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ABSTRACT

APPLYING COOPERATIVE MANAGEMENT IN SMALL-SCALE FISHERIES: THE CASES OF LAKES MALOMBE AND CHIUTA, MALAWI

By

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Fisheries management based on cooperation between regulatory agents and fishing communities, or co-management, is increasingly being promoted throughout the world. Malawi, a small African country, has two inland fisheries, at Lakes Malombe and Chiuta, where co-management has been implemented. Co-management at Lake Malombe was initiated by the Fisheries Department and donor organizations, while at Lake Chiuta, fishermen initiated co-management. To determine the success of these two systems, these case studies were analyzed using the Fisheries Co-management Research Project Analytical Framework, a tool that incorporates community profiles, decision-making arrangements, and management incentives, behaviors, and outcomes. Each approach to co-management has resulted in different roles and expectations for the regulatory agents and fishing communities. These differences will affect the success of co-management arrangements and the sustainability of the fisheries, and they offer valuable insight into designing and implementing appropriate co-management arrangements.

To Joel,
my friend, supporter, consultant, and more

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INTRODUCTION

Fisheries, or systems of fish production, are managed in a variety of ways throughout the world. While most fisheries are managed for the goal of sustainable fish production, a diverse range of considerations must be incorporated into management if this goal is to be achieved. Since social, economic, cultural, and biological conditions vary throughout the world, fisheries management systems likewise vary. Very often, conventional government managers are unable to manage effectively or efficiently due to limited finances and trained personnel, as well as limited understanding of fishing activity. In these cases, community involvement in management is of paramount importance.

This work is an investigation of fisheries management based on community participation and authority, in which communities cooperate with government agencies. Two case studies in Malawi offer valuable insight about designing, implementing, and maintaining this alternative form of fisheries management. This work begins with a description of the socio-economic, political, and environmental conditions in Malawi, a small African developing country. Literature on fisheries management and community participation is then thoroughly described, addressing both cooperative management theory and application. This review is followed by a description of the analytical framework through which the two case studies were examined. Each of the two case

studies is then presented, focusing on community variables as well as management incentives, behaviors, and outcomes. Finally, this study presents conclusions about implementing cooperative management and offers several recommendations for improving and expanding these systems.

PROFILE OF MALAWI

Malawi is a relatively small landlocked country in southeastern Africa. Due to its high population growth rate, widespread health problems, struggling economy, and limited services and infrastructure, it can be classified as a developing country. Malawi's population, predominantly rural and poor, consists of several different ethnic groups, yet Malawians are united by their history of political repression (Posner 1995). British control of Malawi ended in 1964, and the subsequent oppressive rule of "Life President" Banda ended in 1994 (Derman and Ferguson 1995). Malawi's young democracy faces the complicated problems common to developing countries -- in order to meet Malawians' diverse needs, the government must address and resolve several complex and interrelated issues, such as how to provide basic services, infrastructure, economic growth, food security, human population reduction, environmental protection, and government accountability.

Poverty and Environment

Malawi's 118,480 km^2 are populated with an estimated 11 million people, and this density is increasing rapidly as the population grows at 3.3% annually (World Bank 1995).

Malawi's population density and growth rate are among the highest in Africa, increasing pressures on already scarce land resources. Considering that 25% of the country's area consists of lakes and rivers and another 28% is designated as national parks, forest reserves, or private estates, most of the people are crowded on the remaining 55,700 km² (NEAP 1994). Population density is highest in the southern and central regions, where land is most suitable for agriculture and more trade opportunities exist (Msukwa 1994). The countryside is becoming increasingly crowded -- 90% of the population lives in rural areas, and most households have landholdings less than 1.0 ha (World Bank 1995). Utilizing mountainsides and all other marginally productive areas, subsistence agriculture is near maximum capacity.

Poverty is widespread and severe. Malawi's economy, largely based on estate agriculture, has been negatively affected by poor trade conditions and drought. Structural adjustment policies and international aid are intended to reverse negative economic trends, although these gains have not benefitted the majority of the population (Msukwa 1994). Malawi's GNP per capita of US$240 is among the lowest in the world, yet most people make far less -- in 1992 four out of five rural smallholders made less that 240 Kwacha annually (roughly US$55.00; World Bank 1995). Living conditions are extremely poor; most people do not earn enough to meet their basic needs. The government provides little or no form of social security to most people; even basic primary services such as health care and education are limited and unequally distributed -- unaffordable and inaccessible to the majority. There may be several complex and interrelated reasons for this poverty, including improper planning, administration, or budgeting of social and economic programs.

Malnutrition and mortality rates are very high and show no signs of decreasing. Infectious diseases and malaria cause several thousand fatalities annually, and an estimated 2 million Malawians will be infected with HIV by the year 2000 (World Bank 1995). The welfare of children is especially poor. Due to inadequate social security, lack of contraceptives, and low status of women, the average woman bears seven children (World Bank 1995). Since average life expectancy is only 44 years, the high birth rate results in nearly half the population being under 15 years of age. Due to high rates of malnutrition and infectious diseases among children age 5 and younger, over one in four are underweight, half display stunted growth, and one in four will die (World Bank 1995).

Governmental attempts to improve human health, poverty, and other living conditions have achieved only limited success, due to a variety of reasons mentioned above. Faced with few economic options and increasing needs for land, food, and fuelwood, people are becoming more dependent on natural resources. As a result, deforestation is reaching crisis levels with forests on customary (non-protected, non-private, commonly held) lands decreasing at 3.5% annually (UNDP 1994). People are converting more marginal and protected lands to agriculture, thereby severely disrupting habitat and water cycles. Deforestation is also resulting in significant levels of erosion, which in turn threatens soil fertility, aquatic productivity, and food security. The incredible diversity of Malawi's native flora and fauna, among the country's greatest assets, is increasingly threatened by the growing human population.

Political Situation and Policy Development

In 1994 the Government of Malawi (GOM) underwent a significant transition from a one-party state to a multi-party democracy (Derman and Ferguson 1995). The political climate accompanying this transition was characterized by an increased sense of freedom and government accountability (Posner 1995). In this new social and political setting, the government began to re-examine several of its laws and policies, especially those affecting the interrelated areas of poverty, the environment, and economic development. Poverty alleviation is now the paramount goal of the Malawian government, and several policy statements, including the *Statement of Development Policies, 1987-1996*, acknowledge that this cannot be achieved without proper environmental conservation and sustainable economic development (GOM 1994).

How are policies changing in order to alleviate poverty, conserve the environment, and promote economic activity? In a policy shift away from centralized development approaches, the GOM is currently forming and promoting policies and laws which emphasize community participation in decision-making. In what was formerly a tightly-controlled authoritarian state, decentralization and opportunities for citizen involvement are now often promoted, especially in the areas of rural development and natural resource management (Ferguson and Derman 1993, Steiner and Rihoy 1995, Dobson 1996). The sources of this shift may lie in the government's recognition of both its limited ability to fund and administer rural economic/resource development and local communities' ability to direct their own development. Considering Malawi's extreme reliance on donor support, however, the government's priorities may also be shaped by the community-based priorities of some aid donors (Ferguson and Derman 1993, Dobson 1996).

Certain international aid-donating organizations are playing a highly significant role in the new direction of Malawi's policies. Poverty alleviation through environmental conservation and community development is promoted by the United Nations Development Programme 5th Country Programme (1994) and United States Agency for International Development Natural Resource Management and Environmental Support Program (1995). This interest and financial support from the international donor community provides Malawi with much needed information and resources. Successful completion of these development programs, however, require multiple-year donor commitments. Since the GOM relies very heavily on donors-driven development programs which may not always be present, they are at risk of becoming too dependent on these external funding sources.

With considerable donor influence, the GOM is currently updating and improving the country's approach to environmental conservation and community development (Dobson 1996). Initially, interdisciplinary task forces composed of private sector, academic, and government interests were formed to evaluate and restructure Malawi's environmental laws and policies. At the same time, through several workshops, local communities were consulted to identify localized problems and possible solutions. The product of these collaborations is the 1994 National Environmental Action Plan (NEAP), which offers detailed recommendations for the conservation and sustainable use of Malawi's natural resources, largely through effective involvement of resource-dependent communities. The NEAP attempts to replace a fragmented, sectoral approach to natural resources policy with a more holistic and coordinated legal and administrative framework (Dobson 1996). The NEAP therefore provides a basis for more sustainable and effective

environmental law and policy.

The status of several environment-related laws reflect the new conservation-oriented interest of the GOM. Foremost is the Environment Management Act (EMA), the new environmental framework law passed by Malawi's Parliament in June 1996. The EMA's purpose is to promote consistency and cooperation in Malawi's legal approach to environmental conservation, protection, and development as well as to implement an Environmental Impact Assessment process (Dobson 1996, MFNR 1996). Through implementing this law, Malawi's laws and institutions that impact the environment are being re-structured in a more coordinated manner. Cross-sector policy coordination is being pursued through multiple environmentally-focused steering committees and task forces (NEAP 1994).

All ministries involved in natural resources management have been drafting new policies and sectoral legislation in light of EMA's 1996 enactment. The Fisheries Department, Department of Parks and Wildlife, Department of Forestry, and others are all drafting laws and policies generally consistent with the EMA framework (Dobson 1996, MFNR 1996). The effectiveness of these new laws and policies will depend largely on the content of the final drafts presented to Parliament for enactment, therefore it is too soon to determine the success of the EMA.

MALAWI'S SMALL-SCALE FISHERIES

Malawi contains several lakes and rivers which support fishing activity (Figure 1). The commercial and semi-commercial sectors are relatively small but highly efficient. On

Figure 1. Malawi and its Water Bodies

the largest lake, Lake Malawi (567 km long and up to 64 km wide), only one large commercial venture is in place, operated by Malawi Development Corporation (MALDECO), and several semi-commercial pair trawl operations can be found (FAO 1993). Together these sectors account for ~10% of Malawi's total fishery production (UNDP 1994). All other fishing, whether for subsistence or small private ventures, is generally classified as small-scale. Small-scale fisheries are characterized by labor-intensive traditional modes of production; gears, vessels, and processing methods usually have low capital investment and low levels of mechanization, yet they may be highly productive (Bâcle and Cecil 1989, McCully 1991, FAO 1993, Marshall and Maes 1994).

An estimated 200,000 Malawians rely on small-scale fishing for economic activity such as fish harvesting, processing, and trading; it is estimated that an additional 800,000 people are involved in secondary economic activity from these fisheries (UNDP 1994). Throughout the country these activities generate 190 million kwacha annually (in 1994, approximately US$27.1 million; UNDP). While fishing is important economically, Malawians also rely on fish for nutrition -- over 70% of the nation's dietary animal protein comes from its fisheries (UNDP 1994). Aquaculture may help reduce the pressures on the capture fishery; however, this practice is still in its infancy. In recent years small-scale subsistence aquaculture has expanded in Malawi with the support of extension services, yet production is relatively low at less than 40 tons per year (FD 1993).

Problematic Fishing Intensity

An increasing number of Malawians, having few economic options (as explained earlier), are attracted to fishing by the combined benefits of food, work, and low barriers

to entry (Ferguson *et al.* 1993, Derman *et al.* 1994). Yet the open-access commercial, semi-commercial, and small-scale fisheries now have more fishing effort than the lakes and rivers can support, and many stocks are declining (FAO 1993, Tweddle 1995, Mana 1996). Not only are more people fishing, but their gear is becoming increasingly efficient. MALDECO has recently acquired a new, faster trawler (Tweddle 1995) and was slated to receive other "modernizations" through a World Bank fisheries development project (Ferguson *et al.* 1993, Derman *et al.* 1994). Furthermore, it is now common for seine nets to be lined with mosquito netting, taking fish at all life stages (van Zilange *et al.* 1991, FAO 1993, Marshall and Maes 1994).

Malawi's diverse and productive aquatic ecosystems are capable of supporting a healthy fishing industry, but these intense fishing pressures are causing the stocks to decline. This decline was made evident in a comprehensive 1993 study done by the Food and Agriculture Organization of the United Nations. This report demonstrated that overall production in the country has fluctuated between 60,000 and 80,000 kg annually over the last few decades, yet since the late 1980s total catch has taken a downward trend (Figure 2; FD 1993). Although catch may appear stable overall, this is a deceiving indicator of fish abundance. The increased number of fishermen using more efficient gear in all sectors has resulted in a decreasing catch per unit effort in many areas; in fact, the FAO study (1993) revealed localized depletions of fish, such as chambo (*Oreochromis spp.*) in Lake Malombe. These trends may be interpreted as early warning signs of overfishing.

Overfishing and stock depletion are not unique to Malawi; however, its fish are unique. Contained within Malawi's 24,000 km^2 of freshwater lakes and rivers are an

Figure 2. Total Fisheries Production in Malawi

incredible diversity of endemic fish, most notably cichlids. Fish taxonomists estimate there are anywhere from 1000 to 2000 species, mostly found in southern Lake Malawi, of which only about 450 have been described (Stauffer 1996). Overfishing threatens not only the health and security of several thousand Malawians, but it also threatens one of the world's most biologically diverse and scientifically valuable areas. The international scientific community has taken some interest in these fishes, although only limited assistance for conservation has been channeled to Lake Malawi fishing communities (Derman *et al.* 1994).

The impact on fish habitat created by an individual small-scale fishing operation can range from minor to severe. Most fishing is done from dug-out canoes or plank boats; most of these are non-motorized (Sodzapanja *et al.* 1995). When fishermen use relatively small handmade gill nets, seine nets, fish traps, and long lines, habitat impact can be slight.

