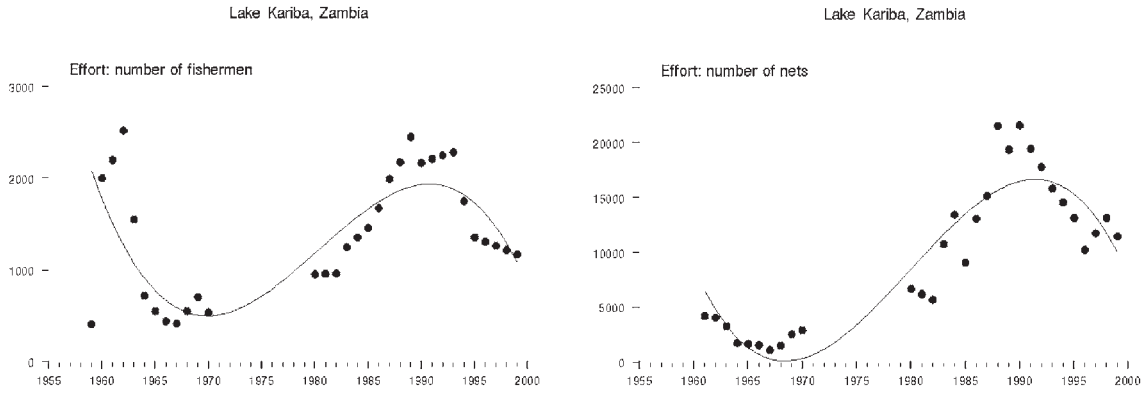

FIGURE 1. *Effort development: Number of fishermen and nets in the Zambian inshore fisheries of Lake Kariba 1960–1999. Source: Jul-Larsen et al. 2003.*

When investment-driven growth has been observed in small-scale fisheries, an influx of investment capital from beyond the fishing units themselves has often proved necessary. Where credit from banks or other official sources are not available for fishermen, access to credit from actors in the fish market is therefore crucial. Traders (with the aim of increasing their fish supply) provide fishermen with credit in order to enable them to invest in more capital intensive gear. New organizational forms (i.e. ownership of fishing boats by traders) and new institutions (i.e. credit and price agreements) may evolve and result in increasing productivity of the fishery. Historically, such "endogenous dynamics" (Chauveau and Samba, 1989) have been observed in many small-scale fisheries in developing countries. In most cases the degree to which traders and fishermen are able to enter into binding and long-lasting contracts is crucial for such investment-driven growth to take place.

According to new institutional economics, the development of credit institutions and supply contracts in fisheries are aimed towards reducing the transaction costs in a situation characterised by market imperfections (inadequate flow of information, lack of infrastructure and access to resources and markets). Jean-Philippe Platteau (1989), for example, sees interlocking credit-supply contracts as an outcome of uncertainty. In order to overcome the obstacles created by market imperfections institutions that "link up credit with marketing relations by offering loans to owners of fishing vessels on the security of future catches" (Platteau and Abraham, 1987:480) will develop. This enables the actors to spread risk and to ensure access to and control over fish supply, capital and – importantly – labour. As Platteau (1989) notices, the institutionalization of such arrangements have been observed in fisheries world-wide, for example through the institution of marriage between fishermen and traders, as in many West African fisheries, or through long-standing relationships of trust, as observed between Malay fishermen and Chinese traders.

In the canoe fisheries of Ghana for example, women traders found a new investment object when the outboard motor was introduced in the early 1960s (see, Vercruijsse, 1984; Hernæs 1991; Overå, 1998). By extending considerable investment loans to fishermen for the purchase of outboard motors and new types of nets and purse seines, the traders were able to increase their fish supply. Some of the women also became canoe owners themselves, hiring men to fish for them. External aid in this innovation process was negligible: it happened from "within" the fishing communities. As a result, the degree of motorization of the Ghanaian canoe fleet increased from zero in the late 1950s to 20–25 percent in 1970 and to 57 percent in 1990. The annual fish landings increased from 20 000 tonnes in 1960 to 300 000 tonnes in 1992. This represents an increase in the productivity from 0.6 tonnes/fisherman/year to 1.4 tonnes/fisherman/year (Degnbol, 1992:215). Important preconditions for this investment-driven growth were (a) institutionalized credit links between fish producers and fish distributors through marriage and kinship, (b) a local gender ideology that allowed for female traders' investment and control of male labour, and (c) the constant adaptation of culturally embedded local institutions to changing situations (male fishery leaders and female market leaders), through which credit and labour relations could be negotiated and sanctioned (Overå, 2001). Platteau's assumption that such "traditional" institutions are more efficient than "modern" institutions in a market characterized by numerous imperfections thus seems well suited to explain the Ghanaian case.[1] The question is, however, whether this approach is useful in explaining why a similar growth process, aided by the evolvement of mechanisms to reduce risk and enforce contracts, does not happen in the Zambian case of Lake Kariba.

The Zambian fish market must be said to be characterized by many "imperfections" that inhibit a free flow of goods, information and capital. The marketing of fish from Lake Kariba is thus neither particularly efficient, nor is the market well integrated with the fisheries through investments. Despite Lake Kariba's location only three to five hours drive from the capital Lusaka where fish is in high demand, the efficiency and profitability of fish trade is highly variable. Likewise, investment by fish traders in boats and fishing gear in order to enhance fish supply, is limited: it is too risky, they say. Indeed, fish traders, Kapenta operators and other potential investors, such as local shop-owners or Lusaka-based fish distribution companies, constantly attempt to enter into contractual relationships with fishermen in order to secure a stable and reliable supply of fish. However, apart from a few exceptional cases, credit relationships and supply contracts are very unstable and tend to fail.

As this situation indicates, it seems difficult to establish institutions – broadly defined as "informal constraints (...) and formal rules (...) devised by human beings to create order and reduce uncertainty in exchange" (North, 1995:97) – that are legitimate among the various stakeholders on the shores of Lake Kariba. The few examples that exist of credit institutions or other long-lasting binding commitments between fishermen and traders have not been of such a magnitude that they have resulted in any significant technological or organizational changes in the fishery at an aggregate level. What is it, then, about this particular context that prevents mutually beneficial contracts and an investment-driven growth in effort from developing?

Sara Berry has pointed out that historically, conditions for the evolvement of "constellations of social interactions, in which people move, acquire and exchange ideas and resources, and negotiate or contest the terms of production, authority and obligation" (Berry, 1997:1228), have

[1] The fact that the canoe sector - despite subsidizing of the industrial sector - continues to land 60-70 of the total marine catch in Ghana (Koranteng, 1996) is a clear indication of the advantages of this "small-scale" fishery.

been unfavourable in Africa. In the case of Zambia and Lake Kariba communities, one can mention quite a few factors that have hampered the creation of what Bierschenk and Olivier de Sardan (1997) call arenas in which stakeholders could come to some sort of mutual agreement about rules for cooperation and for the sanctioning of non-cooperative behaviour. Among these factors are: a lack of "traditional" institutions before the creation of Lake Kariba with rules for the economic organization of commercial fishing and trade; the initial displacement of the Tonga people that created political tension and constrained peoples' livelihood alternatives; subsequent macro-economic and demographic changes that resulted in a "fluid" situation with migration in and out of the fishery; land conflicts along the lake shore; destruction of infrastructure during the Zimbabwean liberation war; fluctuating lake levels and fish catches due to climatic variations; several shifts in administrative regimes and unclear authority structures at the local level. Thus, even if the relationship between fishermen and traders at Lake Kariba certainly is characterised by a recognition of the mutual benefit they have of each other, political and economic instability in the region often inhibit the development of enforceable contracts. When profit is made in fishing, it thus tends – as a perfectly rational strategy under the prevailing conditions – to be invested in a number of security networks (often with conflicting norms, rules and priorities) rather than in more efficient and capital intensive fishing gear.

Much research has been done on the importance of trust for the success of entrepreneurs and traders (i.e. Evers and Schrader, 1994). The Chinese business diaspora and Hausa trade networks are some of the classical examples. In Southern Africa, however, the development of long-term economic relations where trust goes beyond the short-term personal level has been constrained. In contrast to the durable networks of the famous Asian and West African cases, business networks in this part of Africa have been characterized (by the anthropologist Clyde Mitchell) as "instrumentally-activated personal networks" (MacGaffey and Bazenguissa-Ganga, 2000:12). The Zambian economy has thus in many ways come to resemble what Fafchamps and Minton (2001) call a "flea market economy": high risks of theft and embezzlement and breakdown of legal sanctions make traders refrain from entering into contracts and most transactions therefore take a "cash-and-carry form" (ibid:230).

With the high mobility out of formal and into informal occupations (among them fishing), Zambians increasingly find themselves in a situation where they are "faced with the need to build economic relations from scratch in a world lacking both orderly state regulation and the segmentary political structure of their customary society" (Hart, 1988:178). In such a situation the possibility of building durable economic relations based on kinship (ascribed status) is limited, and so is the possibility of relying on contracts legally sanctioned by the state or civil society. There thus remains, as Hart puts it, "the zone of free-floating social relationships formed by the expectation of mutuality" (ibid.), a zone of association and friendship where trust plays a prominent role. Whereas kinship and contract offer a durable model for hierarchy and control (parental and legal sanctions respectively), trust is based on the negotiation of risk occasioned by the freedom of others. Trust is thus central to social life when neither traditional nor modern probabilities hold, but does not hold as a basis for industrial production and division of labour (ibid:191). Sanctions imposed by kinship and formal or informal legal contracts are in other words a "more durable basis for society" (ibid.), and for economic growth beyond individual enrichment.

The case of the fisheries of Lake Kariba sheds light on some of the constraints that inhibit the development of institutions (that require more than fragile economic relations based on trust and mutual personal interest) in an imperfect market. Clearly, one cannot take for granted (as

institutional economics tends to do) that common norms and legal sanctions that would reduce transaction costs and thus would reduce the risks of investment in the fisheries, necessarily and "naturally" will evolve in all types of contexts. The case also illustrates the degree to which investment "bottlenecks" at the local level are intrinsically linked to macro-economic and political processes.

1.2 Methodology

Methodologically, the focus of this study is on the multi-local nature of the activities of fish traders, through which they connect the Lake Kariba fishery and communities to the national and urban economic context. The study is based on secondary sources like the anthropological studies of the Gwembe Tonga in the 1950s and 1960s that documented the consequences of the construction of Lake Kariba (see Scudder, 1960, 1972, 1985; Colson, 1960, 1962, 1971; Colson and Scudder, 1975, 1988). Furthermore, information has been gathered from evaluation reports of development projects in the area (see Brandt *et al.*, 1973; Scudder, Colson and Scudder, 1982; Walter, 1988; Jul-Larsen *et al.*, 1997), from reports by the Zambian ministries (Beatty, 1969; Chipungu, 1988), and in the National Archives of Zambia. In addition to information from the general literature, qualitative data have been collected during three periods of fieldworks in Lake Kariba communities and in Lusaka fish markets in 1998 and 1999 (four months in total). Interviews were conducted with fishermen, traders, transporters, fish traders' organizations, Village Management Committees, Women's Clubs, shop owners, Kapenta operators, chiefs, and with the staff of the Department of Fisheries, of the Ministry of Agriculture, Food and Fisheries, and the Councils in Sinazongwe and Lusaka.

The study provides a chronological description of how a marketing system based on fish from Lake Kariba developed in the 1960s leading up to a contemporary analysis of the socio-economic organization of fish marketing in the late 1990s, and of the major investment constraints.

2. A MAN-MADE LAKE – A NEW MARKETING SYSTEM

2.1 Trade and infrastructure in the Gwembe valley before the creation of Lake Kariba

Before the creation of Lake Kariba, the Gwembe valley with the Zambezi flowing through it was bypassed by most trade routes. For a short period at the turn of the twentieth century, Gwembe lay across the direct route (through Kalomo) between the European centres on the high plateau north and south of the valley: a few shops, missionary stations, schools and administrative posts of the British South Africa Company, which took power in Northern Rhodesia in 1898, were established (Colson, 1971:15). However, in 1906 the railway was built on the plateau, and trade and traffic bypassed the valley again (ibid.). Trade stores and missionary stations gradually disappeared in the 1920s. After the 1930s the valley had no white residents and few strangers visited the Gwembe District other than occasional traders who came to collect tobacco (Colson and Scudder, 1975:194). The tobacco trade was based on long-term bond friendships between the urban-based traders and the Gwembe valley producers (Colson, 1960:47).

The Valley Tonga did of course not live in complete isolation. From 1900 many men (hardly any women) participated in an extensive labour migration system which provided most of the cash income that supplemented the sales of tobacco and subsistence grain production (Colson

and Scudder, 1975:194). One of the reasons for Tonga men to migrate was the need for cash when the “hut tax” was introduced in 1904. In 1956 as many as 42 percent of the District’s able-bodied men were absent as wage workers; mostly in the mines in Southern Rhodesia, especially Bulawayo, and in the Copperbelt in Northern Rhodesia. Thus the majority of the older men had at one time or the other travelled long distances, often walking on foot, in connection with labour migration (ibid.). Nevertheless, until 1950 there was no road in Gwembe (Colson, 1971:17). When colonial administrative officers toured the valley, they were carried by men who reluctantly were mobilized in the villages by appointed headmen. The first four cars owned by Gwembe Tonga were bought in 1956–57 (ibid: 18).

With the influx of money from migrant labourers and the building of roads, the establishment of trading stores followed, in addition to the emergence of “an increasing throng of itinerant traders” in the late 1950s (Colson, 1971:17). Fish trade, however, was not carried out on any significant scale. The seasonal surplus from fishing in the Zambezi was either bartered or sold locally (Scudder, 1960:42). As Colson (1960) put it: “a little dried fish was traded to the Plateau Tonga, but the Valley could not compete with the commercial fisheries of the Kafue and Luapula, handicapped as it was by its isolation” (ibid: 202).

With regards to infrastructure and commercialization, the above description provides a glimpse of the situation when the Kariba dam was sealed in 1958. Within five years a surface area of approximately 2 400 square kilometres would be covered by water. The dramatic and difficult relocation process of the Tonga has been described in detail in the above mentioned sources, and will not be discussed here. The main point is to say that when the new fishery in Lake Kariba emerged, there was neither a well developed infrastructure in the valley, nor a large body of Tonga traders with experience, interest, relevant knowledge or other resources, who stood ready to take care of the distribution of fish from within the new Tonga fishing communities.

2.2 Bumper catches and urban traders in the early years (1958–1962)

Until 1963 the Lake Kariba fisheries were reserved for the Tonga people, and its management was in principle under the control of the Gwembe Tonga Native Authority. The Northern Rhodesian government initiated training programmes. Bemba[1] and Lozi fishermen with experience from other Zambian lakes were appointed to share with the Tonga their fishing skills, and credit for fishing equipment was supplied to encourage local men to turn to fishing (Colson and Scudder, 1988:29). Due to the abundance of nutrients in the water during the first years after inundation, fish stocks multiplied quickly and the catches were very good. The government provided fish markets along the lake, i.e. cemented structures with roofing and scales for the weighing of fish. Around these markets fishing camps were established, which became centres of economic activity and social change. During the first boom years when the lake was filling up, the number of young Tonga men joining the fishery reached 2 500. The Tonga fishermen made nice returns in cash from their sales of fish, and many women from the surrounding farming villages became incorporated in the market economy through the brewing of beer for sale in the fishing camps. Even the District Council responded to people’s new availability of cash by opening taverns and bottle stores near the fisheries: “In the early 1960s

[1] Throughout the study the term "Bemba" is used in the way informants in southern Zambia do. This means that "Bemba" is a collective term for people from "the North", and though they use Bemba as a "lingua franca", they may be of many different ethnic origins.

the camps were noisy with drumming and people making merry over beer" (ibid: 30). The income of the men from fish sales and the income of the women from beer and food sales (which indirectly gave women a share of the fishery profits), was mainly invested in cattle (oxen for ploughing), cotton production, bicycles, small grocery stores, and education of children. Obviously, the source of cash and other goods that led to these new patterns of consumption were the fish traders.

MAP 1. *Lake Kariba fishing camps mentioned in the text and their main fish marketing region along the line of rail and Lusaka*

Whereas the local population received training in fishing, no incentives through training or credit programmes were initiated to teach local people the skills of fish marketing. Moreover, "the Tonga were not traders by heart" (Colson, 1962:602). Thus, even though fishing was reserved for the Tonga, very few Tonga participated in the new fish marketing system.

Fishermen felt that processing and marketing involved too much time and labour compared with disposing of the fish for cash and quickly go fishing again. Another important factor was the reluctance of most Tonga men to let their wives leave the immediate vicinity to be involved in economic activities and to be exposed to town life. Thus, since the fishermen were either too young to be married or, if they were married, did not allow their wives to become fish traders, they depended on distribution by fish traders from outside the Tonga communities. So who were these fish traders?

It does not appear that relocated Tonga in the resettlement areas entered fish trade (Colson and Scudder, 1975). Since very few of the fishermen or other Valley Tonga traded in fish in the initial years, it is likely that most fish traders who came to Lake Kariba lived in urban areas. Indeed, they were welcome: "Traders with vehicles were coming into the fishery from Lusaka and the Native Authority did not put any barriers to the export of fish".[1] It is also likely that these traders predominantly were male. In Nyirenda's (1957) study based on a survey in the Lusaka markets conducted in 1954 it appears that only one fifth (18 percent) of all traders were women, and that almost all of the traders who dealt in fish were men. Three of the 122 fish traders in the survey were female, but these were wives who retailed the fish that their husbands brought to the market. In a follow-up of Nyirenda's Lusaka market study, Miracle (1962) noted that the female proportion of traders had increased to almost one-third (29 percent). A major reason for the male dominance among urban traders was the colonial control on urban residence. Africans were mainly to reside in cities as migrant labourers, and it was assumed that the workers maintained families in the rural areas where they came from and that they would return to these upon retirement (Ferguson, 1999). However, restrictions on female residence in urban areas were never completely efficient, and increasingly the government provided housing schemes that included the worker's family. Correspondingly, the proportion of economically active women in the urban areas, including female fish traders, increased from the 1960s onwards (Hansen, 1997).

None of the fish traders in Nyirenda's Lusaka market survey were Valley Tonga. The Lusaka fish traders mainly came from the Northern and Western regions. It is thus possible that some traders with experience from the Copperbelt fish markets and from fish trade in Lake Mweru, Lake Bangwelu, the Upper Zambezi, and so on, tried out the new fisheries in Lake Kariba after having contact with the fishermen from these regions, who were appointed to teach the Tonga fishing.[2] Fish traders in Lusaka were considered as occupying a pre-eminent position compared with traders in other food items, and fish was the only trade "profitable enough to compete with the other occupations educated men may follow" (Nyirenda, 1957:44). Considering the high proportion of fish traders with an education higher than Standard III (43 percent of fish traders as compared to 33 percent of all traders), Nyirenda assumed that these traders were hoping to "develop a large business rather than just to pass time" (ibid.). Nevertheless, almost all of them were small-scale middlemen, travelling themselves to the various fisheries: buying, processing, transporting and retailing fish in the market.

During the years of inundation and high productivity in the lake, more fish was exported fresh on ice than in a dried or smoked form from Lake Kariba (Colson and Scudder, 1975). In 1963,

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[1] From District Commissioner's Kariba Resettlement Monthly Report, January 1958, National Archives of Zambia SP/4/1/61.

[2] Another indication of the fish traders' experience from the Copperbelt is that many of the fish traders were organised in The Northern Rhodesia African Fishermen and Fish Traders Association (NRAFFTA), which was formed in 1960 after years of struggle over fish prices in the mining companies' markets in the Copperbelt (National Archives of Zambia ML 1/13/2 and ML 1/6/8).

for example, 63 percent of all fish was marketed in a fresh condition. Since only a small proportion of the fish in the Lusaka market places was sold fresh (Miracle, 1962), this means that much of the fresh fish from Lake Kariba reached a "luxury market": the urban white population and hotels and restaurants. It is not clear where all the ice to chill and preserve the fish with came from, but at least a large proportion must have come from the ice plant put up by a commercial company owned by white European businessmen in Sinazongwe. In fact, at one time Kafue fish traders travelled all the way to Sinazongwe to buy ice to put on the fish they bought in Namwala (Lower Kafue) to sell along the line of rail and in Lusaka (Beatty, 1969:23).

The European company in Sinazongwe had obtained rights to purchase fish from the whole Lake in 1963 (Malasha, 2003). The company also had plans of extending their operations beyond the production of ice and purchasing of fish from the Tonga fishermen; they also applied for fishing concessions. This was, however, effectively prevented by both the Gwembe Tonga Native Authority and the Northern Rhodesia African Fishermen and Fish Traders Association. The traders and fishermen were in favour of the company's production of ice (which the traders needed) but threatened to boycott the company (by refusing to sell fish to them or to buy ice from them) if it was given any right to participate in the fishery. Rights to the fishery was a "hot potato" in the independence struggle, and the fish traders association was known to be connected with the African National Congress (ANC).[1] The Northern Rhodesian Industrial Development Corporation, which had provided the company in Sinazongwe with a loan, therefore complained: "The system of marketing Lake Kariba fish is most inefficient in common with all other fisheries in the territory. This is mainly due to the fact that the entire control of the industry lies in the hands of the fish traders who use African Nationalist politics to obtain this control".[2]

The pre-independence political climate in Northern Rhodesia thus made an industrial investment (by Europeans) in the fisheries impossible. Furthermore, the high costs involved in ice production powered with a diesel aggregate and the problems that the company had with the fishing concession, coincided with a biological decline in the fisheries from 1963 onwards (to which we shall return below). An industrial venture where capital was planned to be pooled into motorized fishing gear, ice production and efficient transportation and marketing therefore never happened. Politically it was unacceptable, and with declining fish catches it also proved to be unprofitable. In 1964 the company pulled out of the area and moved their ice plant to the Kafue River (Malasha, 2003).

