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Whose Commons?

Fishermen, Developmentalists and Conservationists on Lake Malawi

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I. Introduction

Fish from Lake Malawi are a major source of animal protein for large numbers of people in Malawi and Mozambique, two of Sub-Saharan Africa's poorest countries. It is estimated that fish, supplied by a dynamic and diverse small-scale African fishing industry, contribute seventy percent of animal protein consumed by Malawians per year (Alimoso et al. 1990).

In this paper we briefly discuss the scale and social organization of fishing and what we have learned about use rights in the southern and central portions of Lake Malawi. We propose that the open access fishing which exists in these areas has not significantly harmed fish stocks to date, although problems may be emerging. An equal, if not greater, threat to the fish, fishing and the ecology of Lake Malawi than that posed by open access small-scale fishing originates from developmentalists-- internal and external actors advocating large-scale, capital intensive exploitation of the fish and the development of an international tourism industry. We also suggest that conservationists will remain outside of the major debates about the lake so long as they concentrate on cichlid species diversity and natural beauty and neglect the lake's importance as a source of livelihood and protein. These combined forces jeopardize the lake and its people.

We report on a three year study of fishing communities on Lake Malawi which is just getting underway.¹ Our findings are based on research conducted between July and September, 1990, in six Malawian fishing villages in the southern and central parts of the lake. Our comments are preliminary as the data have not yet been completely analyzed.

II. Lake Malawi and its Fishing Peoples

Lake Malawi, one of the Great Lakes of Africa, is situated in the southern end of the rift valley and is bordered by Malawi, Mozambique and Tanzania. The lake is approximately 350 miles long and varies between 12 to 48 miles in width (Alimoso et al. 1990). Fish stocks are most plentiful in the shallow southern end of the lake and decline toward the north as the lake increases in depth and the coastal shelf decreases in size. The lake has a very diverse fauna. Having perhaps the greatest number of cichlid species in the world, it is an important source of aquarium fish for the international market (Bass 1989, Alimoso et al. 1990). In addition, representatives of the fish families tilapia, oreochromis (chambo), cyprinidae (including barbus), barilius (mpasa), clariidae, haplochromis (utaka) and others are important for human consumption (Lowe-McConnell 1975, 1987). The largest portion of the lakeshore is claimed by Malawi, a

densely populated country with a per capita income of under \$200.00 per year (The World Bank 1990). Malawi has one of the highest rates of malnutrition in southern Africa, with one out of three children dying before reaching the age of five.

Annual fish catch from the Malawian side of the lake is estimated to be approximately 40,000 metric tons (Alimoso et al. 1990).² Most of this fish is caught by small-scale fishermen; the so called artisanal or traditional sector lands nearly 90% of the catch using an estimated 5,038 dugout canoes, 1,285 plank boats and various types of nets and lines in their operations.³ Few of the craft are motorized.

The remaining 10% of the catch comes from what are termed semi-commercial and commercial operators. There are a total of fifteen pair trawlers (of which ten are operational) in the semi-commercial sector and three trawlers and three ring net vessels (in various stages of disrepair) in the commercial sector. The commercial operation, MALDECO (Malawi Development Corporation), is fully owned by Press Foods, Ltd., a subsidiary of Press Corporation Ltd., the president of the country's company (Alimoso et al. 1990, FAO/World Bank 1990).

While the lake is jointly shared by three nations, only Malawi has a functioning system for the lake's management.⁴ The Fisheries Department (in the Ministry of Forestry and Natural Resources) has primary responsibility for the lake. This responsibility is partially shared with National Parks (also in the Ministry of Forestry and Natural Resources), the Ministry of Commerce, Industry and Tourism and the Ministry of Transport and Communications. Other government ministries such as Agriculture also have interests in the lake and their actions effect water quality and fish and human health.

One "underwater" national park, Cape MacClear, was established in the 1970s. Located at the boundary between the southeast and southwest arms of the lake, Cape MacClear is regulated by the National Parks Department which imposes limits on inshore fishing during certain seasons. In addition, the Ministry of Transport and Communications is responsible for inspecting and taxing boats, while the Ministry of Commerce promotes tourist development along the lakeshore.