However, gear can also be extremely destructive -- beach seine nets' headline length can reach up to 1000 m or more (FAO 1993). When these nets are pulled onto shore, the near-shore fish breeding and feeding areas are usually destroyed (van Zilange *et al.* 1991, Wilson 1993). Furthermore, when this kind of effort is multiplied by several thousand fishermen throughout the most productive areas (the Southeast arm of Lake Malawi, Lake Malombe, and the Upper Shire River), the cumulative ecological impact is severe (FAO 1993).

Fishing pressures have increased in recent years partially due to a fluctuation in precipitation. In the early 1990s rainfall decreased dramatically, and several countries in southern Africa, including Malawi, suffered from the effects of drought for several years (Marshall and Maes 1994). In 1992 Lake Chilwa dried up completely, and all the lake's fishermen migrated to Lakes Malombe and Chiuta, the Upper Shire River, and the Southeast Arm of Lake Malawi. The lack of rainfall also severely hindered the country's agricultural output (Msukwa 1994), so more people entered the fisheries seeking food and employment.

The rainy season of December 1995 to April 1996 saw a return to average precipitation, but Malawi is still affected by the lack of rainfall, especially in fisheries. The combined effects of fishermen's migration and free entry dramatically increased pressures on remaining fish stocks. Although the drought has apparently ended, fish stocks are still depressed and many migrant fishermen have not returned to Lake Chilwa. Even though Lake Chilwa has since returned to normal water levels, natural fish populations capable of supporting a fishery had not rebounded as of early 1996 -- this could take several years. Managers have not stocked the lake in the interest of preserving natural populations and

saving money; however, they will consider stocking if populations do not rebound (Dissi 1996).

Regulatory Approaches of the Fisheries Department

As stated in the 1993 Fisheries Department (FD) Annual Report and several policy statements, the FD is committed to the objectives of maximizing the sustainable yield of fish stocks, increasing the efficiency of all fishing-related operations, and protecting the diverse fish fauna. Their approach to achieving these objectives is based on a broad plan involving research and extension, as well as monitoring and regulating all aspects of the fishery (FD 1993).

Since the GOM adopted the current Fisheries Act in 1977, the FD has been responsible for regulating gear specifications, license requirements, and closed seasons for all fishing activity. This management approach can be classified as "top-down," in which a centralized government agency is responsible for conducting or administering all regulating, monitoring, enforcing, research, and extension (Ferguson *et al.* 1993, IIED 1994, Steiner and Rihoy 1995). In order to perform all these management functions adequately, however, the FD requires appropriate levels of funding for transport, supplies, and trained personnel. As is the case in many developing countries, the FD is hampered by a lack of available funds, and yearly budgets do not cover all management expenses (Mtuwa 1995).

Effective management is made even more difficult due to fishermen's short-term survival strategy. Uncertain about the future of regulations and fish availability, most fishermen are only interested in meeting their short-term needs. As a result, they harvest

as many fish as possible as quickly as they can, given their frequently worn-out equipment and lack of motors (Bland and Donda 1995, Mtuwa 1995). This short-term survival strategy contributes to a lack of incentive to comply with regulations. However, fishermen also have little incentive to comply because very often, regulations seem illogical; for example, a uniform lake-wide closed season is appropriate for only one of several target species. Furthermore, enforcement is irregular and inconsistent; it is possible that fishermen's benefits of violating surpass the penalties of uncertain enforcement. The FD's generally ineffective management does little to prevent overfishing and habitat destruction by the growing number of fishermen (UNDP 1994).

ALTERNATIVE FISHERIES MANAGEMENT IN MALAWI

Recognizing their limited ability to perform all management functions, in the early 1990s, the FD began to consider an alternative management arrangement (FD 1993). Following the lead of other natural resource managers and influenced by interests of aid donating institutions, the FD considered a decentralized, community participation approach to fisheries management (Ferguson and Derman 1993). The Malawi-German Fisheries and Aquaculture Development Project (MAGFAD), part of the German donor organization Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), helped develop a fisheries management system based on extension and community participation (Bland and Donda 1995).

In 1994, with the assistance of MAGFAD and other donor organizations, the FD initiated a pilot project in cooperative management (co-management) at Lake Malombe

and the Upper Shire River (Ferguson and Derman 1993, Wilson 1993, Bland and Donda 1995, Mtuwa 1995). Having additional fishermen, overly efficient gear, and poor relations with the FD, the Lake Malombe fishery experiences reduced catch per unit effort, habitat destruction, and low compliance. These problems are primarily rooted in a long history of top-down management which failed to consider or incorporate communities' economies or cultures (Mtuwa 1995). Co-management differs from top-down systems, as it is based on FD-community cooperation and collaboration.

Another alternative form of small-scale fisheries management is in place at Lake Chiuta, Malawi. This co-management system differs from the Lake Malombe system in that it is not part of a donor-driven project, but is rooted in a more "bottom-up," grass-roots approach (Dissi 1995). The Lake Chiuta fishery also has a recent history of overfishing and habitat degradation, although this fishery has not been largely influenced by top-down FD management systems.

Malawi's two examples of co-management demonstrate the variability that surrounds this alternative form of management. Recognizing the usefulness and potential effectiveness of co-management, the FD intended to implement this potentially useful form of management. Implementing such management was complicated, however, due to the limited number of previous African examples upon which to model fisheries co-management. As a result, co-management in Malawi has evolved differently in fishing villages at each of the two lakes. At each lake, the respective roles of the FD and the communities vary in both implementation and operation of co-management.

Study Objective

By evaluating and comparing the roles of key actors at Lakes Malombe and Chiuta and determining the level of co-management "success," this study will evaluate various factors that contribute to successful applied co-management. Co-management at each lake will also be compared to theories in co-management literature, thereby supporting or contradicting current theories. The primary purposes of this study are 1) to examine what the FD is and is not doing to facilitate the success of co-management at each site, and 2) to evaluate the similarities and differences between theoretical and applied co-management. These evaluations will enable the author to make general recommendations for appropriate co-management policy approaches.

Justification

Malawian policy regarding natural resources management is undergoing significant transition as interest in co-management, as opposed to state control, increases. In light of current policy development in the FD and other agencies, this is a critical time to evaluate and improve co-management policy approaches. Having been in place for over two years, review and evaluation of the PFMP could prove very useful. The FD's policy needs to be analyzed promptly so the co-management approach can be successful as it is expanded to fishing villages on Lake Malawi. This study can serve as an important evaluation; as an independent study, it is perhaps more comprehensive and unbiased than a FD review.

Furthermore, any and all government policy needs to be critically analyzed in context of the current state of relevant theories. Just as research on specific biological, economic, and social factors of fisheries are important, assessments of official policy

incorporating these factors and the FD's ensuing action or inaction are also crucial. From a more theoretical standpoint, analysis of different policy approaches to small-scale inland fisheries co-management is needed. Comparing and contrasting the co-management approaches at each lake will provide crucial information to Malawi's FD, as well as others interested in implementing small-scale fisheries co-management. Adoption of co-management in the inland fisheries of Africa is in a relatively early stage, so these examples are important elsewhere on the continent as models.

Chapter 2

LITERATURE REVIEW

Fisheries are complex systems to manage due to the diverse factors that managers, whether in a centralized government agency or a fishing community, must consider. While fishery management largely focuses on fish ecology, appropriate management cannot take place without considering the social, economic, and cultural elements that affect a fishing community; after all, "fisheries," or systems of fish production, would not exist without fishing people (Charles 1988, Valdés-Pizzini 1990, Mtuwa 1995). Managers must consider the elements of human behavior that influence fishermen choice, and they must also work within and constantly review the limitations of fishing laws and policies.

Conventional Fishery Management in Malawi and other Developing Countries

The management problems encountered by the Malawi FD are experienced by nearly all government agencies charged with sustaining fishery productivity in developing countries. Very often these fishery departments are underfunded, understaffed, and underequipped; this lack of management resources affects managers' ability to collect and disseminate information, monitor activity, and enforce regulations (Kurien 1988, Berkes and Kislalioglu 1991, Marshall and Maes 1994, Gibson and Marks 1995). As a result, managers' involvement with the fishing communities can be irregular and inconsistent, and

this seemingly irrational management behavior can contribute to general suspicion and distrust of managers by members of fishing communities, thereby straining the manager-community relationship.

Further confounding manager-community relations is the "top-down" approach often used by westernized fisheries managers (IIED 1994, Steiner and Rihoy 1995). Fisheries managers in developing countries are often trained in the regulatory approach used by northern/western countries, in which a centralized decision-making body oversees all fishing activity by diverse resource users -- from industrialized commercial operations to recreational sport fishing -- yet rarely involves these users in management (Hamlisch 1989). Many governments and aid organizations have also attempted to "modernize" fisheries in developing countries through technology transfer and increased fish export (McCully 1991). These strategies are usually highly inappropriate for managing small-scale fishing in developing countries, where the western approaches are often incompatible with the basic needs, fishing resources, economic structure, and incentives of fishing communities (Kurien 1988, Valdés-Pizzini 1990, McCully 1991). Thus, even if and when fisheries management is based on sound ecological principles, centralized government management policies are frequently incompatible with the socio-cultural constraints of fishing villages (Bland 1992a, Bland and Donda 1994, Marshall and Maes 1994). When this is the case, fishing people may ignore or misunderstand the potentially inappropriate regulations imposed by non-local managers, since the regulations fail to acknowledge village needs and conditions.

In response to these problems, many fishery managers and researchers agree there is urgent need to develop and implement alternative forms of management (Charles 1988,

Kurien 1988, Pinkerton 1989, Grenfell 1993, Schmidt 1993, Bland and Donda 1994, IIED 1994, Marshall and Maes 1994). In contrast to top-down systems, proposed alternatives are based on various levels of community involvement. These community-based alternatives represent a fundamental shift in resource management paradigms.

CO-MANAGEMENT AND ITS RATIONALE

In a community participation approach to resource management, communities either dominate management decisions (community-based management) or work in cooperation with government agencies (cooperative management, or co-management) (Berkes 1985, Feeny *et al.* 1990, Pomeroy 1990, Bland 1992b, IIED 1994, Gibson and Marks 1995, Steiner and Rihoy 1995). If one visualizes a continuum of management systems with community-controlled and state-controlled management at either end, co-management represents the middle ground between these systems. Under co-management, user communities and government managers cooperate and collaborate to make important management decisions (Charles 1988, Pinkerton 1989 & 1992, Berkes and McCay 1990, Feeny *et al.* 1990, Bland and Donda 1994, Nielsen *et al.* 1996). Both parties are responsible for contributing to management; as a result management can be more appropriate and successful, creating benefits for all parties. This hybrid form of management may be most desirable in many locations, since authority and power rest both with those who rely on the resource and those with some technical and financial resources (Kurien 1988, Bland and Donda 1994, IIED 1994, Steiner and Rihoy 1995).

Community participation may be classified as either "active" or "passive," based on

the nature and extent of community involvement (IIED 1994). As explained in an Overseas Development Administration report on community participation,

> The range of different participatory approaches...can be viewed as a continuum, ranging from limited input into decision-making and control (**passive participation**) to extensive input into decision-making and control (**active participation**). In other words, there is a spectrum of perceptions and attitudes ranging from 'communities are the threat,' through 'communities can't be ignored,' to 'communities control the resource.' (IIED 1994, p. 18, emphasis in original).

Passive systems often resemble current state-controlled systems which may solicit and consider community input; management authority and administration remain centralized (IIED 1994). In a more active community-based management system, members of a resource-dependent community organize to collectively make management decisions; for example, fishing communities would self-regulate aspects such as who fishes, how they fish, when they fish, and what species may be caught (Charles 1988, Kurien 1988, Pomeroy 1990, Bland 1992b). Communities may also collectively determine how to monitor and enforce these standards. Government fisheries personnel assume a supportive role (if any role at all), providing some level of educational and scientific information as well as possible enforcement support. Since social and biological aspects of fishing may differ for each village, each management approach developed by individual communities are more likely to be well suited to unique local conditions (Charles 1988, Kurien 1988, Pomeroy 1990, IIED 1994, Steiner and Rihoy 1995).

Considering the already significant management role and public trust obligations of many government agencies, co-management has received increasing attention over the last several years as a viable long-term management alternative to state-controlled fisheries (Charles 1988, Kurien 1988, Gibson and Marks 1995). Natural resources managers are

increasingly recognizing the valuable contributions user communities can make to management. These contributions do not undermine the necessity or importance of government managers; instead the role of the government is re-directed or re-defined (Berkes and Kislalioglu 1991, Steiner and Rihoy 1995, Nielsen *et al.* 1996). In most cases a formal management body is necessary to represent resource concerns at the national level, provide enforcement support, and conduct research (Charles 1988).

Although one may understand what co-management is and how it works, it is important to also understand *why* it works. Collaboration with communities enhances management by 1) making management regulations more appropriate and 2) creating greater incentives for support and compliance. These principles of co-management are rooted in theory on human behavior and organization.

More Appropriate Regulations

Why are co-management arrangements so potentially effective in fisheries, especially in developing countries? In situations where stock data, scientific information, and other management resources are scarce, the knowledge and incentives of small-scale fishermen can contribute significantly to management. In indigenous and local communities, bodies of resource knowledge are empirical and adaptive, developed through long-term experimentation and observation of local conditions and often sustainable, practical use patterns (DeWalt 1994, Ruddle 1994). Being closest to the resource, in both proximity and dependency, fishing communities are usually in the most logical position to determine appropriate regulations (Berkes and McCay 1990, Schmidt 1993, Bland and Donda 1994, IIED 1994, Steiner and Rihoy 1995). Also, a co-

management arrangement may tap into the traditional authority structure of a community, thereby adding legitimacy to the regulations (Berkes and Kislalioglu 1991, IIED 1994, Steiner and Rihoy 1995). Both of these elements can make management more appropriate by making it more efficient, effective, and socially compatible. The degree of compatibility between a resource management system and the associated social system has a highly significant role in determining management success (Charles 1988, Kurien 1988, Bland 1992b, Bland and Donda 1994, IIED 1994, Steiner and Rihoy 1995).