Fish marketing thus remained in the hands of the urban fish traders. Very little information is available on the extent to which they invested in the fisheries through credit-arrangements or directly in gear ownership. Beatty (1969:75) indicates that fishermen often tried to steer clear of entering into credit arrangements with the traders to avoid them determining an unfavourable fish price. However, with the declining profit margins on which the majority of fish traders operated (Obershall, 1972:120), it may have been a very small minority of the fish traders who had the financial capacity to extend long-term credit of any significance at all. The general impression from Colson and Scudder's works is that the only credit-arrangement

[1] The NARFFTA was associated with ANC during the liberation struggle, but lost its authority when United National Independence Party (UNIP) and Kaunda formed a government after independence in 1964 (Malasha pers. com.). See also Obershall (1972:121), who describes how various market places in Lusaka were organised by the different political parties.

[2] Minutes of a meeting between a Delegation of the Northern Rhodesia African Fishermen and Fish Traders Association, the Gwembe Tonga Native Authority, the Northern Rhodesia Government, and the District Commissioner, Gwembe, 18 July 1962 (National Archives of Zambia SP 1/3/42).

practised was the provision by fish traders of necessities on credit: mealie-meal (maize meal) and fishing nets were bartered with fish. This could probably work out well in the fishing camps around the fish markets. There, exchange between traders and fishermen was supervised by fisheries officers who were weighing the fish and calculating the price according to the gazetted fish price. Fish traders therefore had some security if they extended credit to fishermen. But any massive investment in gear by traders is not reported. Investments by the Tonga fishermen themselves tended to go in the direction of farming equipment and cattle (which represented their most valuable form of saving and wealth; *lubono*), rather than into more technologically sophisticated or capital intensive fishing gear.

2.3 Dispersion, migration, and new trading patterns (1963–1975)

Towards the end of 1962, Lake Kariba had reached its maximum level and the biological productivity declined drastically. This was not related to overfishing, but to natural processes in the "making" of a lake: nutrition levels in the lake sank, the catches and the size of fish decreased, whereas species diversity increased (Musando, 1996). Already by 1964 the catches had declined with 50 per cent, and the number of fishermen dropped from 2 500 in 1963 to 500 in 1969 (Walter, 1988:34). When fish catches in the vicinity of the fishing camps went down, most of the Tonga fishermen returned to farming; many of them producing cash crops (cotton and maize) (Colson, 1971:149). One important reason for a revived interest in farming was also the eradication of tsetse flies because all game had been shot in preparation for inundation of the Gwembe Valley (on the Zambian side) (Scudder, 1972). The end of sleeping sickness in combination with investment of profits from fisheries, led to a shift in the agricultural production system towards ox plowing.

Around the same time, in 1963, the ban on fishing by other ethnic groups than the Tonga was lifted. Whereas natural resources had been governed by Native Authorities (though under the indirect rule of the colonial government), rights to natural resources became centralized under the new government after independence in 1964, and should thus in principle be accessible to all Zambians. Native Authorities were replaced by Rural Councils. The fishery was now open to anyone, and predominantly Bemba men from the Northern Province started to move into the valley to start fishing. Some of these may have been fish traders who were familiar with Lake Kariba and who saw an opportunity in becoming fishermen when the ban on fishing by non-Tongas was lifted. Others were the appointed Bemba and Lozi "fisher trainers" and colleagues and relatives of theirs from their home regions.[1] Since most Tonga were leaving the fishery in favour of farming and labour migration, the new non-Tonga entrants in the fishery were not viewed as competitors. Apparently, although little information exists on this relationship, Tonga "traditional" political leaders (chiefs and headmen) did not resist the entry of "foreigners" into the fisheries.

Demographic and biological changes led to a reorganization of the fishery. First of all, as a result of the lower productivity of the lake, the fishermen had to chase fish where it could be found. This meant that they had to adopt a much more dispersed fishing pattern. Since the migrants neither had rights to land, nor a close attachment to the land in the Gwembe

[1] In addition, 20 people from Luapula and Eastern Province had been employed to clear forest in those parts of the valley bottom that were designated to become fishing areas, and many of these workers became fishermen (Malasha, 2003).

valley as a livelihood and way of life (as the Tonga had), they probably felt more inclined to migrate freely in search of good fishing grounds. The fishermen thus frequently changed fishing locations while their families stayed for prolonged periods on the numerous islands in the lake. Sometimes a fishing camp on an island could consist of only one fisherman and his family.

The spatial dispersion of fishing, the declining catches and the diversification of the fishermen's ethnic identity had far-reaching consequences for fish marketing. It became very difficult for traders to reach the fishermen. Only the harbours of Sinazongwe and Siavonga were accessible by road the whole year. Consequently, a shift from a predominance of trade in fresh fish to a reliance on drying and smoking as the main processing methods, occurred.[1] It was simply impossible to get ice to and from the fishing camps quickly enough, and even many of the lakeshore camps were not accessible at all with vehicles. The transportation problems led to a decrease in the number of traders who frequented the fisheries of Lake Kariba, and the fishermen increasingly had to process and transport their fish to the market themselves. In the migrant fishing households, some integration of production and distribution through marriage and kinship therefore became common. Their trading networks often extended to relatives living in town, with whom they stayed while selling the dried fish, or in whose hands they would leave the market retailing of fish altogether.

During the late 1960s and early 1970s, more of the fish from Lake Kariba was marketed in the Copperbelt than in the early years. This can be attributed to (a) the longer durability of dried fish compared with fresh fish and (b) the origination of many of the "foreign" fishermen in the Copperbelt where they had relatives living in the mining towns who were important co-operation partners in the marketing of fish, and (c) the high demand of fish from the copper mine workers.

Some of the Tonga who remained fishermen also started processing and marketing their fish themselves, and some of the women started trading. However, even in cases where Tonga husbands allowed their wives to market the fish, the women often felt that the incentives for going on a strenuous trading trip were small. In many Tonga households the wife had to account for all the profit she made on a trading trip for the husband, and wives generally had very little control over what the money should be spent on. Hence, most Tonga fishing households continued to rely on traders, and the majority of traders were still male (Obershall, 1972). Often fishermen developed bond-friendships with dried-fish traders who spent as long as a month in the fishing camp buying and drying fish, during which time he would often be associated with one particular household. Traders finding their way to the far-away fishing camps portrayed themselves as "orphans" who were given shelter by the fisher families, rather than as potential absentee owners of fishing gear.

The role of the traders in bringing goods from town into the fishing camps was important. The need to purchase goods was thus as important as selling fish when fishermen made time-consuming journeys to towns. But there was also another reason why fishermen started to bring their own fish to the market: the government had introduced a price policy

[1] In 1972 in the Southern part of Lake Kariba (from Chiyabi to the mouth of the lake) 63 percent of the total catch was dried. Of the remaining 37 percent, 23 percent was consumed locally, while only 14 percent was sold fresh to traders (Brandt *et. al.* 1973).

whereby the official producer price too was very low compared with fish prices in urban markets (Brandt *et al.*, 1973:17). An organization of fish marketing like the National Marketing Board (NAMBOARD), a co-operative distribution system introduced to farmers, was thus impossible as long as the official producer price for fish remained unacceptably low (ibid.). In fact, deteriorating rural-urban terms of trade in general during the so-called "good" years of the urban copper economy (1964–73) meant that prices of agricultural goods declined by nearly 54 percent relative to the prices for the urban processed goods that villagers wanted to purchase (Colson and Scudder, 1988:125). Hence, fishermen either retailed what they produced themselves, which was time consuming and left them with less time for fishing (some of them sending their wives, which meant that they could fish more), or they relied on traders who were willing to pay a higher price than the official one. Another consequence of the price regulations was that it became even more preferable to fish from the islands and other far-away places where price agreements between fishermen and traders could not be observed by officials.

Declining profitability of fish trade and transportation problems were major bottlenecks in the development of the fishery. For example, the fish ferry service that the Gwembe Rural Council had been operating from Sinazongwe was shut down in 1968: the dispersed nature of the fishery had made it impossible to reach all the shifting fishing camps with the ferry. Neither did planners take the needs for improved infrastructure seriously. When a coal mine was established in Maamba in 1968, this opened up for a vibrant bicycle fish trade from the nearest fishing villages to supply the 700 coal mine workers. However, the potential benefits of the establishment of large-scale industry in the Gwembe valley were limited: the tarred road that was constructed from Batoka on the plateau down to Maamba was not extended to the lakeshore. And even if Maamba was electrified, no communities along the lake (the source of the electricity) were connected to electricity.[1]

In such a situation, it was obviously difficult for the traders to invest in the fisheries and establish stable contracts with fishermen. The main strategy for fishermen to increase their number of nets and other fishing gear, was thus to purchase these items themselves when they brought fish to the urban market.[2] With the low productivity of the lake and the amount of time the fishermen spent away from fishing while trading, it was unlikely that these investments would result in an increasing fishing effort. A report from 1972 probably describes the situation in a nutshell: "As the fishermen (…) suffer greatly from poor market integration, many of them have little incentive to catch more fish than is necessary for subsistence. High profit margins between producer prices and retail prices force the more enterprising fishermen into the fish trade which, due to bad transport conditions in Gwembe South, is very time-consuming" (Brandt *et al*., 1973:127).

A combination of ecological factors (declining nutrient levels in the lake resulting in declining catches and smaller fish), poor infrastructure and declining rural-urban terms of trade thus contributed to a continuing low level in fishing effort. In the early 1970s, the number of Tonga fishermen still remained around 500 with an additional 5–600 non-Tonga fishermen on the Zambian side of Lake Kariba.

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1 In fact, it was going to take almost thirty more years before electricity was provided in Sinazongwe, the administrative centre of the southern part of the Valley.

2 In 1972 two thirds of all new nets were bought outside the valley (Brandt et al., 1973:121).

2.4 War and collapse of infrastructure along Lake Kariba (1974–1980)

During the Zimbabwean war of liberation, several attacks by the Rhodesian army extended into the bordering Zambian areas. The Zambian shore of Lake Kariba was particularly hard hit, especially by land mines, and the dirt-road network along the lake that had existed (at least during the dry season) was blown up. Thus there were no longer any roads connecting the fishing villages. Only the main roads between the valley and the plateau remained. Rhodesian raids also destroyed all larger boats in Sinazongwe. No government development activity was implemented between 1975 and 1979 (Walter, 1988:17). On the whole, the war was the most serious setback since the relocation-process when the valley was inundated. After the attacks, shops in the Valley were few and poorly supplied. Whereas most homesteads had a bicycle in 1971, people again went on foot in 1981 as they had done in 1956–1957 (Colson and Scudder, 1988:35). In other words, a lot of the investments that the Tonga had been able to make from the first profitable years of the fishery, were destroyed.

Fishing did not come to a total standstill during the war years. The fishermen searched for fishing grounds in the safer areas, and they were allowed to cultivate some food for their own subsistence in the Tonga villages. However, as a result of the collapse of infrastructure and the danger involved in moving around in the Valley, fish traders almost completely stopped travelling to buy fish from Lake Kariba. A high density of land mines also prevented safe movement by traders for many years after the war. Therefore, fishermen and their families processed the fish themselves, bartered it for food locally and brought dried fish to urban markets when possible. If fish marketing networks with established links between urban traders and Lake Kariba fishermen at all had evolved in the 1960s, most of them dissolved during the insecure years of the latter part of the 1970s. The fish traders who had established bond-friendships with particular fishing camps or households had to seek opportunities elsewhere.

2.5 Lake Kariba as an opportunity for the unemployed (1980s)

The Zambian economy was ruined when the copper prices on the world market fell as a result of the oil crisis in 1973. In 1983 Zambia, as part of an International Monetary Fund (IMF) Structural Adjustment Programme (SAP), devalued its Kwacha by 20 percent (Banda, 1991:12). Furthermore, Zambia had a decline in formal sector employment from 27 percent of the labour force in 1976 to 15 percent in 1988 (Pearce, 1989:6). As a result of these macro-economic events numerous people all over Zambia, in particular in the Copperbelt towns, lost their jobs. Living conditions in general were deteriorating. When Lake Kariba became safe after Zimbabwe's independence in 1980, people thus came from a variety of occupational backgrounds to seek their opportunity in the fishery that for long had been almost unexploited. The number of fishermen thus increased to 1 500 in the mid-1980s and reached 2 500 by the early 1990s (the same number as during the peak of the fishery in 1962). In a survey undertaken by the current project (Jul-Larsen, 2003) it appears that these fishermen were not, as fisheries officers have often claimed, coming from other (presumably overfished) lakes. It rather appears that the great majority had lost various kinds of wage employment in urban areas, particularly in the Copperbelt, and sought the Lake Kariba fisheries as an alternative source of livelihood.

One woman, for example, who arrived at Lake Kariba in 1980 at the age of 37 together with her husband, and who presently lives in the fishing camp Sinalilongwe, said: "My husband

was a bricklayer and I was selling buns and other small things in Mansa. But then my brother-in-law, who had already gone to fish in Lake Kariba, told us that we were wasting our time in Mansa and that there was good money to earn in fishing. So we went." Another woman moved from Eastern Province to Lake Kariba in 1982 at the age of 21. Her husband was a teacher and she was an untrained teacher: "It was my husband's idea to come to Lake Kariba. He said there would be money in fishing, so he went and tried. Then I came after him". Another fisherman had a background as a pharmacist who was not able to earn a viable income when people could no longer afford to buy drugs.

In the African context, the population of copper producing Zambia was one of the most urbanized. The rural-urban ratio had changed from 80:20 in 1963 to 60:40 in 1979 (Kaplan, 1979:86). However, this rapid urbanization trend slowed down for a while in the 1980s. Whereas it was expected that the urban rate would reach 46 percent in 1980, it landed at 43 percent, and between 1984 and 1988 there was in fact a modest reverse trend in the urban rate from 48.3 percent to 47 percent (Pearce, 1989:9).[1] Seen in this perspective, migrants coming to Lake Kariba were responding to a situation of national economic decline, increasing unemployment in urban areas and a continuing population growth rate of 3.7 percent per annum (Banda, 1991). At the same time, the Zambian government repeated its "Go back to the land"-slogan from the 1970s and implemented relocation programmes in the latter part of the 1980s (ibid:84). The copper mines even held workshops giving workers practical information about how to settle in rural areas upon retirement (Ferguson, 1999:72). The decline in the copper economy and the urban crisis – a phase in Zambian history that Ferguson (Ibid:11) characterizes as "de-industrialization" and "counter-urbanization" – affected people from all ethnic groups. According to Walter (1988), there were both local and migrant Tonga, and migrants from a wide range of ethnic groups (though predominantly Bemba), among the "new" fishermen in Lake Kariba. The impression that the migrants came from urban employment and not from overfished lakes is strengthened by Walter's finding that the migrants had a higher level of formal education than the Tonga (Ibid:40). Of those who had fished before moving to Lake Kariba, most of them had fished in Kafue (Walter, 1988:51).

Though both Walter (1988) and Chipungu (1988) point out that fishing and fish marketing were separate occupations, our data show that many of the fishermen started as fish traders. In 1988 Walter (1988:21) recorded a number of 800 fish traders out of which 180 were fishermen themselves. However, "the number of people seeking employment in fishing is higher than the number of jobs vacant" (Ibid:72). Many fish traders thus seem to have regarded fish trade as an entry ticket to the fishery, both economically and socially. A common career path could be like this: a man started trading, going to Lake Kariba buying and drying fish. After a while he might have established more stable contacts and could even be allowed onto the canoe of one fisherman to learn fishing. Sometimes this would be a relative who was already established as a fisherman. At this stage, the trader's wife and children would join him. If he did not have a wife, it is very likely that he would marry one of the numerous female fish traders who were now coming to the lake.[2] Through savings from his own and his wife's fish trade, perhaps with a contribution from the fisherman who taught him fishing, he would invest in a canoe and a few nets to start fishing on his own.

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1 Nevertheless, by 1990 the urban-rural ratio had reached 50:50 (Jamal and Weeks, 1993).

2 Some of the migrant fishermen left wives behind in the North who they never saw again. Only 7 percent of Lake Kariba fishermen lived without wives and children (Walter, 1988:21).

During the 1980s, fish prices fluctuated and alternated between being regulated and deregulated (Chipungu, 1988:31). The profitability of fish trade was highly variable. Walter, (1988:91) found through his calculations of fish traders' earnings that to sell fish as a wholesaler was comparably attractive in relation to wage employment. However, considering that 42 percent of the urban population subsisted below the poverty datum line in 1988 (Pearce, 1989:7) and therefore had a limited purchasing power – to the extent that many consumers had to skip meals (Ferguson, 1999) – fish trade was not particularly lucrative, even if it may have been regarded as one of the better alternatives. The price at which fish could be sold in a poor market remained limited. Considering the appalling state of infrastructure in the Lake Kariba area and the hardships involved in being a fish trader (like sleeping under a tree during the rainy season) it is perhaps not so puzzling that many traders preferred to become fishermen.

The poor profitability of fish trade can thus at least partly be seen as an explanation for the desire of traders to become fishermen. Many urban unemployed men first and foremost entered fish trade as a strategy to familiarize themselves with the Lake Kariba community and to establish personal relationships within the fishing camps in order to enter the fisheries at a later stage. Another strategy, which probably could only be employed after some contact with the fishing camps through trade, was to work as hired labour for the fishermen. Investments by traders in social relations in Lake Kariba fisheries was not, then, as in some other small-scale fisheries (i.e. West Africa and Asia), directed towards the creation of credit relations or ownership of the means of production. Zambian fish traders in the 1980s simply did not have any other capital to invest than their own labour. For women, their labour was not a valid currency in fishing, since it is considered a male activity, and their only niche in the fishing economy was thus in trade or in marrying a fisherman.

In the 1980s, fish processors at Lake Kariba largely dried or smoked the fish. One obvious reason was the problem of getting hold of ice. Lusaka did not have any large ice supplier until Kembe Coldstorage started producing ice blocks in 1989. Neither was electric power installed anywhere near the lake (except in Siavonga), so freezing of fish was not an option either. Traders thus had to stay for long periods in the fishing camps and on the islands buying and processing fish, and the practice of bartering and "subsistence" credit arrangements between fishermen and traders continued as before the war. Fishing camps were still extremely dispersed and variable in their duration. In a catch assessment report from 1986–87, only 26 percent of the fishing settlements identified were compatible with the settlements identified in a report by Beck from 1985 (Walter, 1988:34). Within a time span of two years, three quarters of the fishing camps must either have moved or been renamed. Furthermore, with the inadequate road system, unaffordable fuel prices, lack of accommodation and shelter both on the road and in the fishing camps, fish trade was extremely time consuming and exhausting. Both Walter and Chipungu report that because of their limited capital base, fish traders often did not purchase as much fish as they could have transported to the market. Most traders thus operated on a very "inefficient" level, making frequent trips trading in small quantities, and selling to poor customers in town.

2.6 New entrepreneurs in Kapenta fishing

Fishing techniques and gear types among the numerous new entrants in the inshore fisheries largely remained unchanged and – obviously – at a low cost level. However, another fishery expanded in Lake Kariba during the 1980s. The small sardine *Limnothrissa miodon* had been introduced in Lake Kariba from Lake Tanganyika in the late 1960s. In Zambia this fish is

called Kapenta.[1] The stocks increased with an amazing speed, but were not exploited until 1981 when the first Kapenta licenses were issued. The catching of Kapenta requires a particular type of vessel (a so-called rig) and strong light bulbs to attract the Kapenta in order to catch them with dip nets in the dark of night. The inshore fishermen were thus unable to utilize this resource from their small canoes.[2] Neither did they have the capital nor technical or managerial know-how required to enter the Kapenta fishery. Hence, with the Kapenta fishery, a new group of entrants (in Zambia called Kapenta operators) with stakes in the lake and the land entered the Valley.

Unlike in the pre-independence days this fishery was not reserved for black Zambians, although 50 percent of the shares in each company had to be registered in the name of a Zambian. When the Zimbabwe war ended, a number of businessmen and commercial farmers thus stood ready to invest in the Kapenta industry. The new entrepreneurs were expatriates (for example Italian and Indian) who had worked for international companies and were resident in Zambia. But most of them were white Zambian commercial farmers or businessmen – many of them returning from years of “exile” in Southern Rhodesia and South Africa. Some Kapenta operators were South African or Zimbabwean (South Rhodesian) by birth. Capital for this new industry largely came from personal savings and loans from relatives abroad, and from the private sectors in Zambia, Zimbabwe and South Africa. No black Zambians have so far succeeded in entering the Kapenta industry on a permanent basis, except as workers employed on the rigs and in the drying and packing of Kapenta.

The first operators started fishing in 1981–1982, and several more established themselves in the following years. The Kapenta rigs were copies of those that already were in operation on the Zimbabwean side of the lake. On the Zambian side the rigs were built slightly smaller, and the technology in Kapenta fishing remains very similar today as when it started in the 1980s. Though some operators have diesel motors on their rigs, most of them are still operated manually with four workers hoisting the dip nets up from a depth of 20 metres with a crane.

Since Kapenta was a completely unexploited resource (at least on the Zambian side of Lake Kariba), the catches were tremendous during the 1980s. There was also a high domestic demand for dried Kapenta in the urban markets: Kapenta is ideal for the poor customer because it can be bought in very small quantities. The Kapenta operators thus made good money, not because prices were high but because Kapenta catches were good. Wholesaling and retailing of dried Kapenta became a new niche for urban traders. Walter registered a number of 200 Kapenta traders in 1988 (ibid:21). It does not appear that Kapenta traders combined trade in inshore fish with Kapenta trade, nor vice versa. Kapenta trade and inshore fish trade was – and still is – largely regarded as separate businesses by the individual traders.