The Fisheries Act of the Laws of Malawi provides the framework for regulation of gear and licensing, imposing minimum allowable catch sizes and closed seasons for particular fish species. Fisheries has also divided the lake into zones for trawler operations, and prohibits these craft from operating after dark. In addition, Fisheries limits the number of licenses issued to fishermen in the semi-commercial and commercial sectors.

The small-scale commercial fishermen are regulated by Fisheries

as well. While no system of licensing or zoning exists for these fishermen, taxes are imposed on various types of nets, and the use of certain nets is limited by season, time of day and mesh size.

Our findings (which are consistent with consultants' reports) and our discussions with Fisheries Department personnel indicate that enforcement of Fisheries, National Parks and other regulations cannot be carried out effectively under the current budgetary constraints faced by the respective ministries. The Fisheries Department lacks vehicles, boats, extension and regulatory personnel to fulfill its mandate to protect the fish species most susceptible to over-fishing. Thus, despite a series of laws and regulations, little enforcement occurs (FAO/World Bank 1990 and personal communications).

There are strong continuities in fishing policy between the colonial and independence periods. During the colonial era, fishing was regarded as a domain principally for Africans. Limits were placed on white commercial fishermen who attempted to enter the fishing business. While some larger-scale, white-owned commercial ventures did exist⁵, these did not dominate fishing (McCracken 1987). Since independence, the Malawian government has continued to support the smaller-scale fishing enterprises while beginning to develop a larger-scale commercial sphere.

The Fisheries Department, as noted earlier, currently divides fishermen into three categories: the artisanal or traditional, the semi-commercial and the commercial sectors. Our surveys reveal that fishermen in the southern and central portions of the lake are commercially oriented -- that is, although they do provision their families with fish, they fish primarily to sell. The difference among fishermen has to do with scale -- the number and size of craft, nets and other gear owned significantly influence the amount of catch. We therefore consider all fishermen as belonging to a single commercial sector which is differentiated internally by size of fishing operation.

Most fishermen who were interviewed in our study did not own boats, canoes or other gear but instead worked as crew members. They think of themselves as fishermen (nsodzi).⁶ Many of the boat owners we surveyed did not go out with their craft, choosing instead to remain on shore and engage in other businesses. Crew members do not consider these owners fishermen, and, in some instances, the boat owners themselves have never actually fished.

III Use-Rights to the Lake

In addition to gathering information on the organization of the fishing sector and formal systems of control and regulation, one of the purposes of our investigation is to examine community-

based systems of lake tenure and other ways in which the lake and its resources are managed by local groups.

In his introduction to A Sea of Small Boats, Cordell suggests that small bodies of water are more amenable to tenure arrangements than is the open sea. Our surveys indicate, however, that the southern and central portions of Lake Malawi are an exception to this generalization.

In our studies in six fishing villages in these areas conducted during July-September, 1990, we sought to examine local-level mechanisms limiting fish catch and beach use. These surveys revealed an absence of community-level systems of lake tenure, no limits on the movement of small-scale fishermen and few restrictions on use of beaches. In the areas we have examined to date, then, it appears that a system of open access prevails. At this point, we do not know if this has always been the case or if it is a result of the expansion of small-scale commercial fishing. Discussions with older fishermen in the southern and central lakeshore villages indicated that lake tenure, if it previously existed, has been absent for many decades. However, a brief reconnaissance survey in the north (Nkhata Bay District) did suggest that tenurial arrangements for certain types of gear (gill nets) exist in some communities there, so it appears that forms of tenure may be present in other parts of the lake.

Most small-scale fishermen keep their boats on land at the various beaches, although there are some areas in the southeastern and southwestern arms where boats can be anchored off shore. Anyone is free use the beaches for fishing purposes. These areas are subject to the authority of village headmen, Malawi Congress Party leaders or, in one instance we found, a Beach Committee made up of the boat owners. While fishermen do not need permission to use the beach, they are expected to inform the headman or other appropriate official of their presence. In doing so, they place regulation of their social behavior under local authority. In one case we found, the headman had asked a group of fishermen to leave the village because of their unacceptable social behavior.

