

**USERS' ATTITUDES TOWARD FISHERIES MANAGEMENT ON  
LAKE ZEWAY, ETHIOPIA**

**By**

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## **ABSTRACT**

A resource management system combines a set of regulatory scheme within a particular resource to achieve a management outcome. The effectiveness of these regulatory measures depends on the support gained from the resource user group and the way they themselves define their problem, their involvement in the decision-making process, in installing and enforcing the regulations. Through semi-structured interviews, this study investigated what resource users think about: the status of stocks and the reason for any change, fisheries management issues and measures and management in partnership on Lake Zeway fisheries. It is found out that sample respondents understand and agree the resource is in undesirable state mainly due to increasing number of fishers and/or gears beyond the capacity of the lake, use of small mesh size/fishing for juveniles and on the breeding grounds. They expect a continued pattern of decline unless some possible measures undertaken to curb the problem. Respondents are, for most part, supportive of management. Most of them understand the importance of the variables that management can manipulate and agree on some fundamental element of a common management strategy but lack incentive for compliance due to the absence of property right. Moreover, they showed motivation and willingness to share management responsibility with fisheries officials.

Consolidation of the community coupled with local control of resource base access and active involvement in the management thereof, are important ingredients for achieving true success – i.e. long term sustainability – in the exploitation of the fishery resources.





## **CHAPTER ONE**

### **1.1 INTRODUCTION**

The fishery industry has been of critical importance to the economy and to the social well-being of humanity. It provides a vital source of food, employment, recreation, trade and economic well being for people throughout the world. However, Current harvest trends and fishery conditions put these attributes of the industry at risk. It is threatened with problems of overexploitation, environmental degradation and consequently unrecovered resources resulting in loss of its potentials. These resources, although renewable, are not infinite and need to be properly managed, if their contribution to the nutritional, economic and social well-being of the growing world's population is to be sustained (FAO 1995). William and Johannes (1998) also pointed out that there is a worldwide consensus that fisheries need better management if they are to continue making a major contribution to the economy and social well being of society.

Moreover, fisheries management experts recognize that the underlying causes of fisheries resource over-exploitation and environmental degradation are often of social, economic, institutional and/or political origins. The primary concerns of fisheries management, therefore, should address the relationship of fisheries resource to human welfare and the conservation of the resources for future generations. That is the main focus of fisheries management should be people, not fish per se. Policy interventions, if they are to bring about lasting solutions, must address these concerns (Pomeroy 1995).

Management system combines a set of regulatory scheme within a particular resource to achieve a management outcome (Hanna 1995). The effectiveness of this regulatory measures depends on the support gained from the resource user group (Jentoft and McCay 1995) and the way they themselves define their problem, their involvement in the decision-making process, in installing and enforcing the regulations (Jentoft 1989). Hence, management principals have to include human responses and motivation as part of the system to be studied and managed (Ludwig *et al.* 1993). Particularly, their attitudes and perceptions towards management, compliance and enforcement as these are vital to the effectiveness of any regulatory effort (Clay and McGoodwin 1995)

The endeavor of this study is to assess the attitudes and perceptions of resource user towards management-related topics on Lake Zeway fisheries. For this, together with available secondary data survey interview were used to obtain information that will shade light on the research goals.

This work is organized into six chapters. Chapter one starts by introducing the theme of the study and followed by the descriptive aspect of the study area that gives an overview of Ethiopian fisheries in general and Lake Zeway fisheries in particular. In chapter two, background of the study will be described that include research problem, professional contribution and objectives of the study. The third chapter is about conceptual framework of the study and the methodology. Here different literature related to the research problem will be reviewed as well as the method used for this study will be outlined and the scope and limitation of the study will be presented. In chapter four the field aspect of the study and detailed analysis of the results will be presented. Chapter five lays down the detail analysis and discussion of the results. The last chapter is about conclusion and recommendation.

## **1.2 DESCRIPTIVE ASPECTS OF THE STUDY AREA**

In this sub-chapter the study area, Lake Zeway and its fisheries will be described. Section one provides the general information of Ethiopia with respects to its geographical location, demographic reports and its economic status. Section two describes briefly about Ethiopian fishing industry, its importance and problems. In section three the general situation of the study area and its fisheries will be provided. This include the location of the study area, population structure, administration, history and types of fisheries, market outlets, fishing activities and religion.