[1] The word Kapenta means "ladies' painted lips", and was first used in the Copperbelt, indicating that kapenta is the perfect food to cook for urban ladies of the sort who do not have much time to spend on cooking (pers.com. John Zimba).

[2] The size of the *Limnothrissa miodon* in Lake Kariba is smaller and the shoals go deeper than in Lake Tanganyika, where an artisanal fishery thrives on the same specie.

TABLE 1. *Overview of Kapenta companies in the Sinazongwe district.*

Company started	No. of rigs	Processing (1998)	Marketing
1981	46	Dried	Outlets through agents in Monze, Mazabuka, Kabwe, Kitwe, Lusaka and Livingstone
1981	13	30% frozen, 70% dried	Dried to traders. Frozen delivered pre-packed to distribution company in Lusaka
1981	12	Dried	Through traders
1982	12	Dried, some salted	Through traders, some transportation directly to wholesalers in Maamba, Kafue and Lusaka market places
1984	4	Dried	Through traders in glut periods, otherwise only own transportation to wholesalers in Lusaka market places
1986	24	Dried and frozen	Dried to traders and pre-packed to supermarkets, frozen pre-packed to supermarkets
1988	10	Dried	50% to traders, 50% pre-packed to supermarkets
1992	7	Frozen	Pre-packed frozen to supermarkets
1997	4	Dried	Through traders

Source: Own and Turid Bøe's field data 1998.

In the early years of Kapenta fishing, the operators relied completely on traders coming to their premises to buy dried Kapenta. A system developed whereby the traders deposited the amount they intended to spend in the safe of the Kapenta company. On a first-come-first-served basis the traders are supplied with bags of dried Kapenta. The price per bag, however, is not decided at the point in time when the trader deposits the money, but when the operator supplies the bags. At times the traders will wait for many weeks, and in the meantime, the Kapenta operator gives them mealie-meal and Kapenta to eat. One may see this system as a kind of contract whereby the Kapenta operator gets an indication of how much Kapenta he will be able to sell. Since credit relationships between the Kapenta operators and traders very often fail (because an indebted trader can decide never to come back but to buy from other operators instead). He is also assured that the traders actually have enough cash to buy the volume of Kapenta that they have ordered. When the traders deposit money with a particular operator, he/she de facto commits himself/herself not to "run away" to buy from another operator even if his/her price is lower. The operator cannot prevent traders from leaving, of course, but traders rarely do this, since they come last in the queue for Kapenta if they switch to a new operator. Every month, a complicated price negotiation process is therefore going on: between the traders and each Kapenta operator, and between the Kapenta operators themselves.

As long as Kapenta catches were good, Kapenta operators did not worry too much about their marketing strategy. But as catches stabilised at a lower level after the first boom years, they had to make sure that they made enough profit to cover their costs. The paradox was, however, that the Kapenta operators were not able to co-operate amongst themselves in order to reach good prices. Instead, they underbid each other in the monthly negotiation process in order to ensure that the traders bought from themselves rather than from somebody else. The result of this lack of co-operation was that the prices of Kapenta remained low in the late 1980s, even if quantities of Kapenta on the market declined (due to stabilizing catch volumes). Despite this, the number of Kapenta traders remained quite stable: most of them just traded on a smaller scale than before. In my view, this indicates how "small" the Zambian market is: there is a clear limit to how much the Kapenta consumers, most of whom belong to the poorest segments

of the population, can pay. In addition, competition from cheaper Kapenta, imported from Zimbabwe and Mozambique, has kept prices low.

Kapenta operators therefore increasingly had to try other marketing strategies (see Table 1), either they by-passed the traders by opening their own urban outlets, or they tried to get higher prices from a more wealthy segment of consumers, by pre-packing kapenta for distribution through supermarkets, a strategy which needed investing in freezing facilities. The Kapenta operators have faced many external constraints linked to macro-economic conditions in their strategies to increase the profitability of their business. But inevitably their inability to keep contracts (devised to create order and reduce uncertainty in exchange, to paraphrase North) has played a role in making expansion and investment difficult.

3. ECONOMIC LIBERALIZATION AND CO-MANAGEMENT IN THE 1990s

Continuously failing attempts by the United National Independence Party (UNIP) government at following its own version of structural adjustment after a break with the International Monetary Fund (IMF) in 1987, led to "food riots" among the population in the urban areas and to a reaction from the international donor community that decided to hold back bilateral aid (Banda, 1991). Eventually, the economic and political crisis led to a change in government, and the Movement for Multiparty-Democracy (MMD) gained power in 1991. Zambia embarked upon a new Structural Adjustment Programme (SAP). This involved liberalization of imports, trade and exchange rates, reduction of expenditures in governmental institutions, privatization of parastatal companies, removal of subsidies in the agricultural and transport sectors and introduction of user-fees in the health and education sectors. Unemployment rates increased. From 1990 to 1998 jobs in the formal sector fell from 543 000 to 465 000 (Rakner, van de Walle and Mulaisho, 1999:65). 26 000 jobs in mining and 15 000 jobs in construction were lost. The only alternative for the retrenched workers was to try to survive in the growing informal sector, one way or the other.

Considering this employment situation it is surprising, as Figure 1 showed, that the number of fishermen in Lake Kariba remained stable at around 2 200 from 1991 to 1994. Instead of increasing, the number dropped drastically in 1994 to 1 200 fishermen, a level that remained stable throughout the latter part of the 1990s. One explanation for the sudden decrease in horizontal effort could be environmental. Serious drought exasperated the economic crisis in Zambia in 1992. As a result Lake Kariba in 1992 reached its lowest water level since inundation (Karenge and Kolding, 1995), and this affected fish catches negatively. However, the lake level has risen again (it reached its maximum level in 2000). Consequently fish catches were good, but nevertheless the entry of newcomers into the fishery seemed limited. As local political access regulating mechanisms that reduced the growth in the fishing population are analysed in detail by others (Jul-Larsen 2003; Malasha, 2003), I will only briefly outline the major events as a background to facilitate an understanding of changes in the fish market.

3.1 Co-management through forced relocation

In the 1980s and 1990s there was increasing pressure on lakeshore land by migrant fishermen who needed to diversify their range of income generation. For example, many fishermen's wives had small gardens where they grew vegetables, maize (for consumption and for beer brewing), and sometimes sunflowers as a cash crop. As increasing numbers of migrant fishing households

settled in certain areas, Tonga farmers and village headmen found it difficult to accept additional clearing of land to make room for vegetable gardens. Tensions also arose because many fishermen and traders became involved in smuggling. Furthermore, Kapenta operators noticed increasing theft of fresh Kapenta from their rigs during the night. It was clear that the theft took place through transactions between rig-workers and traders in collaboration with fishermen who went out on the rigs with their canoes. Most of the stolen Kapenta was dried on the islands where many of the migrant fishermen lived. It was then smuggled out of the Valley through routes without police barriers. Kapenta operators also had interests in the development of wildlife tourism on several islands in the lake, and poaching of game by fishermen and others frequenting the islands was a thorn in their eyes.

In response to all these conflicts the Chiefs in alliance with the Kapenta Fishermen's Association (KFA), Rural Councils and the Department of Fisheries (DOF) initiated a "co-management" plan that involved relocation of fishermen into designated villages in 1993. Using arguments about fear for overfishing and the need for fisheries regulations, these strong stakeholders aimed to get the theft and smuggling under control. In their view, the unregulated mobility of the fishermen had to be controlled. According to the new management plan, fishermen and their families were not to stay on islands, and they were – in many cases with force – relocated to the shoreline in 1994 (Jul-Larsen *et al.*, 1997). The number of fishing camps was reduced from 278 in 1993 to 67 in 1995 (Jul-Larsen, 2003). Each camp elected a Village Management Committee (VMC), which in turn was represented in a Zonal Management Committee (ZMC), where fishermen, Kapenta operators, the Chief, the Rural Council, DOF, and the local business community (storekeepers) were represented. As part of the plan, levies were collected from both Kapenta traders and fish traders by the Rural Council. The idea was that this revenue, as a sort of motivation for compliance and as a compensation for the fishermen's removal from their best fishing grounds, would be pooled back into the fishing communities in the shape of schools, health clinics, building and maintenance of roads. The Kapenta operators would be "rewarded" with better policing of smuggling and Kapenta theft.

All stakeholders with interests in the fishery itself or in land went to great lengths in negotiating and reaching solutions in their new communication fora, the Zonal Management Committees. However, problems were not easily solved. Temporarily, the Kapenta operators in cooperation with the police managed to catch many Kapenta thieves. As one "ex-smuggler" described the situation at that time: "It was like a war where you have to send out scouts before you fight the battle". Gradually, however, the risk of being caught seemed to diminish again when funds collected by the Council through Kapenta levies failed to be allocated for the purpose of police patrols. The Kapenta operators also had problems amongst themselves in taking collective action. Finally, with accusations against the Council of embezzlement of funds, many Kapenta operators refused to collect the Kapenta levy on the Council's behalf anymore.

In the fishing camps, people were equally disappointed with the outcome of the co-management plan. Firstly, the Council's promises of improved infrastructure in the fishing communities never materialized. Secondly, the relocation of fishermen to the lakeshore led to an even higher degree of land conflict between fishermen and Tonga farmers. Many fishermen thus left the Lake Kariba fisheries in the mid 1990s. Some went back to the urban areas, others moved their equipment to other fisheries, like Kafue. The fishermen who remained, fished in the areas they could reach from their new locations.

Gradually catches within the "paddling-radius" of the fishing camps declined. Fishermen (usually without their families) started – at least periodically – moving back to the islands where catches were very good. With the high lake level and good catches, Tonga farmers also increasingly found fishing attractive again. Another reason for the Tonga's resumed interest in fishing was that many cattle owners incurred great losses because of the "corridor" (foot and mouth) disease. Many Tonga farmers, especially young men, have therefore become part-time fishermen during the off-farm season. The number of people fishing may therefore be much higher than the number of full time fishermen registered by the Fisheries Department (Figure 1). Thus, even if many migrant fishermen left as a result of the relocation programme in the mid 1990s, fishing effort and total landings have probably increased in the late 1990s. This has provided numerous Zambians with a much needed possibility to earn a living at a time when other alternatives were hard to come by.

3.2 Unemployment-driven growth in the number of traders

Urban unemployed men and women continued flocking to Lake Kariba to buy inshore fish and Kapenta. In 1996, as part of the SAP, a large number of parastatal companies were privatized all over Zambia, a process in which 150 000 jobs were lost. Zambians were on the move in more than one sense: from formal to informal employment, moving between rural and urban areas, experiencing deteriorating living standards and moving down the social ladder (see Hansen, 1997 and Ferguson, 1999). A few examples of fresh fish traders' backgrounds illuminate the enormous changes that Zambians were living through, and also the variety of actors that entered the fish market.

Mary, for example, was on her second fish-trading trip in Sinalilongwe in 1998. She had worked in the Ministry of Mines until 1996, when she lost her job. She had been trying to sell various things, but many other people were doing the same and she found it impossible to make a living that way. Mary took what she had left of the compensation from her former employer and tried out fish trade.

Charles, buying fish in Simuzila in 1998, lost his job in the Zambia Oxygen Company in 1994. Since his mother was a Kafue fish trader, he felt he had the competence he needed to become a fish trader. His mate, a local Tonga man lost his job in the Security Department of Zamtel, Lusaka, in 1994. He went home to farm, but sold most of his cows in 1998 in order to get capital to start up as a fresh fish trader.

Rose, whom the author met in Namafulu, had a husband who worked in the NAMBOARD. When he lost his job in 1996, Rose started fish trading. The husband joined her one year later. Since they have relatives who are fishermen, their aim is to settle and start fishing in Namafulu.

Peter, a young Bemba trader in Namafulu, was working in a bar in Lusaka. In order to make more money, he started selling "salaula" (second-hand clothes) in the Kamwala market (see Hansen, 2000). He left that trade in the hands of his brother and used his savings as well as his contacts with a fisherman uncle in Namafulu to start as a fish trader.

Anne used to work in the Ministry of Health until she quit her job in 1995. She felt that her salary was so low that she had to try something else. She therefore started buying bundles of "salaula" that she brought with her to Zimbabwe. She sold the clothes there and bought

groceries that she took across the border to South Africa. She bought hardware for the profit and took it back to sell in Lusaka. This kind of cross-border trade has increased as a result of the lifting of import restrictions in Zambia and with the opening up of South Africa after apartheid. Through her international business, Jane managed to save enough to buy a pick-up, and she is now trading in fish as well as providing transport for other fish traders.

The fish traders try as much as possible to diversify income generating opportunities. This they have in common. Although some of them are aiming to become fishermen, this is not at all the case for all of them. Fish trade is just another source of many inadequate sources of income. On the lake they seldom buy fish from the same community for longer periods. Also they often shift to fisheries in other lakes and rivers when they hear that the catches and/or prices are better there. Most of the urban and semi-employed traders are thus neither interested in, nor capable of, investing in fisheries.

However, not only "retrenched urbanites" entered the Lake Kariba fish market. In particular, experienced traders with a long career in fresh fish trade in the Kafue (Lusaka's nearest fresh fish source) began to shift their focus towards Lake Kariba. They faced more and more competition from Lusaka residents who attempted to buy fish in Kafue. This crowding of traders combined with declining catches in the Kafue River (caused by high fishing effort and drying up of the Kafue River especially after the draught in 1992), resulted in diminishing returns from fish trade. These two crises – one economic and one ecological – happened to coincide with an increasing availability of ice. Kembe Coldstorage in Lusaka started producing ice blocks in 1989. In 1995, Sinazonge finally got electricity, and many of those "connected" started renting out space in their freezers to fish traders. Also, many Kapenta operators established crocodile farms and acquired cold storage facilities for the storage of crocodile meat and skins. Others acquired freezing facilities in order to find new market niches through the sale of packets of frozen Kapenta. Though production of ice was not the main purpose of the new equipment, Kapenta operators began to sell ice to fresh fish traders who were on their way to the fishing camps. This made it possible for traders to travel from town to the lake without ice (by which they saved on transportation costs), and to buy supplies if their ice melted while they were queuing up in a fishing camp to buy fish.

Some of the more experienced Kafue traders therefore found it attractive to take up fresh fish trade in Lake Kariba, despite its location further away (than Kafue) from Lusaka. With their long experience in fish trade, and their established positions among traders in the market places in Lusaka, many traders in this "Kafue-group" became, as we shall see in a moment, quite influential in Lake Kariba fishing communities.

3.3 Chaos and order in new locations

Since the mid 1960s, the dispersed nature of the fisheries had made it difficult for traders to reach the fishing camps (especially islands) with ice. With the relocation operation in 1994, the new camps became more easily accessible to traders. Whereas it had been a problem in many locations to get traders to come at all, traders with ice now flocked to camps accessible by road.

The influx of fresh fish traders has been encouraging for the fishermen, but this trend has also resulted in conflicts in many households. Fishermen increasingly sell their fish directly to fresh fish traders, and household members seldom process fish anymore. Women thus have less control

with their husbands' income. Less is spent on food, and trading trips to town by wives also become less frequent. Women experience that men spend less on beer brewed by women locally, and spend more on factory-made beer on their fish-selling expeditions. Hence women not only lose track of how much their husbands earn and how they spend the income – they also lose an important source of income (see also Colson and Scudder, 1988). Not surprisingly, then, fish buyers report that wives enquire about the quantity of fish their husbands sell in order to get an idea about their income (whereupon husbands tell traders to underreport their catches).

There is little competition among fresh and dried fish traders. Dried fish traders still come, but mostly buy the fish that fresh fish traders are not particularly interested in: tiger fish (*H. vittatus*), bottle fish (*M. longirostris*), barbel (*C. gariepinus*), the largest and the smallest sizes of breams (*O. mortimeri, S. condringtonii,* and *T. rendalli*), and some other species.[1] Among the fresh fish traders, on the other hand, competition can be severe. A trader has to adhere to many unwritten "laws". His or her economic survival depends on knowing these rules, and success can be achieved when one knows how to use them favourably.

The first commandment for a trader is to build up a trustworthy reputation. Secondly, a trader must share information. By following these two thumb rules he or she can interact with other fish traders and acquire crucial resources: information, experience, credit and social relations – in the fishing camp, on the road and in the market place. Without these resources, it is difficult to gain economically, if not in the short run, then certainly in the long run. Unless a trader is substantially more powerful than the others, breaking of the rules (for example by hiding information or taking advantage of social relations in such a way that it economically harms others) will be sanctioned through the "setting of traps", as one trader put it. These traps can consist in not helping the "immoral" trader with ice supplies or with punctures, refusal of credit, spreading of unfavourable rumours about a trader to the extent that they result in witchcraft accusations, and appealing to fishermen and VMCs to refuse a particular trader access to their fishing camp. Importantly, the market system extends spatially from lake and fishing camp to city and market place, and a trader's reputation follows him or her in all these arenas. Information about a trader's actions in a fishing camp easily reaches traders in Lusaka and vice versa.

Time is a much more crucial factor in fresh fish trade than in dried fish trade because of the lack of storage facilities for ice. The only way to slow down the melting process is to cover it with sawdust. A first-come-first-served institution is the "line system". This institution is common in most Zambian fisheries, and is meant to prevent unfair competition among fresh fish traders. As one trader put it: "The line is our law". Upon arrival in a fishing camp, the traders' name is put on a list administered by the VMC. The first trader on the list ("in the line") is allowed to fill up his or her container (usually an old freezer) with fish before the next one is allowed to buy. An important principle is also that the trader must have enough cash to fill up the freezer without buying it on credit. This system is supposed to prevent that some traders are stuck with melting ice while others are given "special treatment" by the fishermen. The breaking of these rules by both traders and fishermen are, however, a recurring source of conflict in the fishing camps.

[1] During a market survey carried out by the author in all the main fish markets in Lusaka in September 1999, it was hardly possible to find dried fish from Lake Kariba at all. Most of the dried fish came from Luangwa River, Lake Mweru and Upper Zambezi (Mongu area). Dried fish from Lake Rukwa in Tanzania was also plentiful. Both Tanzanians and Zambians participated in this trade. This finding fits with the authors observation that most of the travelling dried fish traders interviewed along Lake Kariba, were retailing their fish in in Ndola and other Copperbelt towns. Fishermen or women in fishing camps tended to sell dried fish mainly in nearby towns like Maamba and Choma.

Another institution in the market is the “cov-ice” system. This is a credit system that provides traders with labour during the trading trip, and provides newcomers or traders who have “fallen” (into debt), with an opportunity to (re)enter the market system. A trader who has purchasing capital, and has hired transport and purchased ice and sawdust, hires a person as a helper for the trip. They stay in a fishing camp until they have filled up the freezer with fish. When it is full, the fish is covered with a layer of ice. On top of this ice, the helper is allowed to put a layer of fish (“cover the ice”), say worth 50 000 Kwacha, paid by the trader. This credit is the payment of the helper. When they reach the market in Lusaka, the helper sells the top-layer of fish, and pays back to the trader the 50 000 Kwacha: “No more, no less”. This means that he or she can earn a small surplus, and may go on another trip and increase the volume of fish trade gradually.

As the examples of the line system and the “cov-ice” system illustrate, competition among small-scale traders combined with an increasing market preference for fresh fish, creates a situation where traders, in order to survive, create and adhere to “laws” or “trade regulations” that make it possible for a large number of people to find employment. Paradoxically, these mechanisms, which serve to limit the accumulation by some few traders at the expense of the majority, also make the establisment of credit-supply contracts between fishermen and traders extremely complicated. This may partly explain the limited investment in fishing equipment and absentee boat and net ownership by traders. Institutions like the line system thus enhance the security against “falling down” in the risky business of trading in a highly perishable good, but it also prevents individual traders and fishermen from entering into contractual agreements. A few exceptional cases exist of traders who have succeeded in establishing contracts with fishermen. The author will let them illustrate the strategies by which traders attempt to enter into binding contracts with individual fishermen and communities, but also the context-specific constraints that inhibit investments.

With more concentrated settlement of fishing households, some traders managed to establish themselves more permanently in particular camps. These were traders with long experience and wide networks of contacts in both fish market and fishing camps. Most of them belonged to the “Kafue-group” – usually a male trader organizing a core group of co-operation partners, including his wife, relatives, and traders known to be trustworthy. A few women were also leading traders. One of them is the “chairlady” of fresh fish traders in the largest open air fresh fish wholesale market in Lusaka.[1]

Each of these leading traders established themselves in one fishing camp striving to be the only leading trader in that camp. As long as one trader did not trespass the “territory” of another, these leading traders co-operated rather than competed. They developed good relations with the community by offering transport, supplying goods (especially mealie-meal and nets), by helping in the maintenance of roads, by giving assistance during funerals, and they participated in VMC meetings. As a result, they were given land to build more permanent houses in the fishing villages. As one VMC secretary commented: “He [the trader] has been very good. He has been coming regularly for more than five years. The most important thing is that he [unlike the other traders] comes even when the road is inaccessible”. In this particular case, the trader

[1] This is the Kambilombilo market. It used to be located in a street near the New City Market. However, this informal market was moved to the New Chibolya Market during the Lusaka City Council's "clean-up" operation in May 1999. As a consequence, the fresh fish wholesale market lost some of its importance, at least temporarily, since its new location is too far away from the city centre, and also because of increasing competition from small fish shops in town.

has become a member of the VMC of "his" camp. He also owns nets that he entrusts in the hands of fishermen who fish for him, and he can buy fish on credit from fishermen. It takes many years to build up such relationships: "You must be very good to the fishermen. Time is the key". This trader claims that by now he knows whom he can trust and whom he cannot trust among the fishermen. Importantly, his membership in the VMC also gives him a possibility to sanction those who cheat him, for example by reporting them for illegal fishing methods.