Conflicts among fishermen reportedly develop over entangling of nets in fishing grounds or from efforts by several boats to follow one school of fish. Fishermen state that these disagreements are usually short lived, but, where they are not, they may be taken to the village headman, Malawi Congress Party head or beach committee for resolution. More detailed information and first-hand observation are needed to fully explore the role and extent of local officials' authority in conflict resolution.

Although systems of lake tenure were not found in the southern and central regions, there are social and economic mechanisms

which limit fish catch and entry into fishing. Subject to further analysis of our data, these include:

1) The high cost of boats and gear. The costs of boats, and especially nets, prevent many people from becoming owners of these means of production and limit their participation in fishing to that of crew members. Plank boats made at the two Fisheries Department boat yards cost between 2,400 and 4,000 Malawian Kwacha.⁸ Boats can be purchased from local carpenters for less, but these craft are usually made of softwood and are not as durable as the hardwood boats produced by Fisheries. While canoes, the most numerous craft on Lake Malawi, are much cheaper than plank boats (generally under 200K), suitable woods for their construction have become scarce. The softwood canoes made nowadays must be replaced every two or three years.

The costs of nets are equally, if not more, prohibitive to entry into fishing. Almost all nets in use today are constructed from nylon thread and are usually partially made by the Blantyre Netting Company. Nets range in price from a few hundred Kwacha to 3,000-4,000 Kwacha. They undergo a process of continuous repair using nylon thread which also requires a steady income to purchase. While boats may be rented from other fishermen, nets are not, reflecting both their high value and their centrality in the fishing operation.⁹

2) Lack of access to credit. Small-scale commercial fishermen do not have access to formal systems of credit. Typically, they purchase boats and equipment through savings generated from migrant labor abroad or from fish-trading in Malawi (Chirwa 1989). Others have inherited their gear from relatives. In some cases, fish traders may lend money to boat owners for the purchase of nets. They are reportedly paid back through preferential access to catch.

While there is an institution for lending funds to small-scale enterprises (Small Enterprise Development Organization of Malawi, SEDOM) we found no examples of small-scale fishermen obtaining credit from this organization. Discussions are reportedly underway with donors about extending credit to small-scale operators. Two sources of credit are available to larger-scale trawler operators: the Investment and Development Bank of Malawi and INDEFUND, Investment and Development Fund.

3) Skill and knowledge of fishing. Most fishermen come from families whose members also engaged in fishing. Those who do not have this background have either spent many years learning the skill or, in the case of some boat owners, leave the fishing to hired managers. However, it appears that there are a growing number of crew members and boat owners who come from inland areas and who have little lake experience. As noted below, they are attracted to the occupation by the relatively high earnings it

offers and the lack of other employment alternatives.

4) Willingness to leave the fabric of ones own community. The best fishing is found in the southern, shallow portions of the lake. Many Tonga from the north have moved to the Chewa and Yao dominated south to take advantage of this situation. In addition to this long-distance and usually long-term migration of northerners, there is considerable movement of fishermen from beach to beach on a daily or weekly basis in the southern and central parts of the lake. Many fishermen, especially crew, spend the greater portion of their time living in temporary shelters on beaches away from the main part of the village and from their homes.

Although constraints on boat and gear ownership exist, many people are drawn to fishing because of the relatively high incomes it generates. Our interviews indicate that boat owners and even crew members typically earn more money in a week than the average Malawian does in a month. Crew members report earning up to 100 Kwacha on days when the fishing has been good, while boat owners' incomes are significantly higher (Seymour 1988, 1989). In the south and central portions of the lake the small-scale fishing sector is fully commercialized--people fish to sell and almost all crew are paid in cash (although they may also receive a ration of fish).

Figures on the number of people entering fishing in the last decade are not available, but the number of boats is growing, suggesting an increase in the number of fishermen. At the same time, however, it appears that decapitalization of the small-scale fishing sector has occurred. The number of motors has declined by nearly 1/4 and nets are being repeatedly repaired rather than replaced. While the costs of fishing--boats, nets, petrol and engines--has increased, the price of fish has not kept up with these increased costs, in part reflecting the low purchasing power of the population (Seymour 1989).

In summary, although there are significant capital requirements to becoming boat or net owners and although other important constraints to entering fishing exist, it appears that the number of fishermen is increasing, thus placing pressure on fish resources. In at least one village where we worked, fishermen reported this situation was aggravated by trawling operators who did not observe the one mile off shore limits imposed by Fisheries.