Incentives to Conserve Resources

The activities of fishing people are directly affected by management decisions and, in turn, fisherman behavior determines whether or not management achieves its goals. Therefore, management must consider and create appropriate incentives to encourage support and compliance by resource users (Charles 1988, Palmer 1993, Steiner and Rihoy 1995). The shared decision-making power of co-management helps promote these incentives. By transferring some decision-making power to communities, co-management may increase the community's sense of responsibility and accountability. When resources users see that regulations come from a process in which they participated -- and that the regulations are reasonable and appropriate -- they may have greater incentive to comply (Charles 1988, Kurien 1988, IIED 1994, Gibson and Marks 1995, Steiner and Rihoy 1995).

An important time factor must also be considered in creating incentives (IIED 1994). In the case of an over-exploited fishery, fishermen must be willing to accept the costs of reducing short-term effort (i.e. economic hardships and/or less food) for the long-

term benefit of rebounding stocks; these incentives must also be incorporated into co-management arrangements (Steiner and Rihoy 1995). Given greater responsibility for the long-term custody and maintenance of the resources, local fishermen may have greater incentive to keep fish populations viable on a long-term basis.

The importance of appropriate incentives is clearly stated in Evelyn Pinkerton's 1989 review of North American fisheries co-management arrangements initiated in the 1980s. Pinkerton defines co-management as "...negotiated agreements and other legal or informal arrangements made...between groups or communities of fishermen and various levels of government responsible for fisheries management..." (1989 p. 4). The co-management arrangements reviewed in her book are portrayed as policy solutions to increasingly complex fishermen-manager conflicts over stock depletion and allocation, data analysis, and community economic development (1989). According to Pinkerton, co-management is based on creating appropriate incentives for all parties:

> Co-management regimes work by altering the relationship among the actors in the fishery....[B]y instituting shared decision-making among these actors, co-management systems set up a game in which the pay-offs are greater for cooperation than for...competition, a game in which the actors can learn to optimize their mutual good and plan co-operatively with long-term horizons (1989 p. 5).

Clearly, the importance of creating appropriate incentives applies to nearly any management conflict. By stating that "pay-offs are greater for cooperation," Pinkerton stresses the important link between incentives, behavior, and benefits. Proper management will certainly lead to greater benefits for all parties involved, and these benefits must be fairly distributed among parties (as must be the costs of management). Proper long-term distribution of net benefits will help ensure all parties have incentive to

cooperate and comply (Charles 1988, Palmer 1993, IIED 1994, Steiner and Rihoy 1995).

Incentives to Conserve Common Property

Property rights regimes have profound impact on how resource users conserve or exploit natural resources. In a common property rights regime,

> the resource is held by an identifiable community of interdependent users who exclude outsiders while regulating amongst members. The rights are unlikely to be exclusive or transferable and are often rights of equal access and use....The rights of the group may be legally recognised... (Nielsen *et al.* 1996).

These features of a common property rights regime foster a greater sense of ownership and accountability within a resource-dependent community. In contrast to common property regimes, state controlled property and open access property are often characterized by a lack of incentive for users to conserve resources, and private property regimes allow owner(s) to exclude others, although the owner may not manage for the best long-term interest of a community (Feeny *et al.* 1990, Nielsen *et al.* 1996). Communal property regimes are based on community-centered incentives; therefore they are emphasized in co-management arrangements (IIED 1994, Steiner and Rihoy 1995).

When communities have a greater sense of ownership and legitimate control over use and access to common property resources, such as fish or wildlife, greater self-regulation and compliance may result (Berkes 1985, Charles 1988, Kurien 1988, Buck 1989, Feeny *et al.* 1990, Berkes and Kislalioglu 1991, IIED 1994, Steiner and Rihoy 1995). Garrett Hardin's proposal that "freedom in the commons brings ruin to all" (1968, p. 1244) rests on the assumptions of complete user selfishness, short-term planning, and absence of community control. Emerging theories in economics and human behavior

suggest that in many cultures, community-based authority to manage fish (or any limited common property resource) discourages overexploitation of the resource, as long as resource users can collectively determine aspects such as who uses the resource and how much of it they use (Berkes 1985, Berkes and McCay 1990, Pomeroy 1990, Berkes and Kislalioglu 1991, Schmidt 1993, IIED 1994, Steiner and Rihoy 1995). By allowing users to limit the influx of additional fishermen and overall harvest, the common property resource is less likely to be overexploited.

In light of these necessary constraints on harvest, common property users often need legal backing and the support of other management bodies. Such legally supportive functions may be built into a co-management arrangement. Guaranteed of having long-term collective control over access and harvest through formally recognized resource property rights, fishermen would be more likely to abandon the short-term survival strategy (Kurien 1988, Feeny *et al.* 1990, IIED 1994, Steiner and Rihoy 1995). No longer uncertain about the future of regulations and enforcement, fishermen would have greater confidence in their long-term ability to manage the resource.

Assumptions

Theories supporting community-based or cooperative management are based on several assumptions. This approach assumes that if communities are given management opportunity and information about fish biology and protection, they will willingly participate in management systems. Such a response assumes that fishing community culture allows for some degree of collaboration and cooperation between communities and the FD (Bland 1992b, IIED 1994, Steiner and Rihoy 1995). In addition, the success of

alternative management systems also hinges on several assumptions rooted in economic theory and human nature, since fish have customarily been considered a common property resource (Berkes 1985, Charles 1988, Buck 1989, Berkes and McCay 1990, Feeny *et al.* 1990, Berkes and Kislalioglu 1991, Bland 1992b, Schmidt 1993, Bland and Donda 1994, Steiner and Rihoy 1995); these works explain that management success assumes that those who fish will put greater emphasis on community welfare than individual welfare. As all these elements will vary by culture, it is clear that the appropriateness of co-management, or a particular form of co-management, will likewise vary among cultures.

APPLYING CO-MANAGEMENT

While the concept of resource management rooted in cooperation and collaboration is not new, fisheries co-management is in relatively early phases of application -- especially in developing countries (Kurien 1988). Diverse examples from developed countries such as Japan, Canada, the United States and New Zealand demonstrate that applying the theory of co-management in fisheries management is not a straightforward, step-by-step process (Charles 1988, Kurien 1988, Pinkerton 1989 & 1992, Palmer 1993). Pinkerton outlines five phases of implementation: "(1) adopting a negotiating posture, (2) conducting negotiations, (3) producing an agreement, (4) fully implementing the agreement, and (5) institutionalizing procedures" (1992, p. 331), but application of each phase is highly subject to local socioeconomic context, legal barriers, communication barriers, cultural attitudes and behaviors, and operating limitations. Thus, resource managers may recognize the need and appropriateness for co-management, yet

hesitate to apply the theory since there is no clear, universal method regarding its implementation (IIED 1994, Steiner and Rihoy 1995). As a result, examples of applied co-management are relatively limited and as diverse as the conditions surrounding each resource-community-government relationship (Kurien 1988, IIED 1994).

Pinkerton (1989 & 1992) and others (Charles 1988, Kurien 1988, Nielsen *et al.* 1996) explain that the term "co-management" represents a range of possible management frameworks that address the specific needs of local fishermen and government agencies. As long as both resource users and government managers make meaningful contributions towards more efficient and effective management, the "mutual benefit" goal of co-management is achieved. The needs and abilities of stakeholders in any specific fishery are unique; therefore, co-management arrangements in different fisheries will vary in terms of design and operation (Kurien 1988, Nielsen *et al.* 1996). Management elements of enforcement, monitoring, extension, and research can be conducted by any party to a co-management arrangement (IIED 1994, Steiner and Rihoy 1995).

Pinkerton's review (1989) primarily focuses on the conflicts between indigenous fishing groups and US/Canadian government agencies. The experiences of such groups in developing countries like Malawi may be comparable, since the fishermen are indigenous and government agents are often trained in developed countries or work with donor organizations. Malawian managers, however, have access to far fewer management resources than their US/Canadian counterparts, and they have very different fisheries to manage. In Malawi and other countries, fishing operations vary in size, type, method, and purpose (Kurien 1988, Bland and Donda 1994). Considering this inherent diversity among fishing villages, the degree of community and government involvement in

management will likewise vary. The most appropriate system for any one fishing community will be that which best meets fishery management goals of efficiency, equity, and cultural compatibility, all of which promote sustainable production (Kurien 1988, Berkes and McCay 1990, Bland 1992a, Derman *et al.* 1994, Steiner and Rihoy 1995). In other words, the most appropriate system will be designed to minimize the use of scarce management resources and equitable long-term distribution of benefits.

Examples of Applied Co-management

Examples of applied co-management can be found in several sectors of natural resource management, such as forestry and national park management (IIED 1994, Steiner and Rihoy 1995). Unlike forest or park co-management with fixed communities and fixed or bounded resources, however, managers of wildlife or fish resources must tailor management practices to species' mobile, migratory, and elusive nature. While managers, in both government and communities, may know a great deal about the behavior and habitat requirements of animals, they usually do not know exact population sizes, distribution, or dynamics. As a result, fish and wildlife managers must incorporate more flexibility and conservative estimates when designing a management system (Kurien 1988, Steiner and Rihoy 1995). When resources are dispersed and mobile, management systems should also have dispersed and mobile qualities; therefore resource users can be highly appropriate managers. Decentralized management may be more suitable, simply because the resource itself is decentralized. Examining select cases of wildlife co-management in other African developing countries will offer insight into how co-management arrangements may be designed and operated.

CAMPFIRE:

The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) is a co-management approach taken by Zimbabwe's government and communities to conserve wildlife (Adams and McShane 1992, Martin 1993, IIED 1994, Metcalfe 1994, Steiner and Rihoy 1995). Its goals are nearly identical to conservation ideals throughout the world: the long-term development, management, and utilization of natural resources in communal areas. It can be classified as co-management, largely run by communities, because the government places custody of and responsibility for the resources at the community level.

Under CAMPFIRE, wildlife-rich communal tenure areas are divided into conservation districts, each with a co-management arrangement uniquely designed for local needs and customs (IIED 1994, Metcalfe 1994, Steiner and Rihoy 1995). The common element among the arrangements is the sense of authority and ownership within communities which promotes a philosophy of proprietorship -- communities are "engaged in the business of wildlife management" (Martin 1993, p.21). The communities within the districts have strong incentives to manage for conservation as they gain direct financial benefits from preventing resource overexploitation (Adams and McShane 1992, IIED 1994, Metcalfe 1994, Steiner and Rihoy 1995). Communities are legally entitled to reap some of the economic benefits of wildlife use, both consumptive and non-consumptive.

CAMPFIRE is often cited as one of the most successful examples of wildlife co-management (Martin 1993, IIED 1994, Adams and McShane 1992). Not only has poaching reportedly decreased under CAMPFIRE, but several hundred thousand US dollars in profits have been returned to some districts; profits may be used for community

benefits or be distributed among individuals (IIED 1994, Metcalfe 1994, Steiner and Rihoy 1995).

The system is still evolving, however, and must overcome difficulties inherent in this approach. Cooperation among administrative units can be challenging, with profits often not going back to communities, and district boundaries are not always drawn along the most equitable or appropriate conservation lines (Martin 1993, IIED 1994, Adams and McShane 1992). Finally, wildlife is only sustained where it is economically valuable; thus wildlife is not valued or protected in areas where conservation is a sub-optimal economic use of the land (Steiner and Rihoy 1995). For example, economic conditions following the listing of the African elephant under Appendix I of CITES may have detrimental results for communities and elephant conservation. The drop in legal value will lead to a drop in community-based managers' legal income; black market value of elephant products -- and therefore poaching -- may increase (Dublin *et al.* 1995).

LIRDP and ADMADE:

Zambia has also incorporated community needs into natural resource management. In the early 1980s, Zambia initiated a shift in their approach to management with the Luangwa Integrated Resource Development Project (LIRDP) (IIED 1994, Adams and McShane 1992). LIRDP was based on the idea that people of the Luangwa Valley should have a role in managing the region's resources and benefit from their contributions; this program could thus be classified as co-management. LIRDP emphasizes decentralized authority and community involvement, but the government still runs this complex program. LIRDP was designed with numerous cross-sectoral committees, in which individuals from communities could participate in management decisions. While LIRDP

has led to a reduction in poaching, some question its sustainability -- the complicated administrative design has several shortcomings, such as costly administration, lack of communication, and competing goals (IIED 1994, Adams and McShane 1992).

The Zambian government has also adopted the Administrative Management Design (ADMADE) program in its Game Management Areas (Adams and McShane 1992, IIED 1994, Gibson and Marks 1995, Steiner and Rihoy 1995). ADMADE is similar to CAMPFIRE in that a large portion of economic benefits of wildlife consumption (and non-consumption) are supposed to be returned to communities. This would provide incentives for communities to protect wildlife from poaching and overexploitation, yet the effectiveness of ADMADE is questionable. The program is hampered by inequitable distribution of benefits and has received conflicting reports of affects on poaching (IIED 1994, Gibson and Marks 1995). In contrast to CAMPFIRE, communities do not have a significant role in making management decisions, nor do they have legal rights to the ownership and authority over wildlife resources (Adams and McShane 1992, IIED 1994, Gibson and Marks 1995, Steiner and Rihoy 1995). In this sense, ADMADE is not truly co-management; it is just government management which considers community needs.

Applying Co-management in Malawi: Review of Relevant Laws and Policies

By learning from the experiences of early co-management initiatives, co-management is increasingly gaining acceptance in the international donor community and many government resource managers. This is the case in Malawi, where some managers in the Malawi FD have recognized that a co-management approach would be appropriate for the small-scale fishing that accounts for over 90% of the catch throughout the country

(UNDP 1994). For any significant change to successfully and sustainably occur in governmental management, however, formal changes within Malawi's legislation are necessary. The support and legal standing provided by legislation are necessary to formalize the new relationships between communities, government, and the resource.