By making economic and social investments in the fishing camps, traders have a particular aim: to secure their supply of fish and to get privileges over other traders when supply is limited. In the established traders' view, a trader who has made commitments and investments in a particular camp should be given precedence over the occasional "free rider" trader who seeks his or her fortune "here and there and now and then", as one trader put it. One could say that the main difference is between those who attempt to institutionalize their relationship with the fishing community, and therefore have a long-term interest in this relationship, and those who do not have the means or skills to take part in the process, and therefore have an interest in defying the "traders' ethics" in order to make short-term gains (see Evers and Schrader, 1994).

In order to exclude "free riders", the established traders organize their fish supply according to the "swapping-method". They have at least three freezers, one freezer by the lake, one on the road, and one in the Lusaka market where the fish is retailed. Through the "swapping" of freezers on the lakeshore – that is when one freezer is taken away from the village it is immediatly replaced – these traders always remain first in the line. However, to escape obeying the "law" of the fish market (the line system) the trader needs to be in alliance with the fishing community and be under the authority of the VMC. In some camps, the VMC has also allowed "their" trader to have his own purchasing spot independent of the line where other traders have to wait for their turn. One young man, who tried his fortune as a fish trader, told me that when he went to a fishing camp with such an established trader, "It's just like fighting Mike Tyson. He will tell me: "Welcome my dear, but you will have to be number six in the line".

In discussions with VMC-members, fears of tendencies towards monopsony by a limited number of traders were expressed, both because the fishermen felt that "their" trader kept the fish price too low, and because they were afraid of becoming too dependent on one particular trader. As it was put: "What if he dies?" Nevertheless, they acknowledged that as a VMC, and as a fishing community in the midst of Tonga farming communities, it was an advantage to be allied with prominent traders who in most cases act as spokespersons for the fishermen's interests. One trader said: "We are part and parcel of the fishermen", and the Tonga farmers clearly also see them as such. In land conflicts or in cases where suspicion is thrown on the fishermen because of their conspicuous (in the eyes of some farmers) consumption of beer and possession of "luxury" items like radios, it has happened that traders negotiate on fishermen's behalf. When traders have tried to mobilize communal labour for maintenance of the dirt roads going through the farming villages, they are often met with very little enthusiasm and participation by the Tonga farmers, who see the initiative as primarily in the fishermen's interest. In fact, the increasing conflict level after the relocation of fishermen to the "Tonga" lakeshore, is often mentioned by traders as a major obstacle in their attempts to establish permanent relations and supply contracts in fishing camps.

3.4 New actors in the market for frozen fish

In the 1990s there has been a trend towards a preference for fresh or frozen fish in Zambian urban markets. Partly this has to do with the emergence in the liberalized economy of a small (and increasingly health conscious) elite. However, also "average" Zambians who are used to eating smoked or dried fish, increasingly buy fresh or frozen fish, despite their low incomes and lack of freezers at home. Fish is still cheaper than beef or chicken. In September 1999 beef was K5 000 per kilogram and chicken was K4 000 per kilogram. In comparison, frozen large breams were K3 500 per kilogram. Especially the smaller breams "of the size of the palm of a hand", are popular in poor segments of the urban market. Since breams of this size gives the trader high turnover, they are often called "money-makers". In a fish shop, small breams were K3 000 per kilogram, which means that one such fish would be about K1 000. In comparison, a small cup of dried Kapenta – the "poor man's food" – was also K1 000.

The growing number of fish shops in urban areas is an indication of the increasing demand for frozen fish. The shops prefer to have a variety of species and sizes of fish. This attracts customers of various ethnic backgrounds (urban dwellers often prefer the type of fish they can find in their home regions) and from various social classes. Even if imported marine fish from Namibia and South Africa, especially horse mackerel, is available in the supermarkets, Zambians still seem to prefer fish from rivers and lakes. Small-scale traders are therefore facing competition from investors who hope to make a profit on the trend among urban Zambians to eat fresh fish.

In the latter part of the 1990s, commercial companies have increasingly involved themselves in the fresh fish market. Chani Fisheries operating in Lake Mweru is the largest fish distribution company, and several smaller companies attempt to establish themselves in other fisheries, such as the Upper Zambezi and Lake Kariba. By "commercial", I here refer to formally registered companies, whose activities are more capital intensive than in small-scale trade. They also have coldstorage facilities, trucks, shops with freezers, and telecommunication facilities. Companies normally use standardized measures, buying fish in kilograms instead of in the volumetric measure "heap", which is an approximate kilogram that can be negotiated, and thus often preferred in exchange between fishermen and traders. There is little social interaction and face-to-face contact between the company owners and the fishermen, who sell fish to them through their buyers. These companies are often connected to other economic sectors than fisheries, as well as to important political and business circles.

In 1996, Chief Sinazongwe gave permission to a Lusaka company to establish itself on the condition that it "developed the area" (i.e. by connecting the site to electricity) and that it would employ local Tonga as workers. In addition to some Tonga workers, a young Bemba man with some experience from fish buying in Lake Mweru in Sinazongwe was employed as their manager in 1997. Headmen and VMCs in certain fishing camps were approached, and the company was allowed to put freezers with ice in their camps that would be filled with fish purchased by a local agent appointed by the VMC. The company's buyers would regularly go around by boat to collect the fish and supply new provisions of ice. Fishermen could also sell fish directly at the company's premises in Sinazongwe, and in the beginning, the company gave out free nets to certain fishermen in order to secure a steady supply of fish. Fish was stored in a freezer container and transported on a truck to the company's fish shop in Lusaka. It has, however, been a problem for the company to financially sustain their capital-intensive

operations, and they have not been able to compete with the small-scale traders price-wise. They have also had a problem of reliable supply of fish, both from the camps where they had contracts with the VMCs and from those of the fishermen they had supplied with free nets. By 1999, after a year's on-and-off operation, the company's scale of operation has decreased rather than increased.

Some of the local Kapenta operators seem to have more success in their attempts of entering the frozen fish market. At the same time as Kapenta catches showed a downward trend and the problem of theft continued, the operators observed that canoe fishermen had good catches of fine bream (because of the high lake level). Some of the Kapenta operators with freezing facilities therefore started buying fish from local fishermen on a small scale.

One Kapenta company started buying fresh fish for freezing on a larger scale, and opened fish shops in Lusaka and Kabwe. They made arrangements with the VMCs in two nearby fishing camps to purchase fish independently of the "line system". The company started out on a small scale by sending workers on bicycles to buy bream (and to a limited extent other species). The bargaining process was cumbersome, so the company opened up a sales point on their premises and announced their wish to buy fish on posters in the health clinic, the church and in the Kapenta-workers' living quarters. The word soon reached all the fishing camps in the vicinity, and fishermen started bringing their catch for sale. There have been many heated debates between the company and the fishermen about the price level, about whether to measure fish by the heap or by weighing it, whether payment could be received in the form of mealie-meal, and so on. The negotiation between the company and the fishermen may actually be seen as a discourse between two different market systems: one "European" based on fixed prices and standardized measures between "neutral" partners, and the other "African" based on negotiable prices and measures, and "personalized" economic relations. The buyers of the company therefore become crucial mediators between these two ways of thinking.

Despite winning the discussion about standardization of fish prices, measurement by weight and payment only in cash and not in kind, the company (as all other traders) discovered the problem of retrieving payment for nets given out on credit. Hence, they decided only to sell nets for cash. In addition, they mainly sold fishing nets with mesh sizes in the range between 3 and 6 inches in order to promote the supply of bream of 1–2 kilograms, which attract the best prices in the urban frozen fish market. To increase fish supply, the company also practiced a kind of lottery where fishermen who sell fish to them could win a net for free. Though there have been many obstacles in the relationship with the fishermen, the company was in 1999 buying almost all the bream above the "three-inch size". The fishermen in the closest fishing camps have therefore become quite dependent on the company for a market. Moreover, it is common knowledge among traders in every market place in Lusaka now, that there is no point for a trader in travelling to those particular camps anymore: he or she will only be left with the small-sized fish that the company does not buy. Therefore, when the company stopped buying fish for a month because they had to change the staff in their Lusaka shop, the fishermen faced serious problems in getting traders to their camps.

The Kapenta company has succeeded in entering inshore fish distribution through their conscious strategy of tending of a good relationship with the local VMCs and by temporarily offering higher prices than travelling traders. Marriage by a white owner and a black Zambian woman also opened up a new universe of information about the Zambian fish market and

consumer preferences, as well as access to contacts and trustworthy workers through kinship links. This case illustrates that despite considerable amounts of capital (compared with the individual urban trader) and connections in the white business community, success in the Zambian fish market by a commercial company is achieved through similar strategies as those employed by the small-scale traders: through negotiation with local leaders; through the building of trust over time; and through social interaction whereby access to information and favourable contacts and contracts are achieved.

So far, the commercial companies have steered far away from investment in fish production. As most other actors in the market, they find it too risky. The risk is mainly related to the problem of controlling the labour and deliverance of fish by fishermen. Moreover, unlike the traders who establish long-term relations in the fishing camps, companies that are "modern", "commercial", "white", "industrial", do not hold the type of knowledge, skills, and cultural and social codes that are required to establish trust, loyalty and control in relations with the fishermen. This would be the main obstacle if companies attempted to invest in modern fishing equipment. As long as the company can maintain a steady supply by the fishermen themselves, they avoid the problem of controlling labour. Whether an enterprise on this scale can be sustained in times of decreasing catches (i.e. if the lake level drops), remains to be seen. Economic and political factors, such as local politics (i.e. chief disputes), urban consumer's purchasing power, or the future of the Kapenta industry, may actually be of far greater importance to fish distribution companies when they decide on whether or not to continue buying fish in the lake area than the condition of fish stocks in Lake Kariba. If the national economy of Zambia continues to decline and the profitability of fish distribution remains limited, individual small-scale traders will continue to play the main role in the fish market for many years to come. If this scenario becomes reality, no major investments in the fishery are likely in the near future.

4. CONCLUSIONS

Given the poor condition of the Zambian economy, the small scale at which traders operate, the inadequate infrastructure and the "fluid" power structure in lakeshore communities, population-driven rather than investment-driven changes in fishing effort will continue to be observed. Local access regulating mechanisms (in particular those regulating access to land) and political reforms (such as the regulation of fisher families' mobility), limit the number of new entrants into the fishery and thus also the population-driven growth in fishing effort. In addition to the limited purchasing power of Zambian consumers, social mechanisms in the fish market prevent accumulation of capital among small-scale traders. As a result of these constraints, Lake Kariba traders' activities remain small scale. Therefore, their possibility to exert control over labour and capital employed in the fishery, and their potential role as investors in new technology, are marginal.

Even if the fishery in principle is open to everyone, the same mechanisms that prevent a very large number of fishermen from entering the fishery also prevent those who do get access to the resources of the lake from maximising their output, and from expanding into more efficient fishing methods or distribution channels. Ever since the creation of the lake, the establishment of mutually beneficial credit-supply contracts between traders and fishermen has been economically, socially, culturally and politically complicated. Currently, a national economy in decline, local conflicts, and fragile stakeholder relations is not the kind of "environment"

that enhances the evolution of common norms and rules that would make the outcome of contracts more predictable. Keeping investments in means of production at an absolute minimum – the strategy employed by fisher families and traders – may therefore be seen as their only choice.

Larger market actors, generally commercial companies with access to capital sources from other sectors of the economy, have to cope with constraints that are similar to those faced by the traders, since they operate within the same environment. Should commercial companies, despite all odds in the present macro-economic situation, be able to make substantial money on frozen fish marketing, it is nevertheless highly unlikely that they will make investments in fish production, let alone invest in technologically more sophisticated gear. Their main constraint is their inability to enforce labour contracts and credit-supply contracts. Over time, personal relations of trust and common interest can be established but only with a limited number of workers and middlemen. However, there is no shared legal framework beyond these small "trust circles" that can be activated when contracts are broken. Investments thus remain risky.

Turning back to the theoretical argument, the Lake Kariba case illustrates that even if credit institutions and technological development have been observed in small-scale fisheries in almost every corner of the world, it does not mean that such a modernization trajectory eventually will happen in all fisheries. The type of economic and institutional development required to set in motion a process of capital accumulation and increasing productivity must therefore be understood in particular historical, economic and cultural contexts. Contrary to Platteau's argument regarding the "natural" evolvement of institutions in order to overcome market imperfections, this study of market development and investment on Lake Kariba shows that economic actors' ability to reduce transaction costs through the establishment of risk-reducing rules for exchange and contracts is limited when the constraints are as many as described for lake Kariba . One may in fact conclude that the market is "too imperfect": at present the constraints are so insurmountable that they hamper institutional development.

The location of this particular fishery within the constraints of the Zambian economy is thus a major explanation for the limited profitability of the fishery and thus for the limited investment in more efficient fish production. An investment-driven growth in effort is therefore unlikely to happen unless either external capital is invested or Lake Kariba producers link up to more profitable (export) markets. And as biological case studies elsewhere in this FAO Fisheries Technical Paper have shown, the fisheries of Lake Kariba are characterized by a high degree of ecological resilience. Therefore, the (unlikely) scenario of uncontrolled external or foreign over-investment in the fisheries most likely would not lead to a "tragedy" for Lake Kariba fish stocks, but it would be a tragedy for the fishermen and fish traders, whose economic alternatives for the time being are meagre.

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ANALYSIS OF EFFORT DYNAMICS IN THE ZAMBIAN INSHORE FISHERIES OF LAKE KARIBA

Eyolf Jul-Larsen

1. INTRODUCTION

Fishing effort remains one of the crucial concepts in fisheries management and research. According to conventional management thinking, fishing effort is considered the main factor influencing stock dynamics and stock productivity, and a lot of research is invested to investigate this relation. It therefore appears as somewhat of a paradox that – at least in the case of African fisheries - very little research seems concerned with the question of what causes changes in effort. But, this lacuna in research often does not prevent experts, policy makers as well as some researchers often from having strong convictions regarding what factors influence fishing effort in what direction. They are strongly influenced by common property theory where the maximization of individual profit at the expense of a collective resource, is assumed to drive effort to increase, but also by the famous G. Hardin who was inspired by the old Malthusian concern related to the danger of demographic growth. In the view of many fisheries managers, maximization of profit and population growth tend to make the continuous growth of fishing effort a "natural" law. But fishing effort is an aggregated manifestation of millions of individual and collective micro-decisions taken by the producers every day. As such they are influenced by the totality of possibilities and constraints that the fishermen and their families are facing of which general population growth and levels of income only represent a fraction.

However, some influential social scientists have invested considerable effort in challenging this view. By questioning the assumption of free access to fish, an assumption on which common property theory rely, they argue that a series of mechanisms at the local level often limit people's access to the resource. In some cases it is argued that such mechanisms - often labeled community based management systems - are strong enough to prevent increase in effort beyond sustainable levels and that they may be considered to constitute types of local governance that distributes benefits amongst the local population. Similar lines of thinking are also the basic elements for community-based or co-management strategies in fisheries. These management strategies have gained a lot of support the last decade. It is characteristic though, that research which challenges the common property view of fisheries often has been more concerned by 'proving' that common property theory is wrong, by showing that free access does not exist, rather than by analysing effort development in a historical perspective through a reivew of fisheries statistics and other available data. With regard to southern African freshwaters, despite the considerable unreliability connected to catch and effort data, it is difficult to avoid concluding that, overall, fishing effort has increased considerably over the last 50 years (Jul-Larsen *et al.*, 2003).

Ottar Brox (1990) proposes an alternative perspective to the study of fishing effort which although not focused on African fisheries, is of relevance for them. One of his objectives is to show that there are different types of changes in fishing effort and that the effects upon the resources, as well as upon social development, may be very different from that predicted by common property theory. By introducing an analytical distinction between

population-driven and investment driven changes in effort,[1] he argues that, until the last World War, fishing effort in the cod fishery in northern Norway was mainly characterized by fluctuations/growth in number of fishermen (population-driven) and that the relatively simple technology in use at that time made such fluctuations unproblematic and that indeed the fishery functioned as a commons but without causing a tragedy. The crisis in the cod-fishery first emerged after 1945 when introduction of increasingly capital-intensive technology (investment-driven change) became the characteristic variable in the effort development. In this way Brox wishes to emphasize that commons in fisheries does not automatically lead to tragedies and that they may serve useful functions, for the fishermen, their dependents and for the society at large.

Inspired by Brox's analysis, and his analytical distinction between population- and investment-driven change in effort, this study investigates in some detail the type, the causes and the effects of effort development in the Zambian inshore fishery on Lake Kariba. The author draws mainly on data sources generated by earlier social science research, on government produced fisheries statistics, on data collected by the author during two shorter visits in 1995 and 1997, on data collected by the author in May–June 1998 and on a survey of 426 fishermen undertaken in September-October the same year by an assistant.

By examining available catch and effort data, the study first seeks to establish what type of effort development has taken place. Lake Kariba is found to be a typical case of population-driven changes. They seem to have dominated effort development since the fishery started in the early 1960s until the end of the 1990s. Despite a strong and stable demographic growth,[2] the development is, over the years, characterized by substantial increases and decreases in number of fishermen. These fluctuations are found largely to rely on two different variables. Like in the study of Mweru fisheries by Gordon (2003), macro-economic conditions and wage labour opportunities in Zambia seem to effect the recruitment of fishermen to the fishery. It seems that when general economic problems increase the number of new fishermen grows and, when there are good job opportunities elsewhere the number of fishermen tends to fall. The other major variable influencing the number of fishermen are local access regulating mechanisms. That is, when the pressure on local resources increases, individuals who are not already part of the fishermen community are prevented from fishing on the lake. These mechanisms are particularly effective if inviduals are not from the area. In the case of Lake Kariba it is interesting to notice that the access regulating mechanisms have been brought into force not because of increased pressure on inshore fish resources, but because arable land and territories for tourist development are in high demand.

The results of this study clearly demonstrate the validity of Brox's argument: provided that effort development is population-driven, commons in fisheries may fulfil important functions as a buffer and a safety-valve for many individuals in times of national economic crisis. Local, access regulating mechanisms on the other hand, which are important elements in various co-management strategies, tend to reduce this function and may, like in the case of Kariba, lead to under exploitation of important natural resources. It remains to be noticed that one important issue is not being dealt with in this paper, namely the question why investment-driven changes do not seem to have taken place on Lake Kariba in all these years. Answers to this question may be sought in another of the contributions in this publication (see Overå, 2003).

[1] For clarity reasons, we have preferred to modify the terms used by Brox from "horizontal" and "vertical" changes of effort to "population-driven" and "investment-driven" changes respectively. The content of the distinction remains the same.

[2] According to FAOSTAT 2000 (http://apps.fao.org/lim500/wrap.pl?Population.LTI&Domain), population growth in Zambia 1970-1990, was 55.6 percent.

2. EFFORT DEVELOPMENT ON LAKE KARIBA ACCORDING TO AVAILABLE STATISTICS

Since its start in the late 1950s the inshore fishery on Lake Kariba has always remained a simple gillnet fishery, mainly undertaken by individual producers from small non motorized dug-out canoes. Fishing is done throughout the year and there is a constant and important mobility along the lakeshore and from the shore to a great number of unpopulated islands from where the fishermen - at least until 1994 - freely seek what they consider to be some of the best fishing grounds. Formally, access to fisheries is free for any Zambian citizen. The view among policy makers and fishery experts has been the conventional one that effort is continuously increasing causing reduced biological production and therefore to further increases of effort. We find this view being conveyed in most of the available policy documents and expert reports (Chipungu and Moinuddin, 1994; Walter, 1988) and even in some research works (Scholz, Mudenda and Möller, 1997). Musando (1996) is more cautious, but here too the image of a steadily increasing fishing effort is reiterated. There are many understandable reasons for this interpretation. First it should be recalled that many were produced in, or immediately after, the 1980s when effort arguably grew very quickly. In addition, the 1980s was the period where relatively good data on effort and catches were produced. However, this picture of steady increases in effort is hardly representative of what happened before and after the 1980s.

Data on effort and catches before 1980 are weak, unsystematic and scattered and it is not possible to establish the exact changes in effort with any reasonable degree of certainty. They derive from a multitude of different sources reflecting different methods of collection and seldom deal with more sophisticated variables than numbers of fishermen, boats and/or nets. Figures of total yearly catches are found in the annual reports from the Fisheries Department but it is unclear on what basis the figures were reached. It is only since the beginning of the 1980s that there has existed a fairly coherent system of data collection. The system is based partly on extrapolation of selected catch and effort data (slightly modified in 1992) and partly on frame surveys. These consisted of census of fishermen, nets and boats carried out in the Zambian part of the lake and were undertaken on average every three years. The two methods are tuned against each other. In this paper data from the 1980s are based on a combination of the catch and effort data and the frame surveys. In some cases data on fishermen and nets have been tuned against other sources considered to be more reliable (e.g. Walter, 1988). For the 1990s, catch data are estimated on basis of the catch and effort collection system, while data on numbers of fishermen and nets are based on frame surveys undertaken in 1990, 1993, 1995 and 1999. All are official data from the Zambian Department of Fisheries. Data on fishermen and nets in years when frame surveys have not been undertaken are simple interpolations made by the author.

Figure 1 shows the development in catches and numbers of fishermen and nets from 1982 to 1998. The data shows that effort must have grown considerably throughout the 1980s while there seem to have been a stabilization and later a reduction in effort after 1990.