In addition to constraints on entering fishing as an occupation, there are also factors which limit catch in the small-scale sector. As discussed earlier, the Fisheries Department, the Ministry of Transport and Communications and National Parks impose a series of restrictions on the fishing operations of the small-scale fishermen. Although enforcement is very spotty,

presumably these rules, and the fines imposed for breaking them, act in a small way to regulate catch. Other limitations at the local level include:

1) The nature of the equipment used. Given the high costs of motors, the difficulties in getting spare parts and the increasing costs of petrol, almost all craft are now powered by hand, thus imposing some limits on the range of fishing operations. In addition the small size of craft--usually 16 feet or under -- limit fish uptake.

The types of nets employed also influence catch. Use of nylon netting material became widespread on the lake during the 1970s and has all but replaced use of local fibers in the southern and central regions. Presumably the effect of this switch to stronger more durable netting, coupled with the introduction of plank boats which occurred in the 1960s, has been to increase the amount of fish caught, although at this time we are not aware of documentation to support this. The British Overseas Development Administration (ODA) Traditional Fisheries Assessment Project does provide information in current fish stocks but, so far as we know, does not correlate this information with changes in gear.

While nets have been improved by the introduction of nylon, some commonly used ones may impose limitations on catch during certain seasons of the year. For example, gill nets are placed in a stationary fashion in the lake. During the cold season when fish are less active, people employing this net catch fewer fish than they do during the warmer season when the fish are more mobile.

2) The weather. Winds and rains often prevent the small boats from going out. Fishermen report that strong southeasterly winds -- called mwera -- prevent them from fishing for days at a time. Mwera are especially common during the months of June through September, but they may occur at any time. Storms during the rainy season also limit fishing and reduce catch.

While bad weather and the type of gear used by small-scale fishermen to some extent reduce the quantities of fish caught, this effect may be countered by the growing number of people attracted to fishing as an occupation. The issue of whether or not the maximum sustainable yield has been reached is much debated. There are reports from the 1930s and 1940s which suggest that at that time the lake was nearing its maximum sustainable yield and was facing an impending crisis (Lowe 1948). At the present time, relatively little is known about the magnitude of fish catches on the Tanzanian and Mozambican sides of Lake Malawi. This lack of information, together with the difficulties in estimating the catch of a small-scale diversified fishing industry in Malawi itself, means that it is difficult to accurately state what the yearly harvest from the lake is.

At this point in our study, we suggest that although constraints both to entering fishing and on the amount of fish caught do exist in the small-scale sector, as the number of fishermen increases, these limitations may not be sufficient to prevent overfishing. The government of Malawi is facing some difficult decisions regarding the appropriate scale of fishing operations.

IV. Additional Pressures on and Threats to Fisheries Resources¹⁰

In an analysis of artisanal fisheries in Africa, Bacle and Cecil (1989) describe the principle underlying one fisheries project in Senegal:

...the set of technical-socio-economic elements that make up artisanal fisheries in a country or a region, constitute a system in equilibrium with its environment. If a change is introduced, which theoretically should be an improvement, the system becomes unbalanced, and a long complex process is required for it to regain its equilibrium. (p. 84)

We do not view the small-scale fishermen on Lake Malawi as being in equilibrium with their environment because they continuously alter their fishing strategies contingent on changes in fish availability and economic opportunities. Nonetheless, we do think the caution Bacle and Cecil sound regarding induced change is well-placed given what we consider to be the major pressures on Lake Malawi.

To date, fully commercial fishermen, although small-scale, have not dangerously depleted fish stocks nor are there indications that they have diminished biological diversity. Where this has occurred, there are suggestions that other factors -- such as trawlers and increased water salinity resulting from irrigation schemes -- are responsible (Alimoso et al. 1990, Bweya and Webb 1985; Tweddle 1990 personal communication).