Malawi's legal system is based on the English common law system, which includes basic "public trust" obligations. Resources held in public trust belong to the government, which is entrusted with managing on behalf of the best interest of the public. Therefore, in the best interest of the people, the GOM is responsible for implementing natural resource policies which promote conservation and sustainable utilization (Bland 1992b).

In light of these public trust obligations and the FD's interest in co-management, the FD needs to draft more appropriate forms of socially-compatible fisheries legislation (Dobson 1996). Similar in several respects to the current 1977 Fisheries Act, the proposed Fisheries Conservation and Management Act keeps all fisheries of Malawi under a uniform state-controlled system imposing fishing licenses, boat registration, gear restrictions, and closed seasons (Bland 1992a, Bland and Donda 1994, Gaiger 1994). This draft provides only two opportunities for local participation in management and decision-making. First, three positions on the proposed nation wide Fisheries Advisory Board may be filled with representatives of small-scale interests who can "consider and advise on" proposed management changes. Second, the Minister may appoint local fisheries committees to which he "may delegate some powers" (Gaiger 1994). It is clear that opportunities for locally based management of small-scale fisheries are severely limited under existing and proposed fisheries laws.

Since five fishing villages are completely encompassed by the boundaries of Lake

Malawi National Park, these villages also fall under the authority of the National Parks and Wildlife Act of 1992 (Grenfell 1993). This act, designed to establish protected areas and conserve wildlife resources (including fish), also does not provide for community-based management. When the park was established, former "Life President" Banda allowed these five fishing villages to remain, an exception to the "no human habitation" rule for protected areas (Grenfell 1993). Without appropriate legislative provisions, however, residents of these communities are unable to decide how resources are managed. The Parks Act, similar to the proposed fisheries law, only allows three to five advising representatives of the general public on the nation-wide Wildlife Research and Management Board. Clearly then, there is no legal backing for community-based management efforts in the Act.

Although there are currently no substantial legal mechanisms for community-based fisheries management, the draft legislation gives government managers the power to determine and apply sound fisheries management strategies (Bland 1992b, Gaiger 1994). They are able to consider and implement alternative management regimes, potentially including community-based or co-management systems (to the extent that alternative strategies do not interfere with other provisions of the act). Should fisheries and park managers be convinced of the effectiveness of alternative regimes, they may attempt to implement them. However, co-management implementation and operation under this approach lacks any long-term guarantee. Alternative legislative language promoting community interests in fisheries management have been proposed by GTZ (Dobson 1996), although recommended language has not yet been incorporated into the draft legislation.

Conclusions about Implementation

Several other developing countries have tried to involve communities in natural resource management, with varying degrees of success. Diverse management programs can be found in several African and Asian countries, most notably Kenya and the Philippines (IIED 1994, Steiner and Rihoy 1995). Common to many of these programs, however, is a lack of official authority to influence management. Attempts at co-management are largely government-run, with little and/or ineffective community involvement. The current status of Malawi's laws provides examples of such government-run co-management with limited community involvement. Nevertheless, based on the above examples, it appears that three main elements are crucial for co-management to be successful: 1) the long-term guarantee of authority and communal rights, 2) sufficient incentive through the return of benefits to communities, and 3) appropriately-designed structures for decision-making and administration.

Chapter 3

METHODS

The analyses of Malawi's case studies were conducted by applying site descriptions to an analysis framework based on co-management theory. The initial step was to describe the fishery conditions and management at Lakes Malombe and Chiuta, focusing on each actor's position and activities in relation to co-management at each site. The author then determined the success of co-management at each lake, and compared each lake's application of co-management to current co-management theory. This research is based on 1) collecting information and 2) analyzing it in context of a theory-based analytical framework. This framework is based on evaluating community incentives, behaviors, and management outcomes in the context of community conditions and decision-making structures.

Collecting Information

In collecting information on co-management-related policy and application in Malawi, the author identified key institutions (such as the FD, fishing committees, NGOs, universities, and aid donors; see Appendix A), conducted unstructured interviews with key actors, and participated in co-management-related meetings. This approach allowed the author to spontaneously explore in depth the most relevant areas unique to each actor's

institution. This approach was determined to be more appropriate than a systematic interview or survey process, as the latter process would not have been efficient or pragmatic for meeting study goals, given what is already documented and the author's operating constraints.

In addition to interacting with key actors in various institutions, the author surveyed laws, records, and other documented information to compile data and other information about fishing communities; policy, compliance, and enforcement; and fish stocks. Information on conditions both before and after the implementation of co-management were sought, for possible comparisons pre- and post-co-management.

Quantitative data are important for determining the effectiveness of co-management at each lake, but data for fishing-related activities at Lakes Malombe and Chiuta are often incomplete and unavailable. Data collection and analysis systems in Malawi could not be assessed for accuracy, so the reliability of available data is unknown. Available data may nevertheless indicate trends and estimates of fishery conditions, as well as identify inconsistencies and gaps in FD (and other) data collection and analysis systems. In this study, available secondary data will serve mainly to supplement the study and help the author reach conclusions regarding FD co-management policy at each lake and the general state of current co-management theory. Evidence of greater accuracy and reliability may come from the author's personal observations, personal communications, fishermen's anecdotes, and other researchers' work.

Analysis: Degrees of Success and Comparisons to Theory

To determine the success of co-management at each lake and compare these applied cases to co-management theory, the author employed the analytical framework developed by the Fisheries Co-management Research Project (FCRP; Nielsen *et al.* 1996). This project is a collaborative effort of the International Center for Living Aquatic Resource Management (ICLARM), the Institute for Fisheries Management and Coastal Community Development (IFM), and National Aquatic Resource Systems (NARS). The purpose of the FCRP is

> to provide a common analytical framework which will enable comparisons between case studies, country research, and pilot-tested co-management models. This will allow data to be analysed in a systematic way and allow generalisations to be made about conditions which facilitate successful fisheries co-management (Nielsen *et al.* 1996, p. 2).

The author analyzed co-management at Lakes Malombe and Chiuta based on the systematic FCRP, so that these analyses can be directly incorporated into ICLARM/IFM/NARS global comparative studies and facilitate meaningful comparisons.

For any given case study, the FCRP assumes and explores four interrelated principles rooted in co-management theory. First, it assumes the existing property rights system defines who controls exploitation, access, and allocation of the resource and if these rights are transferrable. Second, the type and level of user involvement determines user participation in terms of tasks and jurisdiction (ie. local, regional, or national). Third, the nature of representation of user groups determines legitimate participants in decision-making. Finally, the type of management organization determines the administrative arrangements for a co-management system (Nielsen *et al.* 1996). These four principles translate theoretical work on co-management into a framework for analyzing applied co-

management.

The FCRP analytical framework is designed to explore these principles in detail. The framework requires identifying key variables for a study site, combining these with the property rights system, and determining subsequent user incentives and behaviors. A graphical representation of the analytical framework is given in Figure 3. Specifically, the

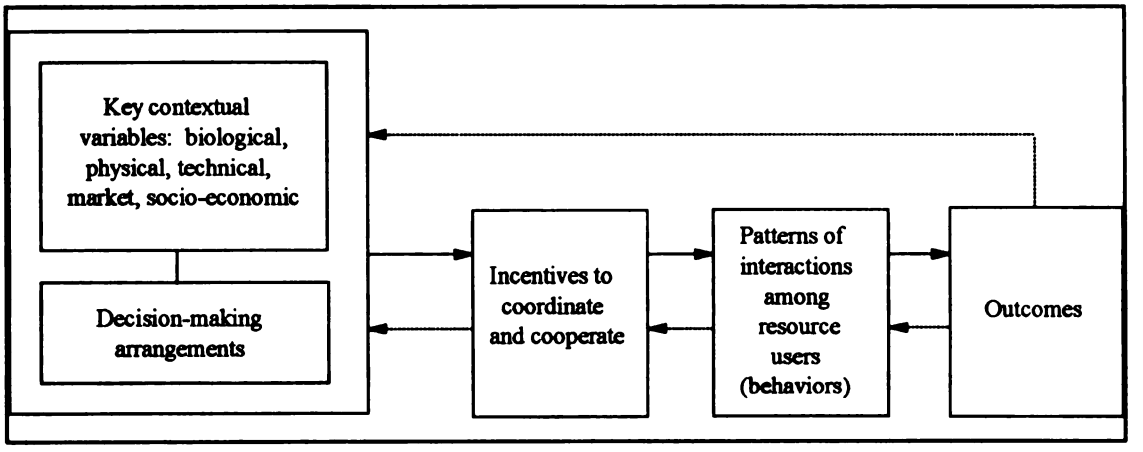

Figure 3: Fisheries Co-management Research Project Framework (Nielsen *et al.* 1996)

researcher identifies certain variables concerning the resource, fishing technology, market conditions, and the resource user. These contextual variables are combined with information on the decision-making arrangements which cover rights and rules for using and managing the resource. The variables and decision-making arrangements determine user incentive to collaborate and cooperate, which in turn is manifested in user behavior. Incentives and behavior result in a certain outcome, such as more (or less) efficiency, equity, and sustainability. These use and management systems are complex and dynamic; therefore the incentives, behaviors, and outcomes can in turn affect the contextual

variables and decision-making arrangements.

The contextual variables required by the FCRP analytical framework (specifically in the left-hand boxes of Figure 3) are defined in the following tables (reproduced from Nielsen *et al.* 1996). Table 1 identifies the key biological, physical, and technical attributes which affect incentives to cooperate and includes questions to guide the researcher in identifying variables. The attributes and questions in Table 2 allow the researcher to characterize the market conditions, and Table 3 explores socio-economic attributes of the community. Decision-making arrangements are defined through the attributes and questions offered in Table 4. Through defining these variables, the researcher establishes a thorough community profile upon which further analyses are made. These four Tables provide a systematic means of describing community conditions.

The FCRP analytical framework does not include a systematic means of determining incentives, behavior, or outcome, but instead the framework allows the researcher to determine these elements based on community observations and other evidence, either documented or anecdotal. Using the FCRP framework, researchers draw their own conclusions about the success of co-management and offer site-specific recommendations. Individual case studies analyzed through the framework can then be incorporated into the ICLARM/IFM/NARS comparative analyses. In these analyses, the relationships between community attributes, decision-making arrangements, incentives, behaviors, and outcomes are compared between case studies, thereby contributing to generalizations about the type of co-management arrangements appropriate for different situations throughout the world.

Table 1. Biological, Physical, and Technical Attributes and Indicators (Nielsen *et al.* 1996)

Biological, physical and technical attributes	**Key questions**
Multi-species or single species fishery	· What species are caught?
Migratory or sedentary fishery resources	· Are the fish resources sedentary or migratory?
Level of stock exploitation	· Have total catches been falling over time? · Is catch per unit effort increasing or decreasing? · What do stock assessments say?
Status of habitat	· What is the % coverage of coral? (where applicable) · Are the fish and plant resources healthy? · Is the water polluted?
Boundaries	· Are there geographical boundaries for the fishery? How are they defined? · Are there restrictions on who can enter the fishery? How are these defined? · Are there any other boundaries relevant to the exploitation of the fishery? What are they?
Single or multiple gear fishery	· What types of gears are being used?
Artisanal (small-scale) or industrial fishery	· What gear and vessel types are there? · What is the range of fishing operations? · Can the fishery be divided into artisanal (small-scale) and industrial? · How are these terms defined?
Level and mix of technology	· What are the gear and vessel types? · What are the technologies for preservation and processing of fish?
Dispersed or localized fishing patterns	· Is fishing a seasonal activity? · Does fishing take place in a localised area? · Is fishing carried out offshore?

Table 2. Market Attributes and Indicators (Nielsen *et al.* 1996)

Market attributes	Key questions
Subsistence or market oriented fishery	· What proportion of catch sold/consumed?
Market structure	· Are there many buyers? · Are there many sellers? · What are the power relations between buyers & sellers? · Do women service other market segments than men? What are these?
Market orientation	· Are the fish/fish products sold in local, domestic, or international markets?
Value of products	· Is the value of fish/fish products high or low?

Table 3. Socio-economic Attributes and Indicators (Nielsen *et al.* 1996)

Socio-economic attributes	Key questions
Homogeneity/heterogeneity of users	· How many ethnic groups are there amongst users? · Are there differences in wealth, religion, gear types, residency amongst users? · What are the vessel/gear/technology ownership structures? · Who are the users/stakeholders (female/male)?
Dependence on the fishery for livelihood	· What proportion of household/family income comes from fisheries?
Motivation of users	· Are users exploiting the fishery for subsistence or commercial reasons?
Attitudes towards: risk, innovation, collective action	· Are these attributes: strong/weak/indifferent? · Is their heterogeneity in the attributes? · Is there any social/political mechanism, that prevent risk taking, innovation, and collective action?
Level of information and knowledge on the fishery and management	· What kind of knowledge (indigenous or scientific)?

Table 4. Decision-making Arrangements and Indicators (Nielsen *et al.* 1996)

Decision-making arrangements	Key questions
Leadership/power structure of user groups	· What are the main characteristics of the leadership? · Are the leaders considered legitimate? · How are decisions taken? eg. consensus, majority
Main types of rules (operational, collective choice, constitutional choice) and at what level of applicability (local, regional, national)	· What are the formal and informal rules on access rights to the fishery? · What are the rules on harvesting rights? · What boundary conditions (social, economic, physical, legal) apply to the regulation of the fishery?
Decision-making process for operational and collective choice rules	· What are the main factors determining the way in which decisions are made for (one or two examples of) operational and collective choice rules? · How are decisions made? (consensus/majority/autocratic) · Which types of decisions are made through consensus/majority/autocratically?
Level of representation in the decision-making processes at different levels (local, regional, national)	· Who are the users/stakeholders? · Are they represented in the decision-making process? how? · What is the level of participation of user groups/stakeholders in the decision-making process? · Are women represented and how?
Relevance of rules	· What are user and stakeholder attitudes/values towards decision-making processes? · What are user and stakeholder attitudes/values towards rule-breaking? · How much legitimacy do the rules have with users?
Enforcement of rules and regulations/sanctions	· How are formal and informal rules enforced? · What sanctions are used? · How do users perceive the utility of the rules? · What is the level of compliance/non-compliance? e.g. number of convictions, user attitudes; obedience/obstruction · What resources are available for monitoring and enforcement?