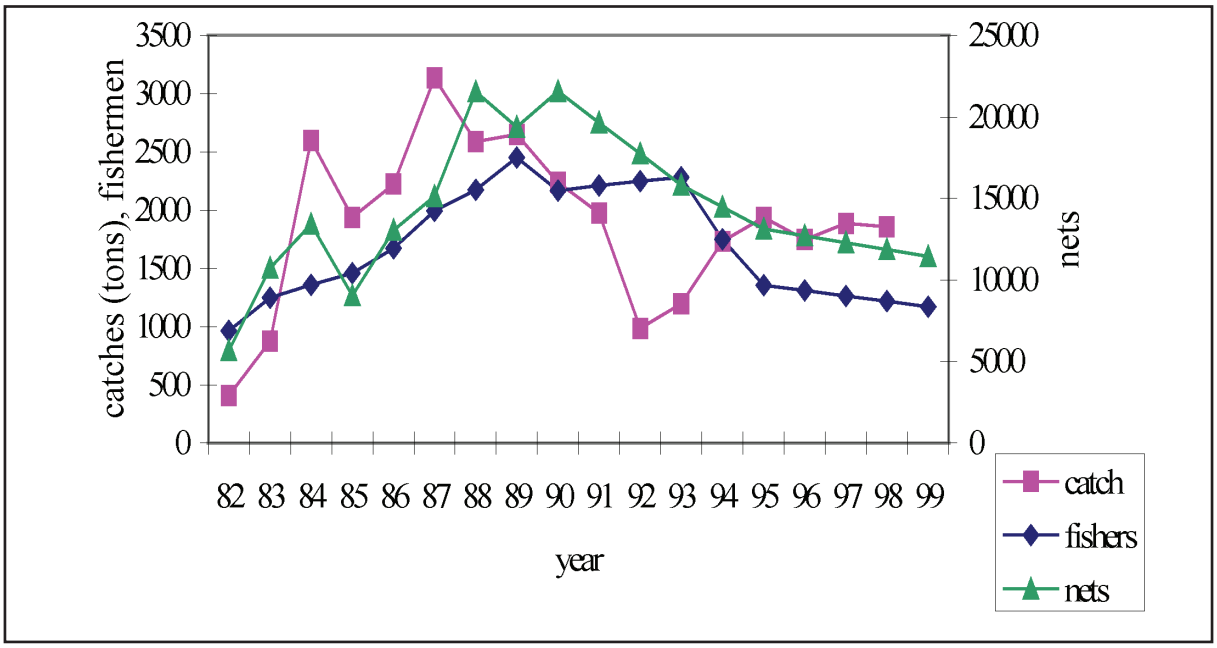

FIGURE 1. *Development in catches, fishermen and nets 1982-1998*

A rough estimate of changes in catch per unit effort (CPUE) expressed as catch per fisherman and year and as catch per net and year for the same period is presented in Figure 2. The similar shape of the two curves indicates that the number of nets per fishermen is relatively stable. It varies between six and ten nets. In both cases CPUE seems to have grown in the early 1980s. From a perspective of conventional fisheries sciences it seems strange that catch rates are growing in a period when effort also increases. After 1984–85 catch rates are falling until they reach a minimum in 1992. This is of course the expected development. Since 1992 catch rates have slowly increased.

Variables related to the frequency of fishing (number of fishing nights) are not taken into account, but there are few reasons to believe that frequency of fishing varies very much (see e.g. Scholz, Mudenda and Möller, 1997:259). Furthermore, no significant technological changes have taken place except for a tendency towards a reduction in the average mesh size. The author therefore considers the picture as fairly representative for how effort has changed during this period, and the trends also conform to what fishermen and other local producers in the area report.

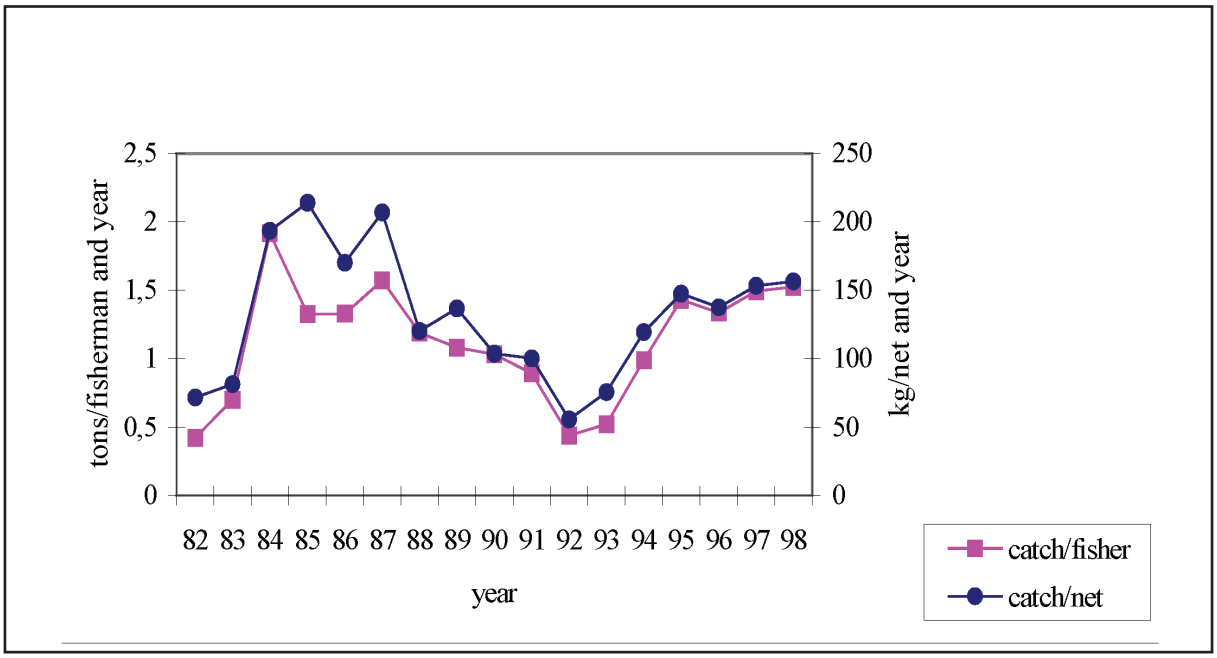

FIGURE 2. *Development in CPUE expressed as caches/fishermen and catches/net 1982-1998*

These preliminary results from the last 18 years are interesting. It would of course be desirable to have an idea of changes in effort for a longer period, but the data does not permit the development of such a view. However, if we go back to the earlier descriptions of the fishery, we discover that, technologically, it seems to have been practised without much change from the time the lake was created. So if we assume that the number of nets per fishermen, just like in later years, has not changed, this means that the number of fishermen in itself gives a fairly good picture of how effort has changed over the years.[1] Although all the older data must be considered unreliable, those on numbers of fishermen are, for purely methodological and practical reasons, relatively more reliable than the others: it is easier to count fishermen than nets and catches. The development in numbers of fishermen from the start of the fishery is presented in Figure 3.

If Figure 3 is seen as a picture of the development of effort it clearly indicates that we are faced with a history characterized by a highly fluctuating fishing effort. We therefore propose to investigate, in some detail, major sociological factors that may explain the fluctuations in the number of fishermen presented in figure 3. For the years preceding the middle of the 1960s, the analysis mainly reflects works of other social scientists (Colson, 1962, 1971; Scudder, 1960, 1965, 1972). From then on the analysis is that of the author. Although aggregated quantitative data do not exist for the period 1971-1979, qualitative data exist which indicate in which direction effort developed and we shall integrate these into the analysis. If the analysis of the period after 1980 is more detailed it only reflects the availability of better and more reliable data.

[1] Another article in this publication specifically concerned with effort in Kariba fisheries (Kolding, Musando and Songore, 2003) has later shown that this assumption may be too simplified since the number of nets per fishermen probably were lower in the 1960s (ibid. Figure 6). Although we accept that this most probably is correct we will maintain that effort development on Lake Kariba until today mainly remains a question of the number of active fishermen.

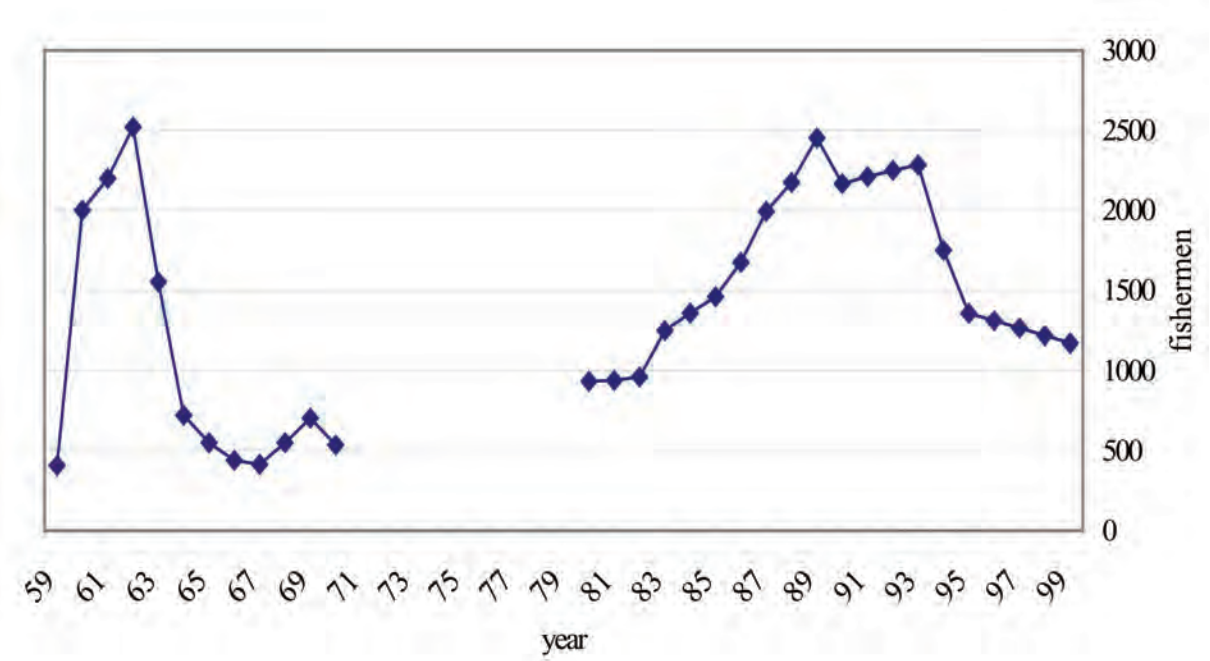

FIGURE 3. *Development in number of fishermen 1959-1999*

3. INTERPRETATION OF THE FLUCTUATING NUMBER OF FISHERMEN

3.1 1958–1980: continuous ups and downs

The construction of the Kariba dam and the consequent creation of a lake covering some 5 350 square kilometres of land in the Zambezi valley on the border between what was then Northern and Southern Rhodesia entailed one of the biggest resettlement schemes ever undertaken on the African continent. In Northern Rhodesia alone it is estimated that as many as 35 000 people were directly affected. Most of them were of Gwembe Tonga origin[1] and mainly practising an extensive type of agro-pastoral exploitation. The relocation process was complicated in that the non-inundated areas apt for this type of livelihood were already densely populated. There was therefore a strong need to establish alternative income generating activities and the colonial government made considerable efforts in facilitating the development of a commercial fishery in the new lake.

According to the then prevailing principles of indirect rule, land rights were formally allocated through the native authorities which in this case was the Gwembe Tonga Native Authority. It comprised the Mwemba, Sinazongwe, Chipepo and Simamba chieftaincies. Through negotiations with the colonial authorities the native authorities managed to acquire the authority to regulate the fishery on the lake. This meant that until 1963 when the system was changed, the Gwembe Tonga people exercised formal and exclusive rights to the fishery. These rights seem to have been respected in practice.[2] The British wished to establish a commercial fishery and employed large resources for that purpose. This effort included a series of projects such as stocking of fish, the cutting of trees in large parts of the inundated areas, establishment of facilities for training members of the Tonga community in skills needed to become

[1] The Tonga population of southern Zambia is generally divided into the people of the valley and those residing on the plateau immediately north of the Shire valley. The Gwembe are the valley Tonga.

[2] For a detailed analysis of the development of fisheries regulations in Zambia, see Malasha, 2002, 2003)

fishermen, establishment of fishing camps and marketing structures, as well as providing credits to fishermen for buying nets, boats and other material (Scudder 1965). The substantial government support and the high biological productivity that characterized the period immediately following the creation of the lake (Kolding, Musando and Songore, 2003) led to the realization of very interesting profits which attracted many young Tonga into the fishery. In the years following the start of the fishery, sometimes in 1958 or 1959, the number of fishermen grew rapidly to attain around 2 500 in 1963.

But, according to Colson (1971) commercial fishing was never taken up as an integrated part of the existing agro-pastoral economy of the Tonga households. On the contrary, fishing became an activity largely dominated by young men who sought a quick increase of their *individual* incomes. In this manner, fishing became an alternative to the long-established practice of labour migration for the young Tonga. The difference was mainly that an increased number of young people were given the opportunity through fishing. But, in a society where authority and power to a large extent were based on seniority, large incomes for younger people created a series of social problems between the fishermen, the households they belong to and their families. As is often reported to be the case in rural communities in Africa, the prosperous young men, difficult to control, were regarded as a challenge to the established leadership of elders to an extent that the most successful fishermen risked severe problems of non co-operation in their home communities.

This, together with concerns about fishing not being easy to combine with other economic activities and requiring a life apart from the villages for long periods of the year, led a great majority of the fishermen to reinvest profits into other productive sectors, such as agricultural cash cropping (also made possible by the creation of the lake) or trade. The removal of tsetse flies, which also were part of the government's undertaking when building the dam, opened up for important investments in cattle.

By September 1962 the lake had reached its maximum level. But already by 1964 a 50 per cent decrease in total annual catches was reported, clearly indicating a strong reduction in biological productivity compared to the inundation period. Retaining the previous profit margins could only be done by intensifying the fishing effort, either through higher investments or through more intensive exploitation of the lake which meant also increased mobility on the lake and along its shores. Since profits already were channelled into other economic projects, increased mobility would amplify the need to coordinate with other activities and lead to stronger tensions in the local communities. Most of the newly established fishermen chose therefore to leave fisheries as quickly as they had entered the profession. In the three years after 1962 their number is reported to have fallen from approximately 2 500 to 500.

This pattern of leaving a newly created occupation and investing accumulated profits in more established occupations is a well known and quite common strategy (see e.g. Henriksen; 1974, Jul-Larsen 1981 concerning the attempt to establish a fisheries among the Turkana in Northern Kenya). The works of Colson (1971) indicate that the young men either resumed to labour migration, started cash cropping (cotton) or took on other types of salaried employment. A few remained in fishing, but it is symptomatic that these individuals disengaged increasingly from Tonga social life. At the start of political independence for Northern Rhodesia, as the Republic of Zambia, we must conclude that the objective of the colonial power to establish individuals of the Tonga as fishermen largely had failed.

As planned, the concessions given to the Gwembe Tonga Native Authority of restricting access to fisheries to the Valley Tonga were abolished by the colonial powers in 1963. The reason for this may be found mainly by studying the political preparations for national independence in 1964. The policy of indirect rule and territorial rights according to tribal identity and origin was to be substituted by a concentration of power at the level of the central government and the new constitution clearly stated the supreme rights of the government to all natural resources in the country. Therefore, the institutions creating native authority, which had been established by the colonial powers in the 1930s, such as the one for Gwembe Tonga, were formally dismantled. This does not mean that traditional political authority[1] disappeared. The system certainly took new forms and new strategies were developed among its main actors in order to assure continued access to vital resources. Interesting accounts are found about how traditional authority and tribal identity have been strategically utilized in order to improve access to fishing grounds in southern African freshwaters (e.g. Chirwa, 1995; Aarnink, 1999). However, the disappearance of most of the Tonga from fisheries did not create much incentives for chiefs and village headmen to insist on the exclusive rights to the lake for the Tonga. On the contrary it could prove useful (and profitable) to allow new actors onto the scene.

Colson (1971) dates the entry of foreigners (i.e. people from outside the Gwembe district) to 1963 and the abolition of the native rights. However, Malasha (2002) indicates that their presence may be traced back to before the start of the fisheries. Already in the middle of the 1950s, the government had introduced a certain number of people from the north to help to clear trees from the areas to be inundated. Later, people with the same origins were recruited to help in the training of the new Tonga fishermen. Most of them belonged to different groups of Bemba speaking people who already had long experience from lake fisheries in Bangweulu and Mweru Luapula. A certain number of these individuals seem to have chosen to assimilate with the Tonga and ally with Tonga political leaders. The fishing experience of the Benga speakers and their local knowledge probably caused the Tonga leaders to treat them as allies and use them to recruit and build a new ‘tribe’ of fishermen on Lake Kariba. Unfortunately, not much is known about the relationships between the first foreigners and the local chiefs and headmen after 1963. It is not know to what extent the work of the foreigners depended on or was approved by the chiefs. In any case, the fact that the rights of the Tonga to the lake were abolished at the same time as the Tonga left the fisheries, opened up for the foreigners to invite other newcomers, mainly from their own area of origin, to come and join them. Initially the increase in number is limited. Figures do not exist for the early 1970s, but according to interviews with fishermen operating at that time, and who were still present in the area at the time of the study, the influx of foreigners was limited. The modest growth is somewhat surprising when we know that both the new government as well as the international community continued to support the development of fisheries in the lake[2], and when we compare it with what happened some 10–15 years later. Although few data on the ethnic or regional composition of the fishermen exist after the mid 1960s, it is in the first half of the 1970s that the presence of foreigners becomes ‘common knowledge’ with regard to the Kariba fisheries.

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[1] In lack of better options we continue to use the term "traditional authority", despite the fact that the Tonga chieftaincies, just like many other authorities said to be traditional, had been constructed by the colonial state only half a century before (Colson, 1960).

[2] The policy of the new government was to encourage rural development through the creation of co-operatives. Paradoxically, the aid from the international community to fisheries in Kariba came as a result of a delayed concern for the relocated Tonga (Colson, 1971).

Whether Valley Tonga or newcomers from outside, the fishermen were forced to reorganize their activities. The mode of work used during the first years was not longer appropriate. Not only fish had become scarcer but also fishing gear and other vital commodities became less easily available. In addition access to arable land was limited. The only way fishermen could compensate for these developments was to increase mobility and to constantly seek new resources as well as gear and fish traders. Contrary to the initial ideas, which envisage to group fishermen and traders in a selected and limited number of fishing camps, the new modes of operation meant the formation of a mobile, dispersed and individualized fishing population. Attractive areas were found around the more than 100 islands in the Zambian part of the lake. The shore-lines of these islands account for more than 20 percent of the total shorelines in the Zambian part of the lake (Pearce, pers.com.). One week a fisherman could spend in a village with fellow fishermen, while in the following weeks he would reside alone on one of the islands, before going back to the village to take his wife and their children with him to some inaccessible area on the mainland far from other people. Evidently, work units operating according to such principles have to be small and "one-man" enterprises were quite common, even though most fishermen were reported to be married and be accompanied by both wife and children. A consequence of this shift in exploitation patterns was a brake down of much of the infrastructure which initially had been put in place by the authorities such as houses and marketing facilities in the centralized camps. It meant a complete reshuffling of marketing structures which introduced serious constraints for increases in production.[1] To some extent it was compensated by a shift in processing methods from sales of fresh fish towards more drying. But, little is known about how the commercialization of fish developed in this period.

By 1974 the Zimbabwean independence struggle had entailed a series of attacks by the Rhodesian army into bordering Zambian areas and the Zambian shores of Lake Kariba were particularly affected. The increased insecurity forced the Zambian government to officially close the fisheries in 1974. However, the closure did not lead to a complete halt of the fishery but rather to another restructuring. Information from fishermen operating during this period indicates that few of the foreigners left, neither the lake area nor the fishing. Instead, they were forced to choose fishing grounds and whereabouts according to the degree of security they provided, rather than according to how much fish they thought could be caught. At the same time fish traders are reported to have stopped coming to the lakeshore. The fishermen had therefore few opportunities but to seek as much protection as the Tonga villages could provide and seek to survive through barter and some cultivation of food crops for their own subsistence. Life stories from people having experienced this period tell us that a quite common strategy at the time for foreigners was to assimilate to Tonga customs and ways of life. No doubt fishing effort must have come down to a minimum in this period even if as many as 900–1 000 fishermen are reported to have operated in the Zambian part of Lake Kariba at the time of independence in 1980. It seems fair to assume that the number of fishermen may already have been of that amplitude when the fishery was formally closed six years earlier, since the recruitment of newcomers can not have been very high in that period.

3.2 The 1980s: the big increase in the number of new fishermen

At Zimbabwe's independence the improvement in the security situation meant that fishing could be taken up as before. In some ways this is also what happened. But while the period

[1] This reshuffling was equally dramatic to the traders who had to try to keep trace of the fishermen they dealt with (see Overå, 2003)

from 1963 to 1974 had been characterized by a modest increase of fishermen, the 1980s saw a noticeable acceleration, particularly from 1983 and onwards. The accepted view has been that the foreigners continued to constitute the bulk of the newcomers, but already in 1985, Beck (1985) documented that the increase was constituted as much by Tonga as by Bemba people and the work of Walter (1988) confirms this. According to Walter's findings, the Gwembe Tonga constituted between 30 and 40 percent of the fishermen in 1988. Furthermore, the data also show that among the foreign fishermen, there was by that time a great variety of origins and ethnic identities represented and Bemba speaking people only constituted somewhere around 35 percent of the total population of fishermen. These findings in many ways contradict the very resilient image among government staff that the increase has to be seen as a result of overfishing in the Bemba dominated waters in the north (Luapula, Mweru, Bangweulu) and a subsequent turn of these people towards Kafue and Lake Kariba.