The Government of Malawi has been highly protective of the lake. For many years it has opposed efforts to introduce exotic fish species as a means of increasing yields. Most recently, it has sought to limit species introductions for aquaculture, fearing that these may escape and threaten existing indigenous lake stocks. The government also has prevented the construction of a pulp paper mill even though several thousand hectares of pine had been planted to supply the mill. This operation would have seriously polluted lake waters. In addition, the government created Lake Malawi National Park designed to preserve cichlid and other fish species diversity.

Despite this promising history, a constellation of factors suggest that there are growing risks to Lake Malawi's role as the supplier of a major source of employment and of animal protein to

the population. We have already indicated that growing poverty coupled with the lucrateness of fishing is driving more people into this occupation, thus increasing pressures on fish stocks. While this is an important process, the following factors have an equally if not more significant impact on the lake and its peoples:

1) A series of risks, in the form of development projects and other types of technical assistance, are posed by those who are benignly called "donors". While many donors currently espouse local community participation in decision making regarding management of natural resources (see among others Bromley and Cernea 1989, Chambers 1987) in practice their plans are the opposite.

For example, the World Bank and the FAO have recently proposed a large-scale, long-term project, Malawi Fisheries Project (1990), to the Fisheries Department. The project provides support to the commercial fisheries sector (i.e. MALDECO, a privatized company), the semi-commercial sector (to increase the number of pair trawlers) and the Fisheries Department itself (for a new headquarters, other infrastructure and expatriate staff). Only a small part of the budget (4.4%) is directly allocated toward meeting the needs of the artisanal fishermen responsible for 90% of the catch, and they appear to have had little voice in setting the project agenda.

This proposal reinforces an existing bias toward large-scale, capital intensive ventures and centralized marketing structures as hallmarks of development and progress. One pair trawler operator we interviewed succinctly reflected this bias. When we asked if a new plank boat we had seen on the lake was his, he stated: "No, that one is a toy, my boats [10 meter craft with inboard motors] are ships." It is difficult to overcome the view, held by many donors and recipient/beneficiaries alike, that those who use mechanized equipment are progressive even if such equipment and the scale of operations it embodies are neither equitable nor economically viable.

2) Another series of threats to the lake and its fishing populations originate from internal and external actors seeking to develop the tourist or vacation potential of Lake Malawi. In these cases, hotel owners are lobbying government to move fishing communities from potentially lucrative locations, and middle and upper class urban dwellers are purchasing lake-front property for the construction of cottages, thus sealing off beaches used by fishermen. In one case near Salima in the Central Region, there is a long (and beautiful) beach used by about forty boat owners and their crews. If the hotel company is successful, the fishing village will be relocated to an as yet unidentified site, and the entire beach will become the private property of the hotel. Simultaneously, donor funds would be used to build a jetty and

the pair-trawl operator owning the "ships" would be able to continue fishing from the location.

3) While we hesitate to include conservation efforts in a list of potential threats to the lake and its people, such efforts do pose risks if they fail to link conservation measures with development initiatives.

Much biological research on Lake Malawi fish has focused on the cichlids and the high value commercial species such as chambo.¹¹ Important food fish like usipa and utaka have received little study. Thus, biologists/conservationists ought to conduct more broadly based and socially sensitive research on catch and conservation issues than has occurred to date. A case needs to be continually made for why a poor country like Malawi should preserve biological diversity when it could introduce new species like kapenta, the sardine-type fish found in Lake Tanganyika and Lake Kariba, and increase fish yields.

Conservationists need to address the issue of how maintaining diversity in the fish population can benefit small-scale fishermen and other populations dependent on the fish they catch. Many of the arguments currently supporting the maintenance of crop genetic diversity may apply to fish (Ferguson and Sprecher 1987). These include the possibility that fish diversity offers a form of yield stability. For example, if the catch of utaka is reduced during one season or year, fishermen may be able to switch their efforts to usipa. Also, it is known that certain fish flourish in some ecological niches while others do better in different locations. We suggest that introducing a new species like the Nile perch or the kapenta is similar to the risks which result from promoting monocropping in agriculture. Although yields may increase, these may fall primarily to wealthier fishermen who can afford the equipment necessary to catch the new fish.¹² In this sense, maintaining diversity may be a better food security and equity strategy than aiming for higher yields alone.