Chapter 4

CASE STUDIES

The following sections contain detailed descriptions of the biological, technical, economic, social, and decision-making attributes surrounding co-management at Lakes Malombe and Chiuta, based on the questions presented in the FCRP analytical framework. The order of information follows the order of questions in Tables 1-4 (from Chapter 3). These descriptions are followed by assessments of incentives, behaviors, and outcomes, also required by the FCRP framework. These latter components are based largely on the author's observations, personal communication, and anecdotal information.

LAKE MALOMBE

Biological, Physical, and Technical Attributes and Indicators (from Table 1, Ch. 3)

Lake Malombe is a relatively small freshwater lake of 390 km² just south of the southern tip of Lake Malawi (Alimoso 1987), where well over 2500 fishermen work out of 61 villages (Sodzapanja *et al.* 1995). Until the early 1990s, catches consisted of chambo (*Oreochromis spp.*), a locally-migratory species with high local trade value. Populations of chambo recently crashed (Figure 4; FAO 1993, Banda 1995), however, following a five-year period of increasing catches and decreasing catch per unit effort

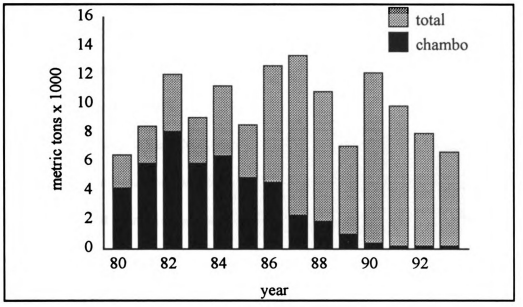

Figure 4. Lake Malombe Fishery Production

(Alimoso 1987, FAO 1993, Wilson 1993). Chambo spawn for the first time at the age of 3 years, but they are vulnerable to gears at ages 1 and 2; discarded fry have been observed littering Lake Malombe beaches (van Zalinge *et al.* 1991, FAO 1993). The 1993 FAO study also reports that total catch of other species caught at Lake Malombe, primarily small haplochromine cichlids (collectively called kambuzi; Banda 1995), has decreased by almost half since 1990 (Figure 4); likewise catch per unit effort has also decreased. The decline in stocks is attributed to the use of small-meshed kambuzi and nkacha seine nets (FAO 1993), habitat destruction, and commercial capture of chambo during migration in Lake Malawi (Bell and Donda 1993). Although the health of fish and plant resources is currently diminished, it is thought that the species, having evolved with periodic lake-drying events, are resilient enough to recover if destructive activity stops (Bell and Donda 1993). Industrial activity or chemically-based agriculture are not present on the shores of

Lake Malombe and motors are rarely used on vessels (Sodzapanja *et al.* 1995), so the lake is not overly polluted. The first comprehensive study of the aquatic ecology of Lake Malombe is currently underway, and will provide valuable insights on the status of this fishery (Mwanyama 1995).

The fishery at Lake Malombe is bounded only by lake shoreline. Vegetation growth near the shoreline may limit access, therefore beaches are often cleared of weeds to facilitate boat launching and use of beach seines. Fishing may extend into the Upper and Lower Shire River, the main inlet and outlet for Lake Malombe, although these locations are intensively fished by other resident fishermen.

Lake Malombe has a multiple gear, small-scale, low-technology, dispersed fishery. Fishermen mainly using gill nets, beach seines (kambuzi nets), open-water seines (nkacha nets), and other nets from dugout canoes and plank boats (Alimoso 1987, FAO 1993, Banda 1995). These gears and vessels are highly labor intensive and non-mechanized, therefore, the Lake Malombe fishery can be described as non-industrialized. Fishing range is not limited by fishing technology, however, as fishermen can reach and operate in any offshore area of the lake. Nor is fishing limited to localized areas, although implying this fishery is "dispersed" on this relatively small lake may be misleading. Fishing is slightly limited during certain seasons; catches are low and irregular during the cold dry season, so at these times fishermen are most mobile in their search for fish (FAO 1993). An annual closed season covers the fish breeding season from January 1 to April 30; however, fishing frequently occurs at this time (van Zalinge *et al.* 1991, FAO 1993). Fish processing is also non-industrialized, since preparing, smoking, and drying each day's catch is very labor intensive and non-mechanized. Fish transport is conducted on foot, bicycle, bus, or

hitched rides (FAO 1993).

Market Attributes and Indicators (From Table 2, Ch. 3)

While the Lake Malombe catch currently meets the subsistence needs of local fishing communities, the catch has been large enough to generate sizable trade activity. The small-scale fisheries of Lake Malombe have generated up to MK 6 million (in 1991; FAO 1993) through informal trade in local and regional domestic markets; therefore, this fishery was seen to have relatively high earning potential. Most of the northern and western shoreline is bounded by M3, a paved road that facilitates transport and access to other markets. The value of chambo was and is very high, although since its collapse kambuzi have become the most economically important fishes (FAO 1993). Data on the proportion or value of Lake Malombe fish sold or consumed are not available.

The number of buyers and sellers (traders) surpasses 1500 (FAO 1993). This number will increase or decrease depending on the amount of fish available, but trade activity has not been limited due to a shortage of traders. The power relation between buyers and sellers was not noticed to be significant, as both groups rely on the activities and cooperation of the other. Gear and vessel owners have more power than their crew, as they keep anywhere from 50 to 75% of the catch for personal use or trade (FAO 1993). Men hold more power than women in nearly all social and economic aspects, including fishing. The only fishing-related activity in which women participate is fish trading and processing; women comprise up to 20% of traders (FAO 1993).

Socio-economic Attributes and Indicators (from Table 3, Ch. 3)

Lake Malombe fishing communities are overwhelmingly occupied by one ethnic group, the Yao, almost all of which are Muslim (FAO 1993). Fishing communities are heterogeneous in terms of a person's occupation, status, and power. Differences in wealth are mainly evident between gear/vessel owners, their crew, and women (Ferguson and Derman 1993). Gear and vessels are owned by an individual, who then may employ several crew members with whom he shares the catch (owners and crew are collectively referred to as fishermen). Lake Malombe supports the fishing operations of over 300 equipment owners and over 2000 crew members (FAO 1993; Sodzapanja *et al.* 1995). These numbers will vary among equipment type and as fishermen enter or leave the fishery; their numbers in 1996 were not available. Gear use and residency patterns vary among fishermen, who will increase their employment and effort when agriculture and other trading is limited.

For equipment owners, crew members, processors, and traders, much of the household income and food come directly from fisheries. The typical Yao fisherman needs to support one or two wives, an average of six children, and several more extended family members (FAO 1993). The most lucrative trading is conducted by men; in these traditional Muslim communities, women usually work in the less public areas of household agriculture and maintenance (FAO 1993). Fishing and agricultural production generate variable levels of income and food security, depending largely on environmental conditions such as drought (FAO 1993). The high dependence on fisheries, therefore, is largely driven by motivation for community and household self-preservation. The information and knowledge upon which fishing (and other means of self-preservation) has been based

is largely indigenous, although the FD has occasionally provided them with biological information.

Fishermen and other members of Lake Malombe fishing communities generally display variable attitudes towards risk, innovation, and collective action; these attitudes will vary depending on the subject. Functioning as entrepreneurs, gear/vessel owners assume the risks and innovation associated with running small businesses and employing others. All fishermen are willing to risk the hazards of fishing (such as crocodiles, hippopotami, severe weather, uncertain catches, and drowning), although they may be less willing to risk their livelihood for political or social justice purposes. Fishermen, often having limited political power, have tolerated inconsistent and unpredictable enforcement of regulations and will often not prosecute to reclaim profit losses due to theft. Having undergone colonialization and decades of oppression by Banda's authoritarian former government, many Malawians have had limited success in their attempts at political resistance, innovation, collective action, and self-determination (Derman and Ferguson 1995, Posner 1995). Lake Malombe fishermen have only recently been organized into bodies for collective fisheries action (described below), although such organized bodies have not been common in these communities.

Decision-making Arrangements and Indicators (from Table 4, Ch. 3)

Information on the decision-making arrangements at Lake Malombe is based on the current Participatory Fisheries Management Project (PFMP), a fisheries co-management pilot project initiated by donors and the FD. The indicators listed in Table 4 (Ch. 3) will be presented in the context of a description of the PFMP.

Project Background

In 1992, with assistance from the Malawi-German Fisheries and Aquaculture Development Project (MAGFAD), the UN Development Program/Food and Agriculture Organization, the Overseas Development Administration, and the World Bank, the FD initiated the PFMP, a 4-year co-management pilot project on Lake Malombe (Bland and Donda 1995). This co-management project emphasizes decentralized authority and shared decision-making power with fishing communities as a means for ensuring a sustainable fishery (Ferguson and Derman 1993, Wilson 1993, Mtuwa 1995). While the project name does not explicitly refer to co-management, the program emphasizes fishermen's participation in making management decisions, monitoring, and enforcement.

After originally deciding to pursue co-management at Lake Malombe, MAGFAD and the FD faced the difficult question, "how do we do it?" (Mtika 1996). While co-management systems vary among societies and resources, there were relatively few examples of fisheries co-management in Africa from which the FD could learn (Wilson 1993). The FD and MAGFAD hired resource management consultant Richard Bell, who worked with FD socioeconomist Steve Donda, to devise a strategy for implementing co-management (Ferguson and Derman 1993).

Through several workshops and meetings with fishermen to examine the attitudes, behavior, and economic activity of communities, Bell and Donda (1993) concluded that: 1) destructive nets and seines should be reduced and converted with compensation to fishermen; 2) the fishermen had little or no alternatives for economic activity; fishermen lacked the capital and resources to start other businesses outside fishing; 3) fishermen unanimously endorsed a 19 mm net size (as opposed to the FD plan of 25 mm); and 4) a

system of licensing would be necessary for communities to limit access. The consultation also found fishermen to be highly aware of the decline in fish stocks and the effects of overly efficient and destructive gear. Moreover, they found the fishermen were highly interested in having input into management decisions. Based on necessary regulatory changes their study recommended, Bell and Donda advised that co-management be based on FD-fishermen dialogue.

In determining how to organize a co-management arrangement, Bell and Donda considered organizational units utilized in similar resource co-management systems. Certain studies have demonstrated that fishermen's organizations can have a crucial role in facilitating co-management (Charles 1988, Kurien 1988, Valdés-Pizzini 1990). These studies demonstrate that organized units can help facilitate the new management arrangement by creating formalized channels of communication and local authority; such organizations serve to represent the interests of the local community and enable efficient, appropriate management. Bell and Donda proposed such representative organizations, referred to as Beach Village Committees (BVCs), for the fishing communities at Lake Malombe.

Program Design and Operation

The purpose of BVCs is to collectively determine regulations and oversee community-level monitoring and enforcement. The BVCs are advised to make decisions through cooperation and the approval of a majority of fishermen, supposedly acting in the best interest of fishing communities. Democratic and cooperative operating procedures, both within the BVC and with the FD, presented fishermen with a departure from their traditional modes of making decisions, which were primarily based on meeting short-term

individual needs. The Lake Malombe fishery, which used to be open access state property, is now recognized as communal property in which the BVCs can exclude others and regulate use among members. Through BVCs, fishermen determine who fishes and how, although they do not limit where people may fish or how much fish they may harvest. The BVCs, however, under their current "pilot project" status, do not yet have formal legal recognition.

The BVCs are the principal organizational bodies of the PFMP at Lake Malombe. In early 1996, the FD reported that approximately 30 BVCs were in operation. Each fishing community selects ten volunteer fishermen to sit on their BVC, and these individuals elect one member to act as chair. Fishermen serve on BVCs for unspecified periods of time; composition of BVCs may change as member interest or participation changes. The BVC members are the only individuals that contribute to decision-making, although they are entrusted with representing the interests of fishing communities. There is a restriction on the position of BVC chair -- while a village chief may sit on the BVC, he may not serve as the chair. This rule is intended to separate fishing management authority away from traditional political authority. The chief traditionally has had authority over beach access (for which gifts or bribes were often traded), but not fishing locations, catches, or gears. Therefore, this provision may serve to increase the legitimacy of BVC leadership.

The Lake Malombe BVCs meet with extension agents from the Mangochi District Fisheries Office and MAGFAD on a regular basis, at least monthly (Wilson 1993, Mtuwa 1995). The FD conducts the meetings, in which they provide BVCs with management suggestions and information regarding fish biology, fishing activity, and loans. Outside of

meetings, the FD also provides additional enforcement support, compiles catch data, and conducts research. During their meetings with FD agents, BVCs make formal reports about catch, compliance, the status of alternative income activities. As representatives of local interests, BVCs also have opportunities to express their concerns with any aspects of management. Other community members, including women, are allowed to observe (but not participate in) these meetings.

Management Regulations, Enforcement, and Other Provisions

Soon after being created, BVCs defined three current fishery regulations through majority approval. While the FD recommended a minimum mesh size of 25 mm and a licensing system, the fishermen decided to set the minimum mesh size at 19 mm, ban the destructive kambuzi seines, and maintain the closed season. These regulations were based on widespread fishermen attitudes, which both favor some gear and disapprove of other gear. While the FD did not agree with all of these regulations, they ultimately endorsed them since the regulations would not likely result in irreversible changes in the fish populations. They also wanted to promote the nature of co-management, which requires recognizing the contributions of other collaborating parties.