The two questions that need to be answered are: why was the acceleration of newcomers in the 1980s so much stronger compared to the period before 1974? And, how to explain the changes in composition of the fishing population? Very little had happened in relation to the inshore fishery which can explain such dramatic changes and the main answers have therefore to be sought elsewhere. In the survey undertaken for this study in 1998, including 426 fishermen located in the Mwemba and Sinazongwe chieftaincies in the two eastern fishing zones of the lake,[1] the foreign fishermen were asked about their immediate occupation before they started fishing on Lake Kariba. Seventy-three percent of those who started fishing in the 1980s reported to have come directly from some kind of wage labour, most often in the Copperbelt or in Lusaka and that the reason for shifting to fisheries was connected to the loss of their employment. The crisis in the Copperbelt and in the Zambian economy is generally seen to have started after the oil crisis of 1973. However, at that time the security situation at the Lake had already begun to deteriorate and a year or so later the fishery was formally closed. It was a risky venture to move to Kariba in that period. However, when it reopened people soon sought the opportunity represented by the underexploited lake.

After 1980 it is hence the general crisis in the Zambian economy and the subsequent reductions in wage employment which seem to constitute the main reason for the sharp increase of newcomers. This also explains the changes in the composition of the population. The crisis struck all ethnic groups and all regions of the country equally. The valley Tonga as well as Bemba and other groups were all involved in labour migration to the Copperbelt or sought wage labour in the cities and major towns. All had equally good reasons to seek the opportunities of fishing and the financial capital requested was as we already have indicated very moderate. The form and organization of the fishery remained very much the same as the type that developed after 1963; a fishery that was very dispersed and individualized with a high degree of mobility. The islands again became a preferred base to operate from. The normal procedure for entering the fishery would be to join an already established fisherman for six months to a year to learn enough about the local conditions (both environmental and social) to operate on your own. According to numerous interviews with chiefs and headmen, little was done by the local and the traditional authorities to prevent the newcomers in establishing themselves as long as they did not request, or claim land.[2] If little was done it also had to do

[1] Fisheries administration is organized according to four zones which largely follow the borders of the four chieftaincies bordering the lake.

[2] Non-involvement here does not mean that the various actors within the traditional authority - on their own or in groups - did not try to take advantage of newcomers and the increased demand for access to the lake. The point is that no action aiming to prevent increased entry was taken.

with the fact that the establishment of new individual settlements or fishing camps was extremely difficult to control. As we shall see this situation was soon going to change.

There was also an additional reason why Lake Kariba emerged as a particularly promising venture for many jobless people in the 1980s. In 1983 the Zambian authorities opened the fishery for *Kapenta*, a small pelagic offshore species which in 1967 had been introduced into the lake from Lake Tanganyika.[1] Kapenta fishing requires mechanized rigs, (electric) light attraction, winches and big dip nets. The Kapenta fishery is undertaken at night by paid workers recruited locally, but not necessarily from the area. The fish is then taken either to one of the islands close to where the rigs are fishing or to the shore to be dried and commercialized. The fishery needs investments and technological knowledge far beyond what was within reach of the inshore fishermen. From the beginning all the operators were white settlers/entrepreneurs from the plateau who either established themselves, or a managing representative, at the lake. Most of them were also involved in a range of other economic activities.

For people who recently had lost their jobs and wages, the Kapenta fishery represented an alternative, even if they had to travel to Kariba to seek employment in the fishery. While waiting they sought to survive as well as they could and many of them found a means in the inshore fishery. Some who were not employed on the rigs or who simply changed their minds became part of the increase of inshore fishermen. It is unclear to what extent crew members on the rigs later sought to establish themselves as inshore fishermen, In our conversations with people it was referred to as a common strategy, but in the 1998 survey there is not a single fisherman who reports to have come from the Kapenta industry.

Kapenta operators soon discovered how difficult it could be to control employed labour and the catches landed by them. According to the operators, fresh and processed Kapenta soon became subject to a substantial illegal sale, taking place between the crews on the rigs and the traders. The inshore fishermen, occupying the islands and disposing of canoes were considered as essential allies in the conduct of this trade, but it goes without saying that in the absence of data their role is difficult to establish with certainty. The delicacy of the relationship between Kapenta operators and inshore fishermen may explain why no inshore fisherman in the 1998 survey wanted to admit any connection to the Kapenta business. Nevertheless, it is probable that ‘opportunities’ in the trade of stolen Kapenta contributed to the increased recruitment of inshore fishermen in the 1980s.

3.3 The 1990s: reductions among the ‘foreigners’

In 1989 the number of fishermen had attained around 2 500 individuals or about the same number as had been registered in 1962. From then on the number of fishermen seems to stabilize before it starts falling sometime in 1994 or 1995. With reference to the causes for the preceding growth, just being discussed, both the stabilization and the fall are surprising as the national economic situation and the prospects for jobs and wages in fact did not improve. Even if the introduction of multipartism in 1991 and the subsequent liberalization of the economy could tempt analysts to think that the macro-economic conditions would have improved, a recently published World Bank report (Rakner, Walle and Mulaisho, 1999) concludes that, on

[1] In Zimbabwe the Kapenta fishery was opened already in 1974, the same year as Zambia had to close its inshore fishery.

the contrary, living conditions and employment opportunities continued to decrease in the 1990s. The causes of the fluctuations in fishing effort – as indicated by the number of active fishermen – must be sought elsewhere. One possible reason for the stabilization of their number could have been the low water levels which started to appear around 1990 (Kolding, Musando and Songore, 2003). But this factor can not explain the reductions after 1994 as employment then started to fall at about the same time as the climatic conditions once again began to improve. We therefore propose to focus in some details on the competition for resources taking place locally.

As already mentioned, the local chiefs and headmen did not, or were not able to, intervene effectively with regard to the establishment of all the newcomers in the 1980s. As long as the newcomers' activities only affected fisheries it was not really a problem. The competition for the fish resources were modest, even if the number of Tonga participating in the fishery started to grew again in the 1980s. However, the increased presence of foreigners inevitably led to competition and conflicts regarding other resources. In order to understand this situation a certain number of additional factors need to be taken into account.

Lake Kariba is characterized by considerable variations in climatic conditions which directly influence the biological productivity of the lake. In particular the hydrological levels of the lake (Kolding, Musando and Songore, 2003) are important. Furthermore, partly due to the considerable shifts in fishing effort over the years, and partly as a result of the dispersed location patterns of this fishing, the marketing systems on the lake have remained weak. In various ways both factors augment the insecurity of anyone who tries to adapt to circumstances by specializing in fishing and forces fishermen, irrespective of their origins, to seek access to alternative resources to sustain themselves and their families. The most obvious alternative resource is land for agriculture or for animal husbandry. If access to the lake has been relatively unproblematic to attain for people from outside, access to land has not. In fact, the persistent struggle by the Tonga to avoid outsiders being given access to land has been a permanent characteristic in the Tonga/outsider relations since the creation of the lake.

At the entry of the 1990s the Kariba inshore fishery found itself in a somewhat paradoxical, but not necessarily uncommon situation; it had become seriously constrained by social conflicts. These had built up progressively during the 1980s and were created as fishermen increasingly demanded access to agricultural land, while the local population would use drastic means to prevent them from getting it. A good example coming to the attention of the author occurred in 1997 when Tonga villagers, with the consent of their headman, fiercely opposed the establishment of a cemetery for foreign fishermen nearby their camp. The Tonga claimed – not without reason – that the existence of the cemetery would improve foreigners' rights to claim agricultural land in the area.

The reasons why competition for land leads to such serious conflicts is complex, but should first of all be sought in the unclear rules for and underlying values about the principles guiding the allocation of land existing in the area. From research on local access regulating mechanisms in sub-Saharan Africa (for Zambia, see e.g. Berry, 1993 and Moore and Vaughan,

[1] Such principles can be kinship (as a member of a lineage, I am the "owner" of the land), marriage (I'm married to the "owner" of the land), social position in the community (as headman I have certain rights to these territories), labour (I and my family have been working and developing the land for many years), investments (I have improved on the use of the land), etc. All these principles may be valid; the problems emerge when they are claimed to be valid at the same time and no-one really knows which principles have priority over others.

1994), it is known that there are normally not one set of (more or less consistent) regulating principles. Rather there tends to exist a whole range of principles, often based in contradictory logics. This leads to a situation of uncertainty and ambiguity as to how land and other vital resources are being allocated and regulated. Hence, different group of actors can, with some kind of legitimacy, claim rights to land (or parts thereof) by referring to all sorts of personal connections to it.[1] On the one hand such a situation offers actors to seek access through a range of different strategies; on the other hand no-one really knows which principles are effective when and where. This unclear situation is also prevalent in the communities on the shores of Lake Kariba. The regulating principles increasingly being used by the foreigners to get access to land included marriage into Tonga lineages, alliances of various kinds with chiefs and headmen and investments. Some of the individuals employing these strategies have succeeded, some have failed and given up, but the majority remain in a state of uncertainty. Some Tonga may say they are allowed to cultivate, or keep animals in certain spots, while others contest any right to land whatsoever for foreigners. Inevitably, this has led to a considerable increase in conflicts, not only between outsiders and Tonga, but also among the foreigners and, may be most important, among the Tonga population itself.

To understand the stabilization in the number of fishermen the increased level of conflicts over land represents an important factor. It does so in two different ways. On the one hand is the stress it imposed on the outsiders causing some of them to decide to leave the area. On the other, and probably as important is that those in the fishing camps invested with the traditional authority realized that the growth in newcomers had to be stopped, and that – overall – the number of fishermen had to be reduced. However, the chiefs did not try to expel people already operating, but when possible limited recruitment of newcomers. According to themselves, they tried new means to reduce the recruitment of outsiders mainly by influencing the outsiders already in place, not to recruit apprentices. The author's survey also indicates that the stabilization after 1989 mainly was due to reduced number of newcomers. While the average number of foreign newcomers in a total population of 313 foreign fishermen was 16.7 newcomers per year in the 1980s, this dropped to 10.7 newcomers per year in the 1990s.

The chiefs and the headmen had an additional reason to actively try to reduce the number of fishermen. Their location in a border area made smuggling and poaching a flourishing business. By occupying the islands and being among the few with access to boats, the fishermen were extremely difficult to control and the problems they faced in getting access to land only increased their incentives to use smuggling to diversify their risks. Although, not directly a responsibility of the traditional leaders, increased level of smuggling fuelled the general conflict level in the valley even among the Tonga population itself. According to Chief Sinazongwe, the high level of conflict over land and other activities forced the chiefs to take action. Since the late 1980s control over the recruitment of fishermen was constantly discussed among the chiefs and headmen. But one thing is to realize the problems, another is to find adequate means to solve them. Even though increased conscience and some control measures may explain a part of the stabilization of fishermen, neither the traditional nor the local authorities (councils, police, customs or fisheries department) were strong enough, to influence the number of fishermen to any significant degree. The local authorities certainly functioned as an ally to the traditional authority at a rhetorical level, but they lacked both means and incentives to exercise the control required by the chiefs.

What was going to make the big difference was the entry of the Kapenta operators in the overall competition for resources in the lake. Their non-involvement in the inshore fishery had made the Kapenta operators keep in the background during their first years of their operations. However, the problems of theft from the rigs soon made them realize that it was also in their interest to control and limit the number of inshore fishermen. Besides, the economic liberalization which followed the political changes of 1991, created prospects of tourism which interested the Kapenta operators as potential investors. The biggest islands became potentially important for establishment of lodges and wildlife sanctuaries. In May 1995 the author were informed by the Local Council in Sinazongwe that five major islands already had been leased to tourist/Kapenta operators on 50 years lease contracts. Also from this viewpoint the limitation and control of inshore fishermen became crucial for some of the Kapenta operators. The operators could do little alone; as whites and wealthy they were and are the 'real' strangers in the valley. They depended on the Tonga chiefs in order to be able to operate successfully. Chiefs had to approve the land allocations necessary to establish their production facilities and to support them in order for the operators to remain on good terms with the local population. The Kapenta operator/chief relationship was mainly established on individual basis and was often delicate and on occasions even hostile. Nevertheless it soon became quite tight and characterized by an understanding of some sort of mutual dependency. This dependency derived from the simple fact that, unlike all other local actors, the operators disposed of considerable financial resources and modern equipment which was crucial in exercising control of inshore fishermen. So, the chiefs had the legitimacy and the Kapenta operators had the means.

Therefore the alliance between the chiefs and the Kapenta operators, supported by the local authorities, is likely to be the main reason for the reduction in the number of inshore fishermen. Already in the early 1990 it is reported that Kapenta operators, in various ways, practically supported the chiefs and village headmen in their attempts to improve control over the fishermen. They provided the necessary means (speed-boats, petrol, etc.) for control trips to the islands and they supported the organization of local meetings. Already from the beginning of the 1990s, one can trace effects of this alliance, but paradoxically, it was an initiative coming from the government in 1994 which should render their alliance particularly effective.

General concerns about falling catch rates, and about what many believed to be overfishing, led the Zambian Department of Fisheries to launch a new co-management plan for the inshore fisheries early in 1994. In addition to employing traditional measures related to mesh sizes and prohibition of certain types of fishing techniques, the new plan would make it possible to allocate exclusive rights to fishermen in defined areas, by relocating and concentrating them into a more limited number of permanent fishing camps (Chipungu and Moinuddin, 1994; Malasha, 2002). It was argued that exclusive rights would eliminate the problems of free riders and irresponsible behaviour. The shores of the islands would still be open for fishing, but it would be prohibited to stay there at night. Such a prohibition *de facto* meant that the islands would become inaccessible for inshore fishing, given their distance from the shore. The new permanent camps were to be governed and managed by a committee elected among the camp population. In turn camp-committees should elect representatives to one of four "zonal" committees where, except for fishermen, there would also be representatives from local government, traditional authority, Kapenta operators and the traders' community. The plan specified that the funding needed to run this co-management system should be assured by the retention of a part of the fishing licenses collected by the Department of Fisheries and by trade levies on fish collected by the Local Councils.

It appears that this plan contained so many ambiguities and unresolved issues that it became impossible to reach the objectives specified in it. Also, the fact that fishermen strongly resented parts of the plan made its implementation an illusion. In particular, the question of closing the islands to the fishermen was resented, even if all sorts of promises were made regarding improved living conditions in the new permanent camps. Nevertheless, most of the relocation of fishermen had been implemented less than two years after the plan had been presented. According to the Department of Fisheries' frame survey of 1993 and 1995, the number of fishing camps had been reduced from 278 in 1993 to 67 in late 1995. As a result the conditions imposed on individuals wanting to operate as specialized inshore fishermen became so constraining that a considerable number of foreign fishermen chose to leave the Kariba fisheries altogether. According to the same frame surveys, the total number of fishermen fell from 2 238 in 1993 to 1 355 in 1995.

Unlike what many observers of Lake Kariba fisheries tend to believe it was neither the Department of Fisheries nor the management plan as such that caused the considerable reduction in number of fishermen in 1994-95. The reason why the relocation of fishermen took place so quickly was the fact that the alliance between Kapenta operators and chiefs made the initiative a reality. Long before the Department of Fisheries had started to consider specific actions, the Kapenta operators through their Kapenta Fishermen's Association (KFA) and the chiefs (sometimes with the consent of the Local Council) started implementing the plan by pushing for a relocation of fishermen from the islands (Jul-Larsen, 1995). Chiefs, accompanied by with impressive courts, travelled around in the area by car and to the islands by speed-boat, explaining to the population how good things would become in the new permanent camps and threatening those who resisted moving. As always in such cases far more was promised than could be kept and particularly serious were many promises given regarding access to land. These campaigns and meetings were to a large extent funded and organized by the KFA[1]. The drama was completed when in early 1995 the chiefs and the local Council managed to convince a troop of the military police force, attending a training camp in Sinazongwe, to undertake some 'reality training' by landing soldiers on the islands and remove inshore fishermen by force (Pearce, 1995). In such a situation it is understandable that the foreign fishermen, despite a lack of good opportunities elsewhere, preferred to abandon the area.

Even after the forced relocation, KFA continued to support the establishment of the camps, both practically and financially.[2] But as time went by little was done on the part of chiefs or by local and central government in providing the infrastructure and the social services which had been foreseen. The chiefs met strong resistance from many of their village headmen concerning the promises made on land allocations, local government proved to be reluctant to allocate the promised part of the trade levies of fish to the management committees, and government had no additional funds to provide. The Fisheries Department never established the exclusive fishing zones which, from the point of view of fishermen, were one of the most important aspects of the whole plan. Despite the interest by some KFA board members, it

[1] To be more precise, it was in particular the chairman and two other board members who pushed KFA's involvement in the co-management plan and the relocation process. Many of the members were strongly opposed to this policy and wanted KFA to remain uninvolved. It is therefore difficult to say how much was funded by KFA and how much came from these three companies' own budgets.

[2] A meeting for representatives of four permanent camps in the Mwemba chieftaincy in late May 1995 (attended by the author) was chaired by one of the KFA board members. Neither the local authorities nor Fisheries Department participated. In the meeting which lasted one whole day the chairman promised to deal personally with many of the complaints brought forward by the fishermen such as grading of roads to the camps, establishment of shops and some other facilities. The chairman also provided meals and drinks for the 25 participants in the meeting.

became impossible for them to continue their support under such conditions and they slowly withdrew from the whole process. A common experience recorded from earlier relocation processes of rural populations in Africa, is that people start returning to their old places and continue to live and work as they did before. Here is how Sara Berry describes relocation of farmers in northern Zambia*: "Moreover during the first decade of independence, the government pursued a policy of village regrouping which bore a close resemblance to colonial efforts to stabilize rural settlements. At first, villagers showed some enthusiasm for 'village regrouping', but voluntary relocations declined as promised services and amenities failed to appear. People who were already well situated in terms of access to jobs and markets or who were loathe to give up established gardens for an uncertain future never participated at all"* (Berry, 1993).

Also in Lake Kariba the same tendencies soon became evident. Some of the individual Kapenta operators who had leased islands tried to prevent the return of inshore fishermen by use of force, but they failed. It is probably correct to say that, already in 1997, the fishermen made as much use of the islands as they had done before the relocation started. However, it seems as if the extremely mobile and individualized fishing that was common until 1994 were given up and that fishermen, at least to some degree, had accepted to use the permanent camps as a residential base (Overå, 2003). It should also be mentioned that one of the results has been a clear switch in the identity of fishermen in the camps. Tonga fishermen are now a much larger proportion of the total number of fishermen than before and for the first time since 1963, they were able to establish their influence and exercize some power in the fishing communities.

One important question remains: why has the number remained so low also after the dramatic reductions in 1994-95? A growth in numbers could have been expected as a result of the collapse in the alliance between the chiefs and the Kapenta operators. It was this alliance which provided the means and the legitimacy to enforce the relocation process and as per 1999, there were no institutions, alone or in cooperation, which could effectively control the recruitment and the mobility of inshore fishermen. From this perspective it is surprising that, according to Department of Fisheries' frame surveys 1995, 1997 and 1999 no growth has taken place. On the contrary, there has been a continued but slight reduction; from 1 355 fishermen in 1995 to 1 263 in 1997, to reach only 1 170 fishermen in 1999. The author is uncertain of how to interpret this latest development and can not provide any well developed explanation. First of all the quality of the frame survey data needs to be checked. It may be that the number of fishermen recorded after 1995 is not directly comparable with numbers of fishermen reported before that year, since some informants claim that the frame surveys of 1995 and after only have included the "official" permanent camps. So, qualified interpretations must await study of the frame survey data.

4. CONCLUSIONS

Brox's (1990) analytical distinction between population-driven and investment-driven changes in fishing effort relates to whether the changes are the result of changes in the number of fishermen or in individual accumulation of gear and technological changes. The reason for making this distinction is that it permits the analyst to study separately the underlying causes of change. These causes are not the same for population-driven and investment-driven changes. Therefore, often the consequences for biological sustainability, for social welfare and

for equal rights to natural resources also will differ. This review of effort development in Kariba shows first of all that, although changes in fishing effort and changes in the number of fishermen is not one and the same thing, the number of fishermen probably constitutes the most important variable in determining effort development. Effort development in the inshore fishery of Lake Kariba is arguably much more population-driven than investment-driven. Furthermore, it demonstrates that population-driven changes are not simple reflections of demographic trends. The changes in Kariba are characterized by a considerable growth in, as well as by reductions in, the number of fishermen, even in a situation where the general demographic growth is noticeable and fairly stable. In Lake Kariba the main factors influencing the changes in number of fishermen can be summarized as follows.

First, the overall changes in what may be termed the macro-economic (to some extent also macro-political) conditions at the national and regional levels. The overall economic situation in the country and thereby the opportunity for jobs seem to have significantly influenced some of the most dramatic changes in numbers of fishermen. It is the war for independence in Zimbabwe that explains fishing effort at a minimum in the late 1970s, even after the general economic crisis had emerged in Zambia. And it is the same crisis that drives thousands of recently jobless people to try fishery on Lake Kariba. But this variable can not be seen in complete isolation; it must also be compared to changes in the opportunities created by the specific fishery in question. In 1963 when there are relatively good prospects for finding jobs in the Copperbelt and in cities inside or outside Zambia, the reduction in biological productivity in the lake is part of the context that explains the rapid decrease of fishermen at that stage.