While many fish biologist/conservationists in Malawi have focused their work on the aquarium fish, a recent article by Tweddle (1985) represents an important exception to this trend. He draws attention to the role of the national parks in providing breeding grounds for food fish. Tweddle clearly links conservation with development by pointing out why and how the preservation of forests and rivers in the national parks and elsewhere in the country helps conserve the breeding grounds for some important food fish.

Conservationists in National Parks and other government departments could also work more closely with the Fisheries Department and with communities of fishermen than they have in the past. In the long-term, all parties have a common and vested

interest in maintaining species diversity. Conservationists could assist fishing communities and the Fisheries Department not only in maintaining diversity but also in devising ways that fishing peoples, in addition to hotel operators, could benefit from the development of the tourism industry.

IV. Some Preliminary Thoughts on Policy Implications

One motivation for undertaking the present study is that the fish in Lake Malawi have been better studied than the fishing peoples themselves. For a range of reasons, lakeshore dwellers have not been subject to social science enquiry. Given the importance of Lake Malawi both to the surrounding countries and as a part of the much larger Zambezi River Basin, it is important to begin obtaining empirical information on these communities. We anticipate that such information will be useful to policy makers as they engage in a series of important debates about the lake's future.

Our assumption is that smaller-scale systems of fishing are more equitable, provide livelihoods for larger numbers of people (both directly through fishing, processing and marketing, and indirectly through boat-building, etc.), require less outside assistance, use less fuel, and probably are more efficient than large-scale trawler operations. This possibility needs to be seriously considered when engaging in debates with donors regarding the appropriate scale of fishing operations to be promoted on the lake.

One way the government can demonstrate its long standing commitment to the small-scale fishermen, fish processors and traders is by making loans and other services readily available. For example, it appears that very few people can generate enough money from working as crew members to buy nets or boats. Entering fishing by starting at the bottom is no longer a viable route of advancement -- if it ever was. It seems reasonable to encourage and reward small-scale fishermen's and crew members' knowledge and skill by making loans available to them rather than offering credit solely to those larger-scale operators with existing collateral. In addition, the government, possibly with donor assistance, could fund research to develop improved, longer lasting canoes, the most numerous craft on the lake. Deforestation is proceeding at a rapid pace in Malawi, and the best trees for canoes have been cut down or are not readily accessible because of transport and costs.

Most fishermen interviewed in the course of our survey reported declines in fish availability. For example, the majority of fishermen interviewed in five of the six villages we visited stated that their catches had declined and that there were increasing numbers of fishermen using the lake, while the majority fishermen in only one village reported improved catches.

This information, coupled with Fisheries Department and donor reports, suggests that the issues of stock depletion and overfishing are of growing concern and will need to be addressed in the near future. If more people enter fishing or improve their gear they are likely to catch greater numbers of fish. If resources are shifted into the large-scale commercial sectors and trawling intensifies this may diminish fish catches for small-scale fishermen operating particularly in the shallow portions of the lake in the south.

A debate continues regarding whether or not there are deep water fish resources that can be commercially exploited on Lake Malawi. This issue is to be examined by an ODA funded-research team beginning in 1990. Large-scale commercial fishing might make sense in areas of the lake -- such as the north -- where there may be deep water fish stocks which cannot be harvested by those using canoes and plank boats, but such large-scale operations may not be justified in the south where they directly compete with small-scale fishermen.

It is clear that in the near future, the Fisheries Department will have to effectively limit the number of fishermen on the lake. However, they will not be able to do so on their own, without community support and understanding. In the short term, Fisheries will have to place emphasis on outreach and extension activities to provide fishermen with a way to communicate their needs to the Department as well as a means for Fisheries to explain regulations to fishermen. These regulations need to be simplified, and they should have demonstrated positive consequences for fishermen. Many of those interviewed were concerned about violations of regulations which resulted in declines of fish stocks. We envision (although more extensive research is necessary) the possibility of creating community or beach based groups that can enforce rules or at least inform Fisheries when they are being violated. Policing the lake without fishermen's support will only lead to hostility and conflict.

Our brief investigation has also indicated the need for collaboration and coordination among ministries, department and donors concerned with the lake and its fisheries. The competing demands placed on lake resources by different scales of fishing operations, tourist industry developers, conservationists and agriculturalists (the last, a topic hardly explored in this brief paper) mean that an integrated plan for the lakeshore is needed. Further, such a plan will ultimately have to be coordinated with the interests of the surrounding nations which also claim access to the lake and its resources.