The FD formerly maintained a licensing system, although these were issued to anyone and did not impose access restrictions; licenses only required fishermen to pay a fee for vessel/gear registration (FAO 1993). Since the initiation of a co-management project, local decision-making bodies have assumed the licensing role of the FD and the access-granting role of the chief; therefore, fishermen must now approach this local group to be placed on a register of fishermen. This register of individuals, gears, and vessels acts as the licensing mechanism through which fishing access is permitted or denied. Once

fishermen have gained access to the lake and agree to follow the regulations, they are free to fish anywhere (FAO 1993).

Under the PFMP, the BVCs also have a role in monitoring and enforcing regulations and determining access, although no additional resources are provided for these tasks. It is not practical or efficient for the FD to respond to all violations, so the FD and BVCs implemented an enforcement system for BVCs to oversee (Mtuwa 1995). Under this system, all fishermen are able to continually monitor the fishing activity of others. Upon receiving reports of violations, the BVCs track down the non-compliant person or party, usually consisting of non-local fishermen. The BVCs inform the violator of the regulations, their rationale, and consequences of further violations, assuming the violator will voluntarily comply in the future. If a repeat offense occurs, the BVC notifies the FD extension agent, and the offender may be fined and have his gear confiscated by the FD.

The fishery regulations, having come from the BVCs, appear to have a great deal of legitimacy with the fishermen. Although rule-breaking was formerly viewed as sometimes necessary, even acceptable, action, fishermen now appear to be less tolerant of rule-breaking. Non-compliance is reported to be much lower with this management system, although BVCs do not keep detailed records and the FD could not provide reliable records of enforcement or convictions prior to the PFMP. The level of previous FD enforcement can be assumed to be extremely low, however; in a 12-month period between 1993 and 1994 the Mangochi District magistrate reported only three cases in which the FD prosecuted to enforce regulations (this was reportedly not due to a lack of violations; Kavamgugu 1994). Overall, fishing communities and fishermen also appear to

be pleased with the BVC decision-making process as well as with its results, although a systematic evaluation of communities' attitudes was not performed.

Extension is another important part of the PFMP. To prepare for their new roles as extension agents, FD personnel initially underwent community participation-oriented training (Mtuwa 1995). The FD and MAGFAD disseminate information to fishing communities through three main methods: regular visits by extension agents, radio-broadcasting extension messages, and entertainment by the MAGFAD Band (Wilson 1993, Mtuwa 1995). Extension agents from the Mangochi District office are assigned certain fishing villages to visit. During their visits, they may have information for local BVCs regarding fish, fishing activity in other areas, and loans. They also reinforce messages about responsible fishing, stressing the importance of limiting catches to ensure future production. These "responsibility messages" are also broadcast over the radio by the Malawi Broadcasting Company (MBC) in the popular program *Usodzi Walero*, as are conservation-oriented songs performed by the MAGFAD Band. Communicating extension messages through music is an extremely effective method among Malawian communities, where literacy rates are low and musical performances are popular (Wilson 1993, Mtuwa 1995).

Through initial meetings with fishing communities, the FD and MAGFAD learned of the limited opportunities for economic activity outside the fishery. Much of the local economic activity is somehow related to fishing, such as gear making, fish processing, and fish trading (Chirwa 1996). Income generated by other business options, such as brick making, basket weaving, and food service, may not meet community-wide needs. Furthermore, opportunities for fishery workers to establish alternative businesses in

developing countries are severely hampered by limited access to credit (Tietze and Merrikin 1989); current start-up loans in Malawi have interest rates exceeding 50% monthly (Dorsey 1995).

Recognizing the importance of encouraging exit from the fishery, the FD established low-interest start-up loans for alternative businesses as part of the PFMP. These funds were channeled through the FD from donors to fishermen. By encouraging a more diversified economy, the FD hoped to decrease the number of fishing-dependent individuals. While fishermen are increasingly interested in receiving loans, the FD only intends to provide loans for a short time; they do not want to become a lending agency (Mtika 1996). The FD also considered offering financial compensation in exchange for illegal gear (Bell and Donda 1993, Ferguson and Derman 1993); this was initially proposed by consultants but has not been implemented (Mtuwa 1995).

Although the FD and BVCs worked together in establishing and administering this new management system, they intend for the BVCs to progressively assume the primary responsibility for making and administering all regulations. In time, the BVCs should become a self-sustaining body and the proposed Lake Malombe Fishermen's Association will facilitate lake-wide management coordination based on the contribution of all BVCs (Bell and Donda 1993). As the progression towards self-administration occurs for the BVCs, the FD intends to diminish their management role.

Incentives, Behaviors, and Outcomes

Under the PFMP, fishermen have more incentive to cooperate with the FD than they previously experienced. Their increased incentive to cooperate applies to both the

decision-making process and in following regulations. Current regulations are the product of fishermen's opinions and input, and the regulations have been validated by the FD. Fishermen are no longer totally reliant on an external FD presence for monitoring and enforcement, and they no longer need to speculate about the status of regulations, access, and penalties. Through this shift towards a communal property regime, fishermen now have more control over their long-term future.

The FD also has an incentive to cooperate, as successful co-management may lead to rebounding fish stocks and greater management efficiency. The FD, however, is also motivated by needs for self-preservation. Fisheries Department agents need to preserve their jobs and maintain donor funding, so eventual community self-management may not be in their best interest. Furthermore, FD motivation to collaborate will likely be affected by their former regard of fishing communities as the object of control. FD agents must accept and demonstrate a significant change in attitude in order to truly regard fishermen as collaborative equals.

Incentives to cooperate do not necessarily guarantee that cooperative behavior will result; therefore, the behavior of fishermen, communities, and the FD warrants separate consideration. Through attending BVC-FD meetings, the author witnessed apparent willingness to participate, collaborate, and cooperate by both parties. Although the FD ran the meetings, both parties contributed to the dialogue and collaboration upon which management is based. Fishermen and FD agents repeatedly expressed support for the PFMP, and BVC reports indicating increased compliance demonstrate fishermen's respect for regulations. According to Dr. Uwe Schulz, PFMP project coordinator for MAGFAD, fishermen compliance exceeded 90% in 1995 (personal communication 1996) -- this

indicates a drastic departure from reported non-compliance in previous years. Along with these claims, BVCs also reported that catches are increasing in number and size of fishes, although it is too early to know if co-management is the sole reason for this rebound.

Outcomes were evaluated based on three interrelated principles: efficiency, equity, and sustainability. In the FCRP analytical framework, efficiency is defined in terms of cost-effectiveness (Nielsen *et al.* 1996). While the FD and MAGFAD initially invested in hiring consultants for program design and implementation, the PFMP may lead to lower FD monitoring and enforcement costs, as these tasks are now performed "for free" by fishermen. The cost-effectiveness of the PFMP has not been quantified, however, and it is very likely that finances will limit the effectiveness of the project. The FD does not intend to keep channeling donor loans to fishermen, nor do they intend to compensate fishermen for turning in illegal nets (Mtika 1996), as proposed by Bell and Donda. Fishermen, however, expressed strong interest in expansion of these provisions. At the BVC meetings, some fishermen also indicated they feel they are entitled to receive financial compensation for their monitoring and enforcement efforts; they claim they are being used as free labor to perform tasks for which FD agents were paid. Incorporating these forms of compensation would clearly reduce program efficiency for the FD. Finally, the FD could not indicate whether they have yet saved money through the PFMP; they continue to pay for frequent travel to multiple villages and for research and extension. They are also not receiving the variable income through fines formerly imposed on violators.

Under the FCRP framework, equity encompasses representation, process clarity (or transparency), homogeneous expectations, and distribution of costs and benefits (Nielsen *et al.* 1996). The BVC purpose and process seem to be understood by

community members, who are interested in seeing their concerns represented. Committee members are all fishermen, however, so the interests of women, other processors, and traders may be under- or unrepresented. Although most members of the fishing community appeared to hold similar expectations regarding fishery sustainability, the mis- or underrepresentation of certain interests could potentially ignite community conflict. The short-term costs associated with limiting catches (through restricted gears and access) will burden all community members, especially the less powerful. The benefits accompanying rebounding stocks, such as greater food security, income, and sustainability, will likely be enjoyed by all residents of fishing communities, although gear/vessel owners will likely reap more benefits than others.

The FCRP framework subdivides sustainability into stewardship and resilience (Nielsen *et al.* 1996). The communal property regime supported by the PFMP clearly promotes stewardship, as fishing communities have greater vested interest in management and have long-term control over harvesting, monitoring, and enforcement. Participants at BVC meetings acknowledge that the future of their fishery depends on their own management and compliance.

Sustainability through resilience refers to the management system's ability to absorb and adapt to social changes (Nielsen *et al.* 1996). As currently structured, BVCs are able to address a wide range of issues; however, the extent to which they will evolve and be self-sustaining is questionable. The BVC structure was designed and imposed by external (non-community) agents. Since BVCs did not evolve out of community self-organization and -determination, communities may feel less "ownership" or control of BVCs. The extent to which communities can restructure BVCs or influence agendas is

uncertain. As a result, the FD needs to both maintain BVC support and empower communities to take on long-term BVC leadership. Without FD administrative support, BVCs would possibly resort to their former modes of interaction and perhaps dissolve; these communities did not have great a propensity toward collective action. With appropriate FD support enabling long periods of successful management, however, the BVCs, as well as the lake-wide Fishermen's Association, may continue to evolve and thrive.

LAKE CHIUTA

Biological, Physical, and Technical Attributes and Indicators (from Table 1, Ch. 3)

Lake Chiuta is smaller and more isolated than Lake Malombe. Located 60 km east of Lake Malombe on the Mozambique border, the freshwater lake covers only 200 km² and has a mean depth of 5 m (Greboval *et al.* 1994). Although relatively small, Lake Chiuta supports over 1000 fishermen working out of 9 fishing villages (Sodzapanja *et al.* 1995). Target species consist mainly of tilapiine cichlids like Makumba (*Oreochromis shiranus*) and Chilunguni (*Tilapia rendalli*), which favor the shallow lake's swampy areas; other target species include Matemba (*Barbus paludinosus*) and Mlamba (*Clarias gariepinus*) (Dissi and Njaya 1995). Available data indicate that catches have generally fluctuated between 500 and 3000 tons over the last few decades (Figure 5; Greboval *et al.* 1994). Fluctuations may also be caused by variations in weather (drought), fishing effort, or by some other compensatory mechanism in fishes' life history.

Beginning in the early 1990s, Lake Chiuta fishermen have competed with more

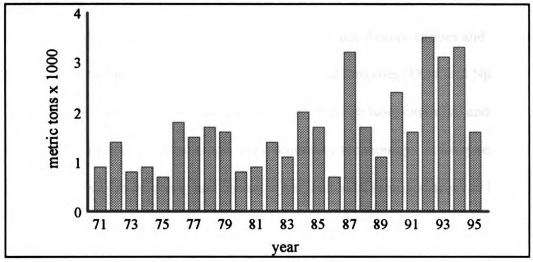

Figure 5. Lake Chiuta Fishery Production

than 300 additional fishermen, most of which migrated from the shores of the dry nearby Lake Chilwa (Dissi and Njaya 1995). These additional fishermen, using more efficient and destructive Nkacha seines, put fish stocks under severe pressure, destroyed fish habitat, and polluted water with human waste. Figure 5 illustrates that total catch increased with the influx of these fishermen; however, similar to fishermen at Lake Malombe, Lake Chiuta fishermen complained of decreasing catch per unit effort, smaller fish, and water pollution (Dissi and Njaya 1995). The fish stocks in Lake Chiuta are generally considered to be "highly exploited" (Greboval *et al.* 1994), although both plants and fishes are thought to be resilient enough to rebound if fishing pressure decreases.

Geographical boundaries for the fishery extend to the shoreline; there are few inlets and outlets which may seasonally connect Lake Chiuta to other water bodies. Malawi shares Lake Chiuta with Mozambique, although fishing is not limited by this international boundary. Physical access to the fishery is sometimes limited in local areas

by dense vegetation, which occasionally is cleared to facilitate boat launching and net use.

Like fishermen at Lake Malombe, fishermen use dugout canoes and non-motorized plank boats, and gears consist of traps, gill nets, and longlines (Dissi and Njaya 1995). Vessels, gears, and processing (smoking and drying) are labor-intensive and non-mechanized, although fishing range is not limited by technology. Fishing occurs from the shoreline as well as offshore, and fishing is not limited to localized areas or by seasons.

Market Attributes and Indicators (from Table 2, Ch. 3)

Although no data are available for the proportion of fish sold and consumed, the Lake Chiuta fishery is more subsistence-oriented. Fishermen engage in less regional trade activity than those at Lake Malombe, since this remote lake is not easily accessible, especially during the rainy season. The value of fish products is high; however, value may be assigned more for subsistence reasons than economic reasons. Fish trading is primarily local and not limited due to a lack of "buyers" and "sellers" (from Table 2, Ch. 3), but these groups are both more accurately described as traders. Power differentials are not prevalent among traders, although the chiefs formerly held access-granting power, gear/vessel owners hold more power than their crew, and men hold more social and economic power than women. Fish processing is the only area of the fishery in which women participate, and their participation appears to be lower than among their Lake Malombe counterparts.