Secondly, the analysis shows that changes in the macro-economic conditions together with the situation in the fishery do not always act alone. While the general economic crisis in Zambia to a large extent explains the growth in the number of fishermen in the 1980s, the prevalence of the crisis through the 1990s did not lead to continued growth during that period, but to stabilization and a subsequent decrease. In this context the analysis shows that local access regulating mechanisms also may be crucial. The larger the pressure on natural resources in Kariba, the more important local access regulating mechanisms become, even if these resources are not those of the inshore fishery . It is the pressure on arable land and on the territories of the islands (even the thefts of Kapenta may be seen as increased competition for resources) which explains why certain groups of actors such as chiefs, headmen and Kapenta operators see an interest in pushing and even implementing policies aiming to exclude inshore fishermen from the same resources. Although many social scientists are right when they insist on the problematic assumptions of free access regimes in fisheries, this analysis shows that assumptions that local access regulations are effective also can be quite problematic. The study shows that local access regulation is not particularly effective in maintaining biological productivity or in assuring the equal distribution of resources at the local level. Local access regulating mechanisms seem to have developed more in response to peoples struggle for control of and access to the resources, than as a manifestation of collective concerns for the sustainability of the resources or for the welfare of the communities.

The implications of these findings clearly demonstrate the utility of Brox’s analytical distinction. The role of macro-economic conditions in determining people’s wish to join fisheries as well as the great mobility of people implicates that this sort of fishery serves as a buffer and a safety valve to ease the consequences of fluctuations in the macro-economy. Such

a situation makes it problematic to define "who are the fishermen" because those who are not fishing today may easily become fishermen tomorrow. And later, both tomorrow's fishermen and those already in business today may decide to leave if conditions elsewhere improve. But, of course, the very high geographical and social mobility of Kariba inshore fishermen is not necessarily a bad thing from the point of view of society. They move over long distances and between countries and they easily switch occupations according to what they can obtain and what they think may generate the most interesting profits. From 1963 to 1994, it can be said that Lake Kariba functioned as a commons to the benefit of all those who fished there and without creating any fishery tragedy.

On the contrary, the establishment of strong access regulating mechanisms at the local level, which also was the intention of the proposed co-management regime, has limited the access to the commons to an extent that the lake is left considerably underexploited. By saying so the author does not underestimate the problems caused by the high number of foreigners in 1989-1990: the Tonga naturally have to protect what land had been left for them after the Zambian society took its share in the 1950s, the Kapenta operators are entitled to protect what was and is their property, tourism may prove beneficial to more than the investors and the chiefs in lake shore communities have a legitimate right and duty to minimize the levels of conflicts in their communities. But, the important question is: to what extent all these legitimate concerns can be adequately dealt with without removing what has proven to be an important safety valve for a great number of Zambians? Co-management in fisheries certainly has many faces.

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COLONIAL AND POST-COLONIAL FISHERIES REGULATIONS: THE CASES OF ZAMBIA AND ZIMBABWE

Isaac Malasha

1. INTRODUCTION

Fisheries management and the regulations on which it is based have mainly been premised on the values of positivistic science with its strong emphasis on rationality and impartiality. Positivistic science tend to portray the universe as mechanistic and deterministic and its workings as being governed by a few fundamental and unvarying laws. Based on these laws scientists can derive regulations that inform the manner in which a particular natural resource such as fish should be exploited to ensure the sustainability of the stocks. However, the implementation and enforcement of these regulations have to fit into the political and economic rationality of the state in which they emerge and these rationalities may be at variance with those of science. The purpose of this paper is to explore the reasons for the type of fisheries regulations that emerged in Zambia and Zimbabwe.[1] It will be shown that although there were attempts to justify the regulations with reference to scientific principles, the regulations had to fit the political and economic interests of their respective states as well as they reflected the dominating representations and images of the man-nature relationship that prevailed among the agents of the states. This resulted in conflicts between fishermen and government agents and ambiguity in implementing the regulations. Using examples from Lake Kariba the paper shows how efforts to develop uniform fishing regulations for the fishery of the man-made lake were not successful because of fundamentally different state interests towards fish and fisheries in the two countries.

2. THE MANAGEMENT OF FISH AS GAME

One of the most noticeable relationships between game and fisheries is the manner in which these resources have been managed especially in a southern African context. In most African countries game and fisheries have been managed under the same bureaucratic institution.[2] But much more fundamentally is the similarity in the regulations defining the way in which they are accessed and utilized. The scientific arguments that had been used to develop game laws were transferred to the way the fisheries sector would be regulated. Consequently, fisheries regulations emerged as an adjunct of the Game Laws. From 1925 the fisheries sector in Zambia was managed under various Game Laws until 1943 when the Fish Control Regulations Act was enacted. Similarly, in Zimbabwe the Game Laws that were introduced in 1891 were also applicable to fish until 1938 when a section specifically dealing with fisheries was incorporated into the Game and Fish Amendment Act. In these various acts a fish was classified as an "animal" and fishing was perceived to be another form of "hunting".[3]

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1 Before Zambia's independence in 1964 and during the Federation of Rhodesia and Nyasaland between 1953 and 1963 the two countries were known as Northern Rhodesia and Southern Rhodesia respectively. Following the dissolution of the federation Southern Rhodesia became known as Rhodesia and in 1980 was re-named Zimbabwe. Unless specifically mentioned the paper will use the post-colonial names.

2 For instance, the former Director of Game and Fisheries in Zambia argued that fish was a kind of wildlife for this reason fish and game had to be managed jointly (Zambia National Archives Ref. No. Sec 6/508 'Memorandum on the Expansion of the Fisheries Section of this Department,' Director of Game and Fisheries, Ministry of Native Affairs, 25/9/61.

3 Zambia National Archives (ZAMBIA NATIONAL ARCHIVES), Ref. No. ML 1/7/19, Vaughan Jones, `Preliminary Report on the Fishing Industry and Its Markets, 1942.

Hunting restrictions that are a common feature of game legislation were applied to fisheries. Restrictions through various means such as closed seasons, protection of young game and licensing are meant to allow for selective removal of certain specimen at particular times to avoid over-hunting. When regulations for the management of game were being developed there was emphasis on the protection of young specimen to only allow for the hunting of animals that had reached a particular age. This was meant to prevent the removal of specimen that would not have a negative impact on the ability of the remaining specimens from replenishing themselves. This legislation is comprehensible in that most game, especially those that the laws sought to protect, such as elephants, do not reproduce rapidly and in large numbers. When specific fishing regulations began to emerge in Zambia and Zimbabwe there was emphasis on setting minimum mesh sizes of fishing nets and the admissible width of apertures in fishing traps and baskets. These clauses on minimum mesh-sizes were aimed at preventing the harvesting of fingerlings.

Ideological reasons were also behind some of the regulations that emerged. As legislation for the conservation of game was emerging calls were made to proscribe certain hunting methods considered to be 'unfair' to the hunted animal (Beinart and Coates, 1995). This was advanced into the public domain as the element of "sport" in game management began to be pushed to the top of the conservation agenda.[1] When hunting game, an animal had to be given an opportunity of escaping in the spirit of "fair play". Hunting methods considered as not giving hunted game a chance to escape were considered 'unsportman-like' and prohibited. For instance, Section 33 of the Game Ordinance of 1941 specified that during hunting no person was to drive, stampede or unduly disturb any animal for any purposes whatsoever. This "fair chance" approach to the hunting of game proved to have considerable impact on formulation of fisheries regulations. When new legislation on fishing was drawn-up in 1943 in Zambia, active fishing or *kutumpula* as it is locally known, was banned. This fishing method of driving fish into nets by splashing and beating

However, these scientific and ideological justifications mask the economic and political interests of groups that pushed for their implementation. In the colonies regulations for the utilization of resources such as game and fisheries were designed to meet the economic and political interests of dominant group. Licensing of fishermen was justified on the need to control access to fisheries. However, it also provided revenue for the authorities. This was particularly the case in most British colonies where fish levies were used to fund administrative structures in rural areas known as Native Authorities. The revenue was used to pay the salaries of chiefs and other employees of the authorities. Gordon (2000) notes that in 1943 chiefs in the fisheries in northern Zambia were eager to enforce fishing regulations because they benefited from the fish-licensing system. For instance, the Shila and Chishinga Native Authorities derived most of their income from this fish levy.

3. EMERGENCE OF FISHERIES LEGISLATION IN ZAMBIA

It was only after 1940 that efforts to develop a local policy for the conservation of fish were made in Zambia. Firstly, while fishing had been a source of food and employment, even before the colonial period, it was now discovered that it would benefit the economy more if some

[1] According to Mackenzie (1987:22-40) hunters also anthropomorphized animals in attempt to suggest a degree of equality in the contest and therefore emphasise the physical endurance and courage required in the hunt. Thus, the killing of intelligent animals such as the elephant provided the greatest exhilaration.

measures were implemented to control the industry. This was based on the prevalence of numerous water bodies that were estimated to have produced fish worth more than one hundred and fifty thousand British Pounds per annum.[1] Secondly, the need to support the booming copper industry with the provision of cheap food prompted the authorities to begin to draft fisheries legislation. Although beef had initially been used to feed the labour on the mines, problems associated with supplies that occurred in the early 1940s, prompted the authorities and mine owners to begin to explore alternative sources of cheap food supplies for labour. Gordon (2000:91) observes that severe beef shortages that occurred in 1941, 1943 and later in 1948 compelled mine owners to import five hundred tons of fish from a Congolese supplier to pacify the restless workers. During these food shortages prices went up causing instability in the urban areas. This compelled the authorities to impose price controls as a short-term measure. The Provincial Commissioner (PC) responsible for the Copperbelt implored the Director responsible for the fisheries sector to maximize fish production by also suspending the existing fishing regulations that were still under the Game Ordinance Act of 1941. The strict enforcement of the regulations was seen as contributing to the shortage of fish in the Copperbelt. The PC argued that:

> "We are having some difficulty in keeping our workers contended here owing to short supplies. The point may be reached when discontent will have serious repercussions on copper production, which would be more disastrous even than upsetting the internal economy of Northern Province or depleting its fish supplies for a time. Bangweulu fish supplies have some bearing on copper production."[2]

This statement is evidence of the importance with which copper production was linked to the availability of cheap food for the labour. Although the fishing regulations had been implemented to protect the fishing industry, these were now seen as hindering copper production. To the State, the collapse of the fishing industry was not paramount as long as copper production was sustained. The Director of Game and Tsetse Control concurred with the Provincial Commissioner by observing that the importance of maintaining a smooth atmosphere on the Copperbelt was so great that fish supplies should be given a high importance relative to that of opposing factors. Consequently, fishing regulations were relaxed and the supply of fish to the Copperbelt improved.[3] Following other food shortages that occurred on the Copperbelt in 1943 the authorities responded by invoking Emergency Powers (Control of Fish) Regulations. These emergency measures were designed to control the distribution of food, especially fish.[4] These regulations gave the Director of Game and Tsetse Control a wide range of powers to deal with the distribution of fish by prohibiting the importation or export of fish into or from any Fishery Area.[5] They further empowered the Director to limit weight of fish or the market

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1 ZAMBIA NATIONAL ARCHIVES Ref. No. Sec 6/190, Correspondence from Acting Director of Game and Tsetse Control to Secretary to Cabinet, 1943.

2 ZAMBIA NATIONAL ARCHIVES, Ref. No. Sec 6/190, Correspondence from Provincial Commissioner, Western Province to Director of Game and Tsetse Control 1943.

3 Although fish supplies temporarily improved following the suspension of the fishing regulations, the fish-price controls that were also imposed at the same time merely drove fish from the formal into the parallel market.

4 According to the Provincial Commissioner in charge of the Copperbelt, which was then known as the Western Province, beginning in 1943 there was a shortage of various commodities on the Copperbelt, including foodstuffs. The consequence of these shortages was that fish prices went up and controls were introduced. However, this only led to drive fish off the official market into the parallel market where prices were high (ZAMBIA NATIONAL ARCHIVES, Ref. No. 6/190, 1/8/1943).

5 A Fishery Area was a fishery covered by the Fish Control Regulations.

in which it was supposed to be sold. These controls were only abolished in 1946 when the distribution of fish improved.[1]

4. AMBIGUITY IN THE APPLICATION OF FISHERIES REGULATIONS

Because of the diverse manner in which fisheries regulations had emerged and were implemented their application was bound to cause ambiguity and resentment. This was also compounded by the fact that the Department of Game and Tsetse Control, under which fish was managed, did not have adequate staff to implement the fishing regulations. In some of the fisheries in remote areas it was left to the District Commissioners and other colonial officers acting on basis of their own (sometimes preconceived) assumptions of fisheries management to enforce the fishing regulations. The issuing of fishing licences was particularly problematic. Native Authorities issued licences to fishermen who fished in water bodies under their jurisdiction. However, local fishermen could migrate from one fishery to another for different reasons. This movement of fishermen across boundaries proved to be a problem in some Native Authorities as it deprived them of much needed revenue.

The enforcement of minimum net mesh-sizes and types of nets to be used were also a contentious issue between the authorities and fishermen. The minimum mesh sizes were designed to ensure that all the fish caught in a net would have bred once. This regulation ignored the fact that some fish species could reach their maximum size without being caught in the minimum allowed mesh-sizes. In 1949, fishermen in Kasempa in the north-western part of the country complained that the institution of minimum mesh-size for their fishing nets caused them to lose many fish.[2] They argued that the fish species that they particularly targeted were so small even at maturity as not to be captured in the nets that they were legally allowed to use. The District Commissioner disputed this argument by observing that the fish that was not caught in the legally allowed nets was not of economic value and did not warrant the change of the mesh-size regulations. In 1953, a Fisheries Officer in Kawambwa reported that he was unable to enforce the mesh-size regulations due to resistance by local fishermen. He complained that the mesh system in the fisheries under his jurisdiction was farcical due to non-observance of the regulations by the local fishermen. He recommended that fishing regulations should no longer apply in that fishery.[3] In another example, in 1954 it was agreed that due to resistance by local fishermen and the lack of adequate personnel, fish conservation regulations in the Northern Province be abandoned in all but the following fisheries; Mweru-Luapula; Mweru-wa-Ntipa; Lake Tanganyika and Bangweulu-Luapula.[4] The regulations were relaxed but despite the abandonment or suspension of all or certain provisions, the clause pertaining to licensing was always retained. This was meant not to disrupt the collection of revenue for Native Authorities.

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[1] It was during this period that the Director of Game and Tsetse recommended that fish exports to Zimbabwe be banned. This ban affected the urban population in Zimbabwe that was reliant on fish supplies from Zambia. These fish- exports had amounted to about 5 000 kilograms in 1943. However, the ban on fish-exports did not stop Zambian fish-traders from smuggling large quantities of fish into that country. (ZAMBIA NATIONAL ARCHIVES, Ref. No. Sec 6/190, Correspondence from Provincial Commissioner to Chief Secretary, 1944.).

[2] ZAMBIA NATIONAL ARCHIVES, Ref. No. SEC 6/570, Acting Director of Game and Tsetse Control, `Preliminary Report on the Fishing Industry and its Markets, 21/10/1949.

[3] ZAMBIA NATIONAL ARCHIVES, Ref. No. SEC 6/570 Correspondence from Fisheries Officer, Fort Roseberry to District Commissioner, Kawambwa, 1953.

[4] ZAMBIA NATIONAL ARCHIVES, Ref. No. SEC 6/570 Correspondence from Director of Game and Tsetse Control to Fisheries Officer, 1954.

The restrictions on the use of weirs were also declared ineffective and impossible to enforce especially in the swampy Bangweulu fisheries. Faced with these problems, the Fisheries Officer for the area unilaterally declared that weirs did not in fact destroy the fry in the lake and called for their relaxation in the fishery. The Fisheries Officer was also compelled to take this decision following the Luwingu Native Authority's refusal to fine fishermen brought before it for using weirs. Such fishermen were usually discharged with verbal warnings and not fined.[1]

The ambiguity in the application of fishing regulations was also premised on the preconceived ideas that local fishing methods were inherently harmful. This prompted authorities to unilaterally declare certain methods illegal even when there was no scientific evidence to prove it. The problem with this evidence was that it was more often based on perceptions. In 1942, the seine net was banned after one District Commissioner observed that it was destructive and would lead to depletion of fish.[2] In 1948 the Director of Game and Tsetse control wrote to a Game Warden based in Fort Rosebery (Kasama):

> *"Labeo* and *Hydrocyon* (sic) are agreed as being in need of control so far as trade in immature specimens is concerned. I feel that *Auchenglanis* (sic) is badly in need of protection, though I have no data at present to support this general opinion. *Chrysichthis* is perhaps fairly safe; if, however, it is likely to have to come into this restriction within the fairly near future, it had best be put in now. Are there any other species which should be considered in this connection?"[3]

To conduct research, it was argued, was not necessary in the face of a perceived catastrophe in the fishing industry if regulations were not implemented. Proper research would take time and the results might be too late to prevent a tragedy in the colony's fisheries:

> "We cannot proceed very far without proper research, but as, even if commenced now, that would take some time to give results, I consider that our present action on empirical lines is fully justified in view of the urgency of the fishery problem in the territory."[4]

In the absence of a full-fledged research framework it is not clear what the Director of Game and Tsetse Control referred to as "empirical lines" in terms of the policy towards the fishery sector. It can however be assumed that due to the importance of the fishing industry to the economy of the country one would not take chances. The other reason why the authorities could not wait for scientific research was the perception by staff of the Department of Game and Tsetse Control that their primary function was to protect the destruction of natural resources and not that of conducting research.[5]

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1 ZAMBIA NATIONAL ARCHIVES, Ref. No. SEC 6/570, Correspondence from Fisheries Officer to Director of Game and Tsetse Control, 1954.

2 ZAMBIA NATIONAL ARCHIVES, Ref. No: SEC 6/508, Correspondence from District Commissioner, Gilbert Phillips to Provincial Commissioner, Kasama, 7th November, 1942.

3 ZAMBIA NATIONAL ARCHIVES, Ref. No: SEC 6/158, Director of Game and Tsetse Control to Fisheries Officer, Fort Rosebery, 1941.

4 ZAMBIA NATIONAL ARCHIVES, Ref. No. SEC 6/10 Correspondence from Acting Director of Game and Tsetse Control to member for Agriculture and Natural Resources, 16th January, 1951.

5 Vaughan-Jones, T.G.C., 'Memorandum on Policy Concerning the Foundation of a Game Department and the Conservation of Fauna in Northern Rhodesia,' Government Printers, Livingstone, 1938.

Differences in the efficacy of the fishing regulations were not only confined to the authorities and the fishermen but were also present within the colonial establishment itself. In 1953, a biologist from the Commonwealth Office in London challenged the manner in which fisheries regulations were designed and implemented in the colonies. He observed that fisheries regulations in the colonies were modelled on United Kingdom Fisheries Regulations of 1866 and on game laws and thus faulty. He said that these 1866 laws had borrowed heavily on game laws and the analogy between game and fish was dangerous because stocks of game can be watched and even enumerated and their breeding rate is slow. On the contrary, fish stocks had an extremely rapid rate of breeding, and they cannot be directly watched, but only indirectly by conclusions drawn from the results of commercial fishing and of biological research. He observed that most of the restrictions and prohibitions currently in use in the colonies were of a doubtful nature. The licensing of gear or nets required large and expensive enforcement staff. Other measures such as closed seasons; mesh-size restrictions and size of fish regulation were not very useful either. Fish fences were also harmless because if only a small number of fish suffice to replenish stocks, then there was no need in allowing excessive numbers to spawn and the capture of the surplus was an economical exploitation. He argued that mesh-size regulations, which were designed to take only the largest category of fish, must result in the dysgenic removal, for generation after generation, of the best-growing strains.[1] This left future breeding increasingly to the poorer strains and the result of attempts to restrict capture only to the larger fish might be fewer and fewer large fish to be caught.

The reaction to the biologists' observations by officers in the Department of Game and Tsetse Control was mixed but generally reflected the government's political and economic interests in the fishing industry. While agreeing to the biologists' general thesis, a Fisheries Officer observed that the former was ignorant of "factors important in Central Africa." He said that African fishing methods "so primitive that weirs across tributaries allowed no fish to escape and that some river-pools fished communally by spears and baskets had no survivors".[2] The Director in the same department was more open about the political and economic objectives of the fishing regulations in the colony. He said that the reasons for the existing regulations were that licensing was a source of revenue for Native Authorities.[3] Secondly, it was argued that fishing was the major industry in which most of the Africans in rural areas were employed. These local people were so dependent on fishing and had not developed alternative economic activities that there was a need for the existing fishing regulations to avoid an unemployment catastrophe in the event that the fishing industry collapsed. Such fishing regulations, observed the director, were "not only reasonable but positively desirable."[4] Thirdly, he acknowledged that the mesh size regulations may or may not be an unnecessary restriction, but as it already existed it was going to be a psychological error to abolish it until it was quite certain that it was not necessary.

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1 ZAMBIA NATIONAL ARCHIVES,Ref. No. 6/560 Hickling, C.F., "Memorandum on Fisheries regulations," Colonial Office, London, November, 1952.

2 ZAMBIA NATIONAL ARCHIVES, Ref. No. 6/560 Correspondence from Fisheries Officer to Director of Game and Tsetse Control, Dr. Hickling's Circular on Regulations, 1953

3 Officially this was not put so openly. It was usually said that the main reason for licensing was "to stimulate the Native Authorities interest in the conservation of fish" (ZAMBIA NATIONAL ARCHIVES, Correspondence from Fisheries Officer to Director of Game and Tsetse Control, Dr. Hickling's Circular on Regulations, 1953).