V. Conclusions

The research has revealed a dynamic, small-scale, highly

commercialized fishery which was initially protected by the colonial government and now is supported by the Government of Malawi. However, as pressures build to increase the scale of fishing and to develop international tourism, the livelihood of fishing communities and their associated processors and traders is jeopardized. While we would have liked to report that there were systems of lake tenure which could be built upon to manage the resources, we find that the lake, although technically state property, functions as an open access regime subject to the constraints enumerated earlier. Although there are clearly dangers to the lake's fish and ecology from the small-scale fishermen, there are equal or greater dangers to fishing communities in many donors' plans to increase the scale and intensity of fishing and to concentrate such efforts in the hands of large-scale operators. In addition, conservation biologists have an important role to play in protecting endemic fish species, but they have not yet linked these efforts to those aimed at improving the well being of the populations dependent on the lake for their livelihood.

1. This research on Lake Malawi is part of a larger study, "Fragile Lands, Fragile Lakes" funded by the John D. and Catherine T. MacArthur Foundation. The purpose of the investigation is to explore the social science dimensions of the ecological health of Lakes Malawi and Victoria and to consider means by which the lake-owning nations can coordinate their efforts with regard to lake management.

We use the term "fishermen" instead of a gender neutral term such as "fishers" in this case because we found no evidence of women taking part in fishing itself. However, we do not want to imply that such is impossible in the future or does not exist in other areas of the lake not yet surveyed. Women do currently play an important role in fish processing and trading, aspects of the fishing industry which we have not discussed in this paper, and with access to resources they could play an expanded role in other aspects of fishing and management of the lake.

2. There are no reliable estimates for the Tanzanian and Mozambican catch nor for what might be landed by Malawians on the non-Malawian shore.

3. Annex 1, Table 3, FAO/World Bank Study Mission. 1989

4. Until recently Malawi has recognized only Mozambican claims to the waters of Lake Malawi. The Malawian border on Malawian maps is along the Tanzanian shore. Tanzanian maps however show a different boundary. The recent agreement between the three nations under the Southern African Development Coordinating Council funded

by ODA to explore the deep water resources of Lake Malawi indicates a new level of cooperation between the three countries.

5. The most important one was owned by Mr. Yiannakis which became the parastatal Malawai Development Corporation (MALDECO) and which has now been bought out by the President's own company Press, LTD.

6. The term for crew - alovi - comes from Tonga - a people and language of the northern lakeshore. In the past it referred to people who fished together, often kinsmen. Today, it is used by all fishermen bonded not by kinship but by an enterprise.

7. In addition, there are biological parameters--fish seasonality, breeding patterns and the like--which also influence catch and access but will not be explored here.

8. A Kwacha is currently valued at 2.6 per US dollar.

9. Many net owners seek ritual specialists to enhance the powers of their nets to attract fish. If one net owner appears to be catching more than his/her share while another goes without, this can be attributed to magic or witchcraft and the aggrieved party may seek to counter the other net owner's powers. Nets then have special "charms" or "spells" given to them. These hidden powers apparently lead owners not to lend or rent nets.

10. We are aware that there are other threats to Lake Malawi's ecology. These include deforestation and soil erosion, oil exploration, oil dumping from trawlers and commercial fishing vessels, continued suggestions for the introduction of exotic species which the Malawian government has rejected to date, and even acid rain.

11. Even the study of chambo is recent. The FAO study began one year ago (1989) because of a reported decline in chambo catches and worries over the depletion of fish stocks. It is not yet known how many species of fish are actually included in the category. FAO is not, of course, an organization promoting conservation in this context, but rather trying to maximize fish production.

12. This was the case in the creation of Lake Kariba. While there were many fishermen living along the river they were not in a position to purchase the vessels necessary for the successful harvesting of the introduced kapenta. The kapenta fleet was white owned and highly capitalized providing relatively inexpensive fish for an African market. In the same way one could argue for Lake Victoria that only larger scale commercial fishermen can make a successful living from the Nile perch thus displacing smaller scale fishermen.

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