Socio-economic Attributes and Indicators (from Table 3, Ch. 3)

Fishing communities around Lake Chiuta are composed of the Yao and Lomwe ethnic groups, of which most are Muslim. Many fishermen are stationary residents, although some will migrate to pursue other activities and have often competed with migrant fishermen. Fishing operations are generally centered around one of the several gear types, and like the ownership structure at Lake Malombe, gears are usually owned by an individual who operates with the assistance of crew members. Wealth and power may be less concentrated than at Lake Malombe, since there are 500+ gear/vessel owners and 600+ crew members (as opposed to a respective 300 and 2000 at Lake Malombe; Sodzapanja *et al.* 1995). The stakeholders of this fishery include all residents of the local communities. Nearly all of their food and income comes from farming and fishing, so their desire to have a sustainable fishery is motivated by self-preservation.

Like many Malawians, the Lake Chiuta fishermen and other residents have generally had limited success with their attempts at risk, innovation, or collective action in the political arena. Regarding fishery management, however, they have displayed significant collective action in defending the fishery from the influx of migrant fishermen and their destructive practices. Bell and Donda (1993) report that Lake Chiuta fishing communities have previously formed groups or committees (in the 1970s, '80s, and early '90s) to address various resource-related concerns. Their protective attitudes towards the fishery appear to be very strong and widely supported. Being more remote and inaccessible, the residents of Lake Chiuta villages may be more isolated from political and market mechanisms that either reward or discourage risk, innovation, or collective action. Their information and knowledge are mostly indigenous, and their management system has

evolved to be highly appropriate for their local conditions.

Decision-making Arrangements and Indicators (from Table 4, Ch. 3)

Information on the decision-making arrangements at Lake Chiuta is based on a fisheries co-management arrangement primarily initiated by fishing communities. The indicators listed in Table 4 (Ch. 3) will be presented in the context of a description of their co-management arrangement.

Co-management Background

According to the accounts of fishermen, the FD and MAGFAD did not directly initiate a formal co-management program at Lake Chiuta as they did at Lake Malombe. While there are FD fish scouts who occasionally visit these remote villages, the FD has not traditionally had a significant role in management at this lake (Dissi and Njaya 1995). As a result, fishing activity has not been influenced by formal regulations. Fishermen have largely relied on their own judgment to decide when, where, and how to fish.

With the influx of additional fishermen, however, their delicate self-regulation system was severely disrupted. As catches declined, Lake Chiuta fishermen saw their principal source of food and income disappearing. Disputes with the migrant fishermen were frequent and fierce; in May 1995, the original Lake Chiuta fishermen drove out 200-300 migrant fishermen by burning their straw and grass houses (Wilson 1996). Fishermen have also openly scorned local chiefs for accepting bribes from outsiders in exchange for beach access. Frustrated by their lack of authority to regulate methods, gear, and access of the new fishermen, the Lake Chiuta fishermen looked to the FD for support. They thought the FD had some obligation to help them conserve their fish stocks, and they

sought their help to limit the influx of fishermen.

Co-management at Lake Chiuta developed from this interest at the grassroots level. Fishermen at Lake Chiuta met with FD agents and heard the extension messages that were broadcast by the FD (through MAGFAD). Through these meetings and messages they learned of the Lake Malombe BVCs and how they influenced management; they also heard messages about the importance of fish conservation. These fishermen thought that they too could benefit from such a management partnership with the FD, so they began pursuing a co-management arrangement. Lake Chiuta fishermen attribute the initiation of their interest in co-management to the PFMP extension messages; through these messages the FD only indirectly influenced the creation of co-management at Lake Chiuta.

Program Design and Operation

The Lake Chiuta fishermen, with guidance from the FD, created their co-management system similar to the BVCs at Lake Malombe. In early 1995, Lake Chiuta fishermen organized themselves into 14-member Fish Stock Management Committees (FSMC; also referred to as BVCs) for each of the 9 villages, electing a chair other than the chief (Dissi and Njaya 1995). The FSMCs, like the BVCs, are the principal organizational body which provides community leadership in management.

The FSMCs have the ability to determine fishing methods and access. The FSMCs do not keep a register of fishermen similar to BVCs, but are still responsible for monitoring access. Migrant fishermen need to seek the approval of the local FSMC to gain beach access, although FSMCs do not control fishing catches or locations. Like the Lake Malombe fishery, village chiefs could formerly regulate beach access, but had no

control over gear, locations, or catch limits. Also similar to the Lake Malombe fishery, the Lake Chiuta fishery used to be open access state property but is now recognized as communal property. The FSMCs are able to limit non-resident fishing activity and regulate use among members, although they are not formally recognized in Malawi's fisheries legislation.

The FSMCs hope that support of the FD will help ensure sustainable production. The FD agreed to meet with the FSMCs on a regular basis, which is usually monthly (weather permitting). During these meetings, the FD offers management support in the form of information and recommendations. The FD readily endorsed the regulations proposed by the FSMCs, although they do not assume a significant leadership role.

Management Regulations, Enforcement, and Other Provisions

Fishermen are overwhelmingly united in their opinions about which gears and fishermen should be permitted, and the FSMCs defined regulations based on fishermen's consensus. Decision-making processes for issues not based on consensus have not been defined, although the opinion of a majority will likely prevail. The FSMCs represent the interests of local fishermen and community members, the primary stakeholders. Like Lake Malombe communities, however, non-fishers and women have a less active role in the fishery, so their interests in the fishery may be underrepresented by FSMC decisions. Nevertheless, community members appear to hold similar aspirations for a sustainable fishery, and FSMCs claim to widely discuss the status and effectiveness of regulations with community members. Fishermen appear pleased with the regulations and the decision-making process, and they also seem strongly opposed to rule-breaking. As a result the regulations seem to have a great deal of legitimacy (although a systematic evaluation of

attitudes was not performed).

Lake Chiuta fishermen agreed to regulations different from those for Lake Malombe, but more suited to local conditions. Minimum legal mesh size for beach seines was set at 2.5" (63.5 mm), Nkacha seines were banned, and *Oreochromis* species must be at least 4" (101.6 mm; Dissi and Njaya 1995). Fishermen have traditionally had little interaction with the few fishermen from the Mozambique side of the lake, so they thought it unnecessary to include international aspects in regulations. Mozambique fishing activity was diminished due to civil war; however, now that the war is over interactions with Mozambique fishermen are increasing. Malawian fishermen monitor all fishing activity, and Mozambique violators in Malawian waters (80% of the lake) are dealt with the same way as other violators (Dissi and Njaya 1995).

Lake Chiuta FSMCs take a similar informal approach to enforcement as those at Lake Malombe. All local fishermen are given the responsibility to monitor others' fishing activity. Since there is no licensing system at Lake Chiuta, migrant fishermen are allowed to fish, given they seek access and follow the regulations. Violators, whether migrant or local, are lectured to about the regulations and consequences of non-compliance, and repeat offenders are fined and/or "chased away" by fishermen (Dissi and Njaya 1995). Those who return and continue to violate regulations are reported to the FD, although chases are usually successful and involvement of the FD is rarely necessary. The FSMCs do not keep records of violators and chases (nor did the FD), so quantitative analyses of compliance pre- and post-co-management are not possible. The FSMCs report, however, that enforcement is overall successful and effective.

Provisions for start-up loans for alternative businesses are not included in co-

management at Lake Chiuta (Dissi and Njaya 1995). There are several reasons for the lack of financial incentives for leaving the fishery. Receiving loans was not an initial objective of the fishermen, who were mainly interested in managerial support. In addition, the remote location of these villages limits their interaction with other communities and opportunities for trade or business; there is limited potential for economic activity outside the fishery. Finally, Lake Chiuta falls under the jurisdiction of the Zomba Fisheries office, which did not receive donor funding for loans like the Mangochi Office did under the PFMP (Dissi 1996). The lack of loans has the potential to become a contentious issue, as fishermen are increasingly interested in receiving loans and possible compensation like their Lake Malombe counterparts.

Extension messages are disseminated to Lake Chiuta villages through the same methods as at Lake Malombe -- FD agents and *Usodzi Walero*. The content of the agents' messages is the same, although information specific to Lake Chiuta may be included.

Incentives, Behaviors, and Outcomes

Fishing communities at Lake Chiuta have a great incentive to seek and maintain co-management arrangements. They are highly dependent on their fishery, and they have much to gain from effective community leadership, authority, and FD support. The communal property regime enables them to have greater confidence in their long-term fishery control. The FD is interested in pursuing this co-management arrangement, although their incentive may not be as strong as communities'. The FD is interested in promoting fish production and appropriate management, but since they have had little involvement with fishing at this small, remote lake, the status of this fishery may not be

held as a high priority.

The behavior of FSMCs, other community members, and the FD seem to reflect their level of incentive. Community members and fishermen on the FSMC display great eagerness to communicate and collaborate with the FD, and their willingness to make decisions and engage in monitoring and enforcement is manifested in their enthusiasm for FSMC operations. The FD is willing to participate in FSMC meetings, which are run by the FSMC chair. The FD staff, however, assume much more of a passive presence at their meetings than they do at BVC meetings, only occasionally offering comments and ideas in response to fishermen questions or concerns.

The efficiency, or cost-effectiveness, of outcomes is not entirely applicable as an evaluation tool at Lake Chiuta. Increasing cost-effectiveness was not a co-management objective of either the communities or FD. Through organizing themselves into FSMCs, the fishermen have established an effective way to manage their fishery, and their benefits will be more subsistence-oriented than economic. This co-management arrangement is not as efficient for the FD, however, since they now make more frequent visits to this lake. The vehicle maintenance, supplies, and time commitments required for these visits require the FD to redirect already scarce resources away from other management issues.

Co-management outcomes appear to be somewhat equitable among fishermen. Fishermen have equally endured a period of low catches, and now, after vigilant monitoring and enforcement, they report increasing fish sizes and catches. These costs and benefits are distributed among local fishermen, although gear/vessel owners may benefit more than others. Nevertheless, communities appear to have similar expectations about how their fishery should be managed, and the concerns expressed by fishermen at

FSMC meetings seem to be based on the best interest of their community. The FSMC decision-making and administrative processes seem to be well-understood and less cumbersome as there are no registers to maintain.

Sustainability of the fishery will not likely be limited by a lack of stewardship. Lake Chiuta fishing communities have displayed a great sense of stewardship toward their fishery, and they are very optimistic about the sustainability of production. Their management system, based on communal property concepts, promotes stewardship as it allows fishermen to have greater confidence in their long-term ability to make decisions, monitor, and enforce regulations.

This management system may also be more resilient to changes than the PFMP. These fishing communities were able to self-organize and act collectively when their fishery was threatened, and their willingness to seek community-wide solutions may allow their system to continue to adapt and evolve. The FSMCs have further demonstrated lake-wide collaboration -- on May 25, 1996 they held the First Annual Meeting of the Lake Chiuta Fishermen Association, at which FSMC members optimistically discussed the lake-wide status of stocks and compliance. While the FSMCs value FD support, the presence of the FD may not necessarily enhance resilience of the management system.

Table 5 presents a summary of the fisheries co-management arrangements at each lake. The purpose of this Table is to review the conditions and outcomes of surrounding each arrangement. Due to the great socio-economic and physical variability surrounding each arrangement, outcomes should not be directly compared to each other.

Table 5. Summary of Co-management Arrangements

Information from FCRP Analytical Framework	**Lake Malombe**	**Lake Chiuta**
Biological, Physical, & Technical Attributes	· small-scale, low-tech operations · overfishing · 2500+ fishermen; 390 km²	· small-scale, low-tech operations · overfishing · 1000+ fishermen; 200 km²
Market Attributes	· trade-oriented	· more subsistence-oriented
Socio-economic Attributes	· variable residency & occupations · concentrated wealth & power · limited success with risk, innovation, & collective action	· somewhat variable power, residency, &occupations · limited success with risk, innovation, & collective action
Decision-making Arrangements	· PFMP FD & donor-driven · BVCs determine regulations, access, monitoring & enforcement · FD administers, performs extension, & provides loans · long, adversarial relationship between FD and BVCs	· FSMCs based on fishermen initiative · FSMCs determine regulations, access, monitoring & enforcement · FD endorses regulations, does extension · historically limited interactions between FD and fishermen
Incentives	· increased BVC incentive · limited FD incentive	· increased BVC incentive · limited FD incentive
Behaviors	· both parties willing to cooperate	· both parties willing to cooperate
Efficiency	· not likely cost-effective for FD	· not likely cost-effective for FD
Equity	· risks unequal representation and distribution of costs and benefits	· representation and distribution of costs and benefits may occur
Stewardship	· increased sense among fishermen	· remains high among fishermen
Resilience	· risks having low resilience	· likely to be resilient and expand

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Chapter 5

CONCLUSIONS

According to the anecdotal reports of fishermen at both Lakes Malombe and Chiuta, fish harvests are increasing. If fishery production was the only indicator of successful management, both co-management arrangements could be described as successful (even though the rebound may be caused by other factors). By evaluating co-management outcomes in terms of efficiency, equity, stewardship, and resilience, the FCRP analytical framework expanded the definition of co-management success. Their expanded definition acknowledges that in order to be considered successful, co-management arrangements must consider and incorporate human and community elements which promote sustainability.

Facilitating Successful Fisheries Co-Management in Malawi

The evaluations of co-management and its outcomes at Lakes Malombe and Chiuta indicate that arrangements are more successful in some ways than others. As currently designed, both arrangements alter the property rights regimes from open access to more of a communal regime; this shift promotes long-range collective planning by communities. Able to make, monitor, and enforce regulations, both communities have greater control of their fishery. Under co-management, fishermen at both lakes have

greater incentive to collaborate with each other and with the FD, and their behavior generally reflects this incentive. Current administration of co-management is based on fairly clear processes which may be capable of facilitating equitable distribution of costs and benefits among fishermen. A sense of stewardship appears to be instilled among fishermen and communities at both lakes.