4 ZAMBIA NATIONAL ARCHIVES, Ref. No. 6/190, Correspondence from Colonial Office, London, to Governor of Northern Rhodesia, 18th May, 1944

Following this debate the Fish Conservation Ordinance of 1955 was enacted. The new ordinance sought to remove the clause of leaving a gap in a weir. It was reasoned that licensing weirs would in itself be a hindrance to the making of the same gear and would automatically cease to be used.[1] However, the principal objectives of the new ordinance remained the same as those of the previous ones. It regulated fishing appliances, placed restrictions on minimum mesh sizes and also prescribed that offences and penalties to be meted out to those fishermen who violated the ordinance. In particular it also specified that licensing would continue to be imposed on all fishermen operating from fisheries under the control of the various Native Authorities.

In 1963, the Department of Game and Tsetse Control was renamed the Department of Game and Fisheries. It was also transferred to the Ministry of Lands and Natural Resources following the abolition of the Ministry of Native Affairs under which it had been located. In 1965, the Fish Conservation Ordinance and the Fish Control (Mweru-Luapula Fisheries Area) Regulations were amended. In 1974 all the different pieces of regulations such as Fish Conservation Ordinance and the Fish Control (Mweru-Luapula Fisheries Area) Regulations were combined to create the Fisheries Act of 1974. In the same year, the Department of Fisheries (DoF) was also established. The Fisheries Act currently provides for the development of fishing in the country. It is principally still based on the restrictions that emerged in the game laws of the 1940s. However, due to the manner in which the regulations emerged coupled with reduced government funding to DoF, the implementation has not been effective. Most fishermen admit that the fishing regulations are not an inconvenience to their fishing activities.

5. FISHERIES REGULATIONS IN ZIMBABWE

It was also during colonial rule that regulations for the management of fisheries began to emerge in Zimbabwe. In a Proclamation of 10 June, 1881 issued under Order-in-Council of 9 May, 1891, the Game Law Amendment Act, 1886 of the Cape of Good Hope became the game of laws of Zimbabwe. This piece of legislation was aimed at protecting big mammals such as elephants that were considered to be in danger of being over-hunted by ivory hunters, missionaries and builders of railway lines and roads.[2] In 1929 the Game and Fish Preservation Act was passed. It was in this new act that there was a direct reference to the way fisheries resources were to be utilized in Zimbabwe. The new act attempted to consolidate and amend the law for the better preservation of game and to design an act that would reflect the realities in Zimbabwe. The amendments dropped all references to Cape Province that had remained in the previous pieces of regulations. It was in this act that a section dealing with fishing was also included. As in the way that game was conserved, the section on fish in the act prohibited the use of drag, cast, stake or other nets and determined that any under-sized fish shall be returned to the water. The act also prohibited the use of dynamite or chemicals or fishing without a licence. As with other pieces of regulations on natural resources these restrictions on hunting methods marginalized Africans' access to fisheries or game. Most of them could not afford to obtain the required licences and did not have resources or time to utilize the required hunting or fishing implements and methods.

Reflecting the emerging discriminatory land tenure system in the country the Game and Fish Preservation Act made it a punishable offence to enter or trespass the land of another person

[1] ZAMBIA NATIONAL ARCHIVES, Ref. No. 6/570, Director of Game and Tsetse Control, Notes on New Features in the Draft Fisheries Conservation Bill, 11/12/1952.

[2] It is during this phase of colonial penetration into the interior that Mackenzie has associated with the transformation of hunting into the Hunt for the benefit of a few people from among the settler community (McKenzie, 1987: 41-62).

in the pursuit of game or fishing without the authority of the landowner. The ordinance gave a wide range of powers by those who had water bodies on their private properties to prosecute anyone who poached or trespassed with the intention of poaching. This provision engendered the emergence of a strong lobby-group from among the settler community that started importing exotic fish species for stocking local waters. Although these initiatives to import exotic species had been started in the late 1920s they were now officially recognized in the new act. It gave powers to any association or person to introduce, in defined waters, any fish not native to such water and making provision for that introduced fish to grow to exploitable levels. These groups formed associations and lobbied government for funding to import ova from the Cape and further north as Scotland. In 1938 trout ova were imported from Scotland for the stocking of the colony's fisheries (Bell-Cross and Minshull, 1988). Later an umbrella organization known as the Trout Acclimatisation Society was formed to co-ordinate the operations of associations interested in the importation of trout ova. Imports consisted mostly of the Largemouth Black Bass, Carp, Rainbow and Brown Trout. One common feature of these imports is that they were meant to improve the fish-angling facilities in Zimbabwe and little attention was paid to their potential as food (Toots, 1970). The rise in the importation of exotic species led to the this emergence of a strong sport-fishing lobby. It was such lobbies from among the settler community that pushed for legislation to protect their sport. In 1938 the Game and Fish Preservation Act was renamed the Game and Fish Amendment Act. These amendments were a result of strong pressure that was being exerted on government by associations with an interest in angling; sport and fly-fishing that wanted direct government funding for their activities. Institutions such as the Flyfishers Association of Southern Rhodesia lobbied government to provide financial assistance to angling clubs that wished to import exotic fish species from outside the country. The society also asked for more powers to control the manner in which the exotic species were stocked and harvested. Between 1936 and 1946 a total of seventy-three government notices were made in relationship to the Game and Fish Preservation Act of 1929. Most of these notices were to authorize an organization known as the Rhodesia Angling Society to introduce alien fish into the waters of the colony and also to ban fishing for a period of five years to allow the introduced species to expand.

In 1944, the Southern Rhodesia National Anglers Association was formed. By 1947 similar associations had become so politically entrenched that they began to lobby government to amend the Game and Fisheries Act to give more responsibilities on the management of water bodies to its members. These amendments were made towards the end of 1947 when the act made members of the Angling Societies into Honorary Fish Wardens. The wardens had powers to prohibit fishing and apprehend those doing so in water-bodies located on private property.[1] Those caught were liable to fines ranging between five and twenty-five Rhodesian pounds. The various angling associations also established research stations in the country to improve the strain of imported fish species to local conditions. Some of these research stations were privately run while others relied on government subsidies. These included the Mashonaland Highveld Research Centre at Lake McIlwaine, Trout Station at Nyanga, Matopo's and Southeast Lowveld at Kyle. The research station at Kyle was responsible for research on Bass. It was only in 1966 that the Department of National Parks and Wildlife Management assumed responsibility for all fish research in the country.[2]

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[1] Zimbabwe National Archives, Ref. No. S482/637/39, Correspondence from Parliamentary Secretary to the Secretary, Department of Agriculture and Land, 2/4/1942.

[2] Government of Southern Rhodesia, Ministry of Mines and Lands, "Reports of National Parks Advisory Board and Director of National Parks and Wildlife Management for 1966", Government Printers, Salisbury, 1967.

In Zimbabwe the development of fishing regulations were driven more by individuals, associations and clubs with an interest in sport fishing than government initiative. The government's involvement in the industry was not as manifest as was the case in Zambia. Partly, this is because the agricultural industry was well developed and able to provide cheap food products such as beef to labour. Secondly, fish requirements, especially for the large immigrant community in the mines and farms, were met through imports from Zambia and Malawi (Chirwa, 1996).[1] Thirdly, as fishing did not contribute much to the economy except through tourism, the government did not invest much in personnel and infrastructure. This was left to private interests. It was only in 1949 through the passing of the National Parks Act that for the first time the government created a National Parks Board and employed officers specifically responsible for fisheries. However, even the policy thrust of the new board was to support sport angling. It promoted sport angling in all water bodies in the country's national parks.[2]

The change in government policy which led to the establishment of the board was prompted by the findings of a 1948 consultancy report commissioned to advise the country on the potential of inland fisheries.[3] The report observed that the country already had water bodies that were well stocked with fish. The report recommended that the creation of a new fisheries department was necessary as was the need to maintain water bodies that had already been stocked with exotic species. This department would maintain breeding pools, hatcheries, and a central experimental fish farm to serve the dual function of producing fish for stocking and conducting experiments in fish farming. The major recommendation, however, was that fisheries policy should generally put emphasis on sport fishing to attract tourists (Hey, 1948). Furthermore, the restocking of some of the country's water bodies should concentrate more on fishes that had virtues of superiority in fighting ability (ibid.). The emphasis on sport angling was based on the premise that the diet of white settlers was wide ranging enough so as not to make fish a staple. Instead fishing was to be promoted as a sport. Even the consultancy report recommended that priority should be given to the import of 'angling species' into the country's water bodies while undesirable (or unsporting) species such as catfishes were to be got rid of (ibid.:9).

African fishing methods were marginalized on the grounds that they were destructive and unsportsmanlike. African fishermen were accused of using explosives and throwing poisonous plants and remnants of beers dregs into the water and scooping out all sizes of the dazed fish. These methods, it was argued, did not give fish a 'sporting chance' and hence needed to be banned.[4] These views completely ignored the importance of fish as a means of food or employment for the majority of the local African fishermen. They merely re-emphasised the prejudices of the settler-community towards local fishing methods. African fishermen were further marginalized as most of the water bodies were on private lands or in National Parks. Existing legislation and land tenure system made it almost impossible for local people to access these water bodies for fishing purposes. However, other non-white races were treated much better. In 1952, it was decided that no restrictions should be placed on the rights of Asiatic and Coloured people to fish in park waters on the same basis as Europeans who were not members of particular Angling Societies concerned.[5]

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1 Zambia National Archives, Reference No. Sec 6/190, Correspondence from Director of Game and Tsetse Control to Mine Office, Shabane Mine, 17/9/1946.

2 Federal Ministry of Agriculture, 'Memo on Fishing, Salisbury, 1955 pp.1-6.

3 Hey D., `Report of A Survey During July-August 1948 on the Potentialities of Inland Fisheries in Southern Rhodesia, Stellenbosch, Inland Fisheries Department, Cape Town, 1948.

4 Bulawayo Chronicle, "Letter to the Editor", 28 June 1948.

5 Government of Southern Rhodesia, Ministry of Mines and Lands, "Report of the National Parks Advisory Board for the Year ended 31 December 1953," Government Printers, Salisbury, 1954.

In 1975, the National Parks Board was renamed the Parks and Wildlife Board. This followed the repealing of various acts related to the conservation of wildlife among them the Fish Conservation Act of 1960. The new act became known as the Parks and Wildlife Act of 1975. In terms of fish conservation the act still retained provisions on how fishing is to be conducted and the fishing methods that were not authorized. The act authorized the minister responsible for the country's fisheries to declare any person to be the Appropriate Authority for any waters in the country. The act further empowered the minister to declare any waters as Fish Conservation Areas if it was considered that there was a threat to the fish in those particular waters. However, further controls on actual fishing were instituted: no person was allowed to fish in any waters without a permit with the exception of those given Appropriate Authority. Other prohibitions included the use of poisons, chemicals or explosive devices in the killing of fish. It was also an offence to disturb any fish on its spawning run or in such areas as spawn is deposited. The provisions on the introduction of alien fish were retained from the previous acts. A number of gears was totally banned. These included spears, spear guns or basket traps. To date, the Parks and Wildlife Act of 1975 governs the conservation of fish in Zimbabwe.

6. FISHING LEGISLATION AND REGULATIONS FOR LAKE KARIBA

By the time that Lake Kariba, which lies on the Zambia/Zimbabwe border, was constructed in the late 1950's two different fishing policies and regulations had emerged in each of the two countries. In Zambia the regulations supported the utilization of the fishing industry to feed labour in urban areas and to pay for the running of Native Authorities. These objectives were met by allowing local fishermen access to the country's numerous water bodies. In Zimbabwe the fishing policy and regulations were on the promotion of fishing as a sport. Individuals and private associations imported exotic fish species for stocking water bodies most of which could not be accessed by local people. In addition to these differences, the fishing regulations in each of the two countries did not apply to the Zambezi River upon which the lake was to be constructed. The Fish Conservation Ordinance and subsequent ones in Zambia could only apply to fisheries that had been prescribed by the director responsible for fisheries. The Zambezi River was not a prescribed fishery and consequently the ordinances did not apply to it. Similarly, the Game and Fish Preservation Act in Zimbabwe did not apply to the Zambezi River.[1] This meant that new fishing regulations for the Lake Kariba fishery would have to be drawn-up.

As a precautionary measure the two governments had agreed that a 100 mm mesh-size be employed, as the lake was filling-up. At the same time the Zambian authorities began to conduct experiments upon which to justify the new regulations. There wasn't much research conducted on the Zimbabwean side of the lake at the time. By 1960 results from these experiments began to be available. It was on the strength of these results that the Zambian authorities began to advocate for the type of regulations that they felt would be suited to the fishery. The first differences in developing uniform fishing regulations were on the question of the appropriate mesh-size to be employed. Results from the Zambian experiments had indicated that there was no need to have a mesh-size restriction on gillnets to be used.[2] They argued that the initial 100 mm mesh size restriction had been an arbitrary one meant to protect species during the

[1] Zimbabwe National Archives, Ref. No. S1194/1647/12, Correspondence from Conservator of Forests to the Secretary, Department of Agriculture and Lands, 1945.

[2] ZAMBIA NATIONAL ARCHIVES, Ref. No: ML 1/15/17 Correspondence from Director of Game and Fisheries to Permanent Secretary, Native Affairs, 20 July 1962.

stocking exercise as the lake was filling up. The Zambian argued that the dominant species caught in the 50 and 70 mm mesh-size nets were *Alestes imberi* and *Hydrocynus vittatus* (Tiger Fish), which, between them, comprised eighty six percent of fifty millimetres net catches and 38 percent of the 70 mm net catches in experimental netting.[1] These species were not commercially attractive. Furthermore, the effects of using 50 and 70 mm mesh-size nets was not harmful. This is because these nets did not affect dominant commercial species such as *Tilapia, Labeo* and *Distichodus* to a significant extent because they would already have spawned by the time they were caught.[2] The nets would not affect *Alestes imberi* either as this fish has already bred before being caught in even a 50 mm mesh-size net. On the other hand, these nets would remove large quantities of the voracious *Hydrocynus vittatus* which would be of considerable benefit to the fishery (ibid.). It was further argued that the prevailing emphasis of removing vegetarian species tended to produce an imbalance in the predatory/prey proportions of the fish population.[3] It was observed that the continued use of 100 mm mesh-size nets was allowing a constant removal of the bigger fish and best breeding stock, reproduction of the race being left to the small and poorer stock. The Director of Game and Fisheries argued that:

> "In the light of information from research, it was fully agreed that there was no necessity whatsoever for continuing to impose the four-inch mesh size as a minimum. If anything, encouragement should be given to the use of smaller meshes in an endeavour to achieve a more balanced take-off from the fish population. It is not known on what evidence Southern Rhodesia bases its desire to persist with the four-inch minimum restriction."[4]

The Zimbabwean authorities rejected this proposal arguing that they did not favour any changes to the proposed mesh size of 100 mm. They counter-proposed that the 100 mm mesh size should be adhered to until commercial fishing on the lake as a whole had been in operation for a minimum of six months.[5] Secondly, the Zimbabwean authorities argued that they did not have adequate data to support the Zambian argument on mesh-sizes because information collected from their commercial fishing concessionaires was confidential and not for public use. Thirdly, the Zimbabwean authorities argued that they felt it undesirable to remove restrictions 'to avoid confusion to African fishermen.'[6]

The other difference in fishing policy and regulations between the two countries was the question of allowing for full-exploitation of the entire fishery. The Zambian authorities sought to allow for full-scale commercial fishing using gillnets even before the lake had reached its maximum extent. Their counterparts on the Zimbabwean shoreline refused to open the entire fishery to fishing. They argued that there should be no net fishing in the fishery until stocks had stabilized.[7] However, this restriction on the use of nets applied to African fishermen only and

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1 Ibid.

2 Ibid.

3 ZAMBIA NATIONAL ARCHIVES, Ref. No: ML 1/15/17 Correspondence from Director of Game and Fisheries to Permanent Secretary, Native Affairs, 20 July 1962.

4 ZAMBIA NATIONAL ARCHIVES, Ref. No. ML 1/15/17, Correspondence from Director of Game and Fisheries to Permanent Secretary, Native Affairs, 20/7/60.

5 ZAMBIA NATIONAL ARCHIVES, Ref. No. ML 1/15/17, Correspondence from Secretary of Lake Kariba Co-ordinating Committee to Permanent Secretary, Native Affairs, Northern Rhodesia, 27/6/62.

6 ZAMBIA NATIONAL ARCHIVES, Ref. No. Sec 6/560 Lake Kariba Co-ordinating Committee, Technical and Organisational Matters relating to Fishing in Lake Kariba, 21/3/1963.

7 ZAMBIA NATIONAL ARCHIVES, Ref. No: SEC 5/201, Summary Record of a Meeting of Ministers Held in Salisbury on 29/2/60, Kariba Lake Development Company.

did not extend to the white-owned fishing concessionaires. This discriminatory policy was justified on the grounds that the concessionaires had different contracts with the government and were also assisting in the collection of data and could thus not be restricted from fishing (ibid.). Consequently, gillnet fishing for African artisanal fishermen on the Zimbabwean side was not allowed until the passing of the Fish Conservation (Kariba Controlled Fishing Area) Regulations in 1962. This contrasts with the Zambian side where fishing had commenced as soon as the lake began to fill-up.

The differences between the Zambian and Zimbabwean authorities reflect the different roles of the fishing industry to the two countries social and economic interests. The Zambians advocated for a policy and regulations that would maximize the exploitation of commercially important fish species. This was in line with the need to make the fishery provide food to labour in the urban areas. To the authorities species such as *Hydrocynus vittatus* (Tiger Fish) were not commercially important and thus of little value. However, this contrasted with the Zimbabwean fishing policy that put emphasis on sport fishing for recreation and tourism. Within this policy the promotion of fish species such as Tiger Fish that "have virtues of superiority in fighting ability" was paramount. The second difference reflects the Zambian policy of using natural resources such as fish to raise revenue for Native Authorities. It was on this basis that they advocated for full-exploitation of the fishery as a means to raise money for the local Native Authority known as the Gwembe Tonga Native Authority (GTNA). Owing to the manner of colonial rule such a policy did not emerge in Zimbabwe and, much more fundamentally, there were no permanent human settlements along the shores of the lake whose inhabitants would have befitted from such a revenue.[1] All the local people who had lived on the banks of the river had been resettled further from the lakeshore. There was also a general belief on the Zimbabwean shoreline that local fishing methods were inherently harmful. Therefore, there was need to control the activities of local fishermen to avoid the new fishery, which became the biggest in the country, from being overfished.

These differences were not resolved. To date, the fishing policy and regulations between the Zambian and Zimbabwean fisheries have remained different. The entire Zambian shoreline is fished and the minimum mesh-size net employed is 75 mm. This contrasts with the Zimbabwean shoreline where about only 60 percent of the lakeshore is open to artisanal fishing. The rest of the grounds are closed to fishing as they lie close to National Parks area where only sport angling is permitted or they are used to re-stock the fished areas. Artisanal fishing is also not authorized in river mouths that are considered to be breeding areas of fish species such as Tiger Fish. On this shoreline the minimum mesh size allowed is100 mm. Evidence from both shorelines, however, indicates that the use of methods considered illegal is still prevalent. Active fishing or *kutumpula* is still widely practised by artisanal fishermen especially on the Zambian shoreline. The fishermen contend that the method is not harmful to the fishery. They observe that without employing this method they would not catch particular size and specie of fish. On the Zimbabwean shoreline the violation of fishing regulations such as fishing from parts of the lake that are closed to fishing is also rampant. Fishermen contend that their existing fishing grounds are not adequate and hence they have to encroach on closed areas. In order to counter the policing activities of the authorities, fishermen have formed networks that they use to evade arrest. Furthermore, these encounters with the authorities have led to the development of a vessel that consists of corrugated iron and a thin strip of wood. These

[1] Zambia National Archives, Reference No. SP 4/7/16, Minutes of a meeting of ministers held in Salisbury on 11/12/1959.

vessels are used to fish from closed areas especially estuaries. Being simple to make the boats can be easily abandoned whenever there is a confrontation with the authorities.

7. CONCLUSION

The paper sought to show that although it is generally believed that fishing regulations are based on science, their implementation have to meet the economic and political interests of the state. It was shown that the scientific arguments that had been made to justify the management of game were transferred to the way fisheries were to be managed. It is for this reason that fishing restrictions through licensing, the setting of minimum mesh sizes and the manner in which certain fishing implements such as weirs were to be used became part of the new fishing regulations. However, these restrictions not only masked the economic interests of the state, such as the need to obtain revenue from fishing licences, but their implementation was also haphazard and brought conflicts between government agents and fishermen. This was particularly the case in Zambia where the government sought to maximize fish production to meet food requirements for labour in the mines while attempting to protect the industry from the destructive fishing methods of local fishermen.

In Zimbabwe fishing regulations emerged as a result of pressure from a sport-fishing lobby from among the settlers. Here there was emphasis on stocking water bodies with exotic fish-species that were amenable to angling. With the emerging land tenure system that placed most of the water bodies in private and state lands, most of the local people were marginalized from fishing. These differences in approach to fishing regulations were to manifest themselves when attempts to have joint fishing regulations for Lake Kariba were made. The Zambian sought regulations that would maximize fish production to feed labour and meet the revenue requirements of the local Native Authority. The Zimbabweans wanted regulations that would promote sport fishing and control the fishing activities of local fishermen. These differences in approach to regulations were not resolved and each country went on to implement its own type of regulations.

This study has shown that although science influenced the manner in which regulations emerged, regulations have to fit the economic and political interests of the country to which they apply. As these interests may be at variance with scientific conclusions there is conflict and ambiguity in the manner in which regulations are developed and implemented.

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