In other respects, co-management at each lake is less successful. Both management systems are at risk of overrepresenting the interests of gear/vessel owners at the expense of their crew, fish processors and traders, and others outside the fishery. Neglect of these other interests, which are likely to be relevant to the fishery, could potentially limit the effectiveness of management and the legitimacy of regulations. Both the BVCs and FSMCs must also ensure that the benefits of sustainable fishery management are fairly distributed among processors, traders, and other relevant sectors of their communities. Equitable distribution of management costs and benefits will ensure that all community members have sufficient incentive to self-regulate. In the short-term, all community members -- fishermen, traders, processors, consumers, and others -- will likely need to endure a period of limited catches in the short-term; therefore, fair representation and equity will be crucial for ensuring everyone has a long-term stake in the fishery.

Successful co-management at each lake is also limited by other factors. At Lake Malombe, co-management originated with the FD and was imposed on communities with little experience in self-determination, collective action, and coordinated fisheries administration. Operation and administration of BVCs seem to be highly influenced by FD input, and the FD determines the kind and extent of BVC power. The BVCs, having

limited experience in administering organizational bodies, are at risk of becoming too dependent on FD involvement. If the FD does not maintain a supportive presence and perhaps guide the BVCs through potential social, economic, and biological changes, coordinated lake-wide BVC operation may be jeopardized.

While the current and future role of the FD at Lake Malombe will strongly influence the PFMP, FD financial constraints may limit their efficiency and effectiveness. Cost-effectiveness could not be determined, although in the short-run it appears the FD is not operating in a cost-effective manner. Their behavior indicates a willingness to pursue co-management, although their incentive for doing so is not likely as strong as the fishing communities'. Furthermore, FD-BVC relations may become strained in the future as FD loans phase out, compensation for turning-in illegal gear does not appear, and the FD faces probable budget limitations. The delicate co-management relationship between these formerly uncollaborative groups will require careful attention, maintenance, and room for growth.

Co-management at Lake Chiuta faces fewer challenges than the PFMP. These communities demonstrate greater initiative in designing and implementing their co-management arrangement; therefore, they may be more able to adapt to change and continue to evolve. Fishermen in the FSMCs continue to value and expect FD involvement, although they should not become too dependent on FD participation. While the FD may not always be able to maintain a consistent presence at Lake Chiuta, they may not necessarily need to. Self-management and administration may be more plausible at this isolated lake, as fishermen are less subject to influences of the FD and market conditions. Additionally, this lake has a smaller area and fewer fishermen, making

consensus building, monitoring, and enforcement less complicated.

Malawi's experiences with co-management illustrate how each group in a co-management arrangement must assume appropriate roles and functions. The roles and functions assigned to a group need to be based on several considerations, such as a group's expectations, resources, incentives, and expertise. These elements will vary between fisheries, so each co-management arrangement must be carefully and deliberately designed, with both short- and long-term conditions in mind. The expectations, resources, and expertise of each group must be thoroughly understood by the other group. For example, the Lake Chiuta fishermen expect FD involvement, but they may not thoroughly understand the operating constraints that may limit long-term FD presence. Incentives must also be understood and, where necessary, property rights which promote appropriate incentives should be established. If both parties in a co-management arrangement understand the potentials and constraints of the other party, they will be more likely to design appropriate structures and to ensure costs and benefits are assigned appropriately.

Recommendations for Community-level Management Committees

Based on the above considerations, the members of BVCs and FSMCs can do certain things to promote co-management sustainability and success. Primarily, they need to engage in and maintain meaningful two-way communication with *both* FD agents and community groups. The FD needs to be aware of community concerns, and communities need to understand the operating constraints of the FD that could limit their long-term role. BVCs and FSMCs have a crucial role in facilitating this two-way communication, as they need to both represent community concerns to the FD and channel information from

the FD to communities. Having these important roles, BVCs and FSMCs serve as educators for both the FD and communities.

BVCs and FSMCs, serving as management bodies as well as representatives of community interests, need to actively seek input from all sectors of the community. Fishing crews, processors, and traders not currently serving on committees have concerns and interests that are directly based on the fishery; their ideas and advice should be sought and considered by community-level managers. Community members not directly associated with the fishery also have an interest in the fishery, since fish provide food, employment, and indirect benefits. Furthermore, successful BVC/FSMC operation will likely require widespread community support and approval, especially if the role of the FD diminishes and committees are to become self-sufficient.

Seeking management input from all sectors of the community will also help ensure that costs and benefits are fairly distributed. Decision-makers on BVCs and FSMCs must understand that the costs and benefits do not have to be the *same* among all sectors; after all, certain sectors are more dependent on the fishery than others and may need to sacrifice more in the short-term. Accurate quantifications of these costs and benefits would help ensure fair distribution, although it would be exceedingly difficult to maintain this information. Nevertheless, as management decisions are considered and made, committee members must be keenly aware of how much a certain group is sacrificing. Equitable distribution of costs and benefits means ensuring that those that bear the most costs (or sacrifices) will also reap the most long-term benefits. Effective communication with community members will help ensure that BVCs and FSMCs understand who is bearing the costs of management, thereby helping management be more equitable and effective.

Finally, BVCs and FSMCs should continue to view co-management as a valuable opportunity to promote both a sustainable fishery and self-empowerment. They should educate each other and work to build consensus, both within communities and with other BVCs. Since the FD may not always function in their current role, BVCs and FSMCs need to achieve some level of independence and become self-administering. In light of these needs, it will also be important for BVCs and FSMCs to communicate and cooperate with other management committees with which they share the fishery. This will help build alliances and promote committee independence. Appendix B contains a list of these recommendations to be translated into Chichewa and Yao for distribution to BVCs and FSMCs.

Recommendations for the Malawi Fisheries Department

The FD could also do certain things to improve the sustainability and success of co-management at each lake. They need to further clarify their current and future roles with BVCs and FSMCs. Fishermen and communities need to thoroughly understand the FD's operating limits, and they must be aware of and prepared for the FD's potentially limited future role. If the FD anticipates a diminishing future role, they need to actively promote self-administration for committees and encourage their independence. Appropriate meeting procedures, such as agenda setting and record keeping, should be developed based on committee needs and clerical resources. The FD must also be acutely aware of the status of fishery self-management and administration; if BVCs or FSMCs demonstrate ability to function without FD involvement, the FD should be willing and able to diminish their role and assume a supportive role as needed.

As long as the FD is involved in the co-management systems, they should promote committee representation of all community interests and help determine fair distribution of costs and benefits. The FD must also maintain a high level of funding, whether from donors or the Malawi Government, to increase and insure operating efficiency, thereby removing finances as a limiting factor to co-management success. They must also maintain and expand current research and extension programs.

The FD should also propose fisheries legislation that gives formal, legal recognition to BVCs and FSMCs. Their communal property rights must be formally recognized, as this would establish a permanent foundation upon which authority and management plans can be based. Currently, with no legal standing, BVCs and FSMCs can manage only through FD consent. Fishermen may view this consent as tenuous and subject to change, potentially detracting from local confidence in their long-term control. Legal arrangements must be pursued which guarantee community rights to self-manage, yet still allow the FD to oversee research, extension, and education. Modifications to the language of the draft Fisheries Conservation and Management Act, such as those proposed to the FD by GTZ, must be considered and incorporated. While the role of the FD should be shifted away from management of the small-scale sector, they should take a greater role in facilitating co-management, settling conflicts between fishing communities, and representing the small-scale fishery at the national level. These elements will become more important as co-management expands to Lake Malawi's small-scale fisheries.

Expanding Co-Management to Lake Malawi

Expanding co-management to Lake Malawi fishing communities is currently being considered and designed (Schulz 1996, personal communication). This expansion will be largely based on the experiences of the Lake Malombe PFMP. For several reasons, however, co-management at Lake Malawi will need to consider and incorporate greater socio-economic diversity than at Lake Malombe (Derman *et al.* 1994). In addition to the issues faced by BVCs, Lake Malawi communities must deal with other issues, such as tourism, construction of private cottages, potential industrial activity, and competing fishery sectors (Derman *et al.* 1994).

The kinds of fishing taking place on Lake Malawi are significantly more geographically dispersed, diverse, and intensive. In addition to several hundred small-scale operations, intense fishing is done by semi-commercial pair trawl operations and the commercial operation, MALDECO (Derman *et al.* 1994). Since these larger operations are largely responsible for overfishing and localized depletions, small-scale efforts at co-management and conservation may have negligible impact on the status of stocks. Co-management at Lake Malawi will need to be based on equal representation and decision-making power between small-scale, semi-commercial, and large-scale commercial fishers. Such collaboration may be much more difficult to achieve and maintain than at Lake Malombe.

In addition to competing with larger sectors of fishing, small-scale fishing communities on Lake Malawi display more variability in composition and culture. Communities on this large lake differ in their ethnicity, level of education, residency patterns, tenure systems, authority systems, agricultural landholdings, participation of

women, and distribution of gear and vessels; the lakewide distribution of fish stocks also varies significantly (Derman *et al.* 1994). Furthermore, very little is known about other Lake Malawi fishing communities in Tanzania and Mozambique.

In short, the numerous Lake Malawi communities display a wider range of diversity than communities at Lake Malombe. As a result, co-management systems will need to incorporate this diversity by designing decision-making committees that both represent local conditions yet are capable of cooperating with other committees in the region. Local committees can influence the behavior of fishermen operating out of that community; however, the fishing areas on the Lake are usually not bounded or defined (Derman *et al.* 1994). As a result, conflicts may arise due to competing fishing interests and needs, both between fishing communities and between small- and large-scale sectors. Co-management arrangements will also need to incorporate appropriate dispute-resolving mechanisms, perhaps based on compromise or trade-offs.

Recommendations for Further Study

Several elements of the PFMP and the Lake Chiuta arrangement warrant further study. Primarily, survey research should be conducted in fishing communities to determine and compare the incentives, attitudes, and expectations of community members. Similar survey research should also be conducted among the FD and other government bodies. The culture of the fishing villages should also be described and understood in more detail, as communities' ways of thinking and behaving directly influence their willingness and ability to collectively contribute to management. With such studies, the evaluations presented in this study could then be verified or improved.

Another worthwhile research project would focus on quantifying the cost-effectiveness of the co-management arrangements. Many FD financial records were not available at the time of this study, and a more thorough market evaluation was not possible. With such information, this study could have more accurately evaluated the efficiency and economic limitations and potentials of fishery management arrangements. Such studies would also serve to verify or improve this study.

Finally, more complete biological information will help determine the actual relationship between a co-management arrangement and fishery sustainability. The FD has approved a comprehensive ecological study for Lake Malombe, although ecological studies of Lake Chiuta and the food fishes of Lake Malawi are also necessary. Due to the likely expansion of co-management to Lake Malawi, surveys and other socio-economic studies must also be conducted for these diverse fishing communities.

APPENDIX A

APPENDIX A

List of Key Actors Consulted in Malawi

Informal interviews and meetings were conducted with the following actors and/or institutions:

Dr. John Wilson, Consultant
Dr. Uwe F. Schulz, MAGFAD Project Co-ordinator
Mr. Malakabu, MAGFAD Band member and fish farmer
Peter Kulemeka, National Programme Officer, United Nations Development Programme
Joseph D. Ndengu, Programme Officer, United Nations Development Programme
Sean Southey, Environment Programme Officer, United Nations Development Programme
John P. Snell, Administrative Officer, Food and Agriculture Organization of the UN
Earnest Makawa, Ministry of Research and Environmental Affairs
Sam Mapila, Deputy Director of the Fisheries Department
Matthew Mtemba, Director of Malawi Parks and Wildlife
David Himelfarb, NATURE Program Manager, USAID
Zililo Q.Y. Chibambo, Minister of Natural Resources
Minister of Research and Environmental Affairs
Georg Walter, Sociologist, Consultant to MAGFAD Project
Steve Alimoso, Head of Research for the Fisheries Department
B.F.R. Mtika, UNDP National Extension Expert, Mangochi District Fisheries Office
Enert Nyando, Regional Fisheries Officer for Women's Programs
George Sodzapanja, Data Officer, Monkey Bay Fisheries Office
Mr. Jumpha, Enforcement Officer, Mangochi District Fisheries Office
Stafford Mkandawiri, Technical Assistant, Mangochi District Fisheries Office
Peter Ksayera, Technical Assistant, Mangochi District Fisheries Office
Mr. Kavamgugu, Mangochi District Magistrate
Mr. Dissi, Head, Zomba Fisheries Office
Sloans Chirmatro, Fisheries Extension Officer, Zomba Fisheries Office
Mr. Alfred Nkoza, Fisheries Assistant, Lake Chiuta
Mr. W. Rmkwamba, Head Fish Scout and Data Officer, Lake Chiuta
Wiseman Chirwa, Professor of History, University of Malawi
Janet Probyn, Forestry Research Institute
F.J. Njaya, Acting Regional Fisheries Officer
G. Kazako, Malawi Broadcasting Corporation
BVCs: Chipalamawamba Village, Likala Village, Nasapulu Village, and Mtela Village

APPENDIX B

APPENDIX B

Community Fisheries Management Committees

Recommendations

Your Committee has a very important role in sustaining your fishery! The decisions you make today will affect your whole community, as well as future generations. To make effective management decisions and become self-reliant, consider the following recommendations:

Communicate with everyone in your community.

All members of your community have a direct or indirect interest in the fishery. Everyone's concerns should be reflected in your management decisions.

Communicate with the Fisheries Department agents.

Let them know your community's concerns, and find you what affects their management roles and decisions. Open communication helps solve problems!

Communicate with other Management Committees on your lake.

Share your management ideas and concerns with other fishery managers. Look for ways to help and support each other. Your decisions may then be more efficient and effective!

Build consensus for management decisions.

Your management decisions should be based on agreement and have support of community members and possibly other management Committees on your lake.

Make fair management decisions.

Consider how your decisions will affect others in your community who do not make management decisions. Those who sacrifice the most for the fishery now should reap the most benefits in the future.

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