### **1.2.1 Ethiopia**

Ethiopia (3-18°N, 33-48°E) covers a total surface area of 1.1 million square kilometers. The country, which is the ninth largest in Africa, forms the major portion of the East African landmass, known as the Horn of Africa. It is surrounded by Sudan (North and West), Kenya (South), Somalia and Djibouti (Southeast and East) and Eritrea (Northeast). The capital city is Addis Ababa. The land area comprises twelve

river basins of which nine have perennial flows and three are normally dry valleys and lowland areas.

The number of people inhabiting Ethiopia in 1994 was estimated to be 53435000 with a 3 percent annual growth rate. The rural population is about 85 percent of the total. Agriculture accounts for 40 percent of the Gross Domestic Production, employing 80 percent of the population. The principal exports from this sector are coffee, oil seeds, flowers, vegetables and sugar. There is also a thriving livestock sector, exporting cattle, hides and skin (Wudneh 1998).

### **1.2.2 Ethiopian Fishery Industry**

Ethiopia depends on the inland waters for the supply of fish as a cheap source of animal protein. It has a number of lakes and rivers with substantial quantity of fish stocks. The total area of the lakes and reservoirs stands at about 7000 to 8000 km<sup>2</sup> and the important rivers stretch over 7000 km in the country (Mebrat 1993). In addition, minor water bodies such as crater lakes and reservoirs make up about 400 km<sup>2</sup> (Wudneh 1998). Most of the lakes are located in the Ethiopian Rift Valley depression, which is part of the Great East African Rift Valley system (Appendix 1). However, Lake Tana, the largest lake in the country and the source of the Blue Nile River, is located in the northwest plateaux outside the Rift Valley. This lakes and rivers are stocked with various species of fish. The potential yield of fish is estimated to be between 30, 000t and 40,000t/year for the main water bodies and about 25,000 t/year from Baro River alone and a large potential from other rivers (FAO 1995).

The exploitation of the different water bodies of the country is very uneven. For example, those located near the capital, Addis Ababa, and having good road connection, like Lake Zeway and Lake Awassa, have been heavily exploited to the extent of overfishing. Lake Tana, which is located 500 km from Addis Ababa, is amongst the least exploited lakes, inspite of its size of 3200 km<sup>2</sup> and fish resource (Wudneh 1998). Hence, for most water bodies, the production estimate is far below the estimated potential yield.

In 1998 the total production, mainly from the Rift Valley lakes, is estimated to be about 14,000 ton, (LFDP 1998) less than 50 % of the estimated potential. There are

several reasons attributed to the low production among which the lack of fishing tradition and low fish consumption habit of most people is frequently quoted. Subsequently very little attention was given by the government for its management and development. However, with the high rate of population growth and the progressive shortage of livestock products, the situation is now changing and the demand for fish is growing very fast (Anon. 1999).

Prior to 1992 the Central Government formulated policies for the management of inland water fisheries. Maximization of yield has highest priority in developing countries with expanding populations and increasing food requirements (Leveque 1997). Ethiopia is no exception in this regard and the main objective of the government were increased production to the estimated maximum sustainable yield (MSY) and job creation. Now the involvement of the Central Government is limited to issuing nation wide fisheries laws and provision of technical support and professional advice when requested by the regional governments. Policy decisions are made by the Regional Administrative Council and implemented by the regional Bureau of Agriculture. There is no fishery legislation that is presently enforced. The fishery legislation that existed before 1974 has been repealed by change of government. Any control and regulation of fishing activities is made by directives from the Bureau of Agriculture, who prepare and issue fishery regulations based on available biological information (Wudneh 1998).

### **1.2.3 Study Area, population structure and administration**

Lake Zeway is the most northerly Rift Valley Lake (Appendix 1). It is located between 7 51' N to 8 07' N and 38 43' E to 38 57' E, in the Oromia region of the country. Lake Zeway has open water area of 422km<sup>2</sup> and shoreline length of 137 km. The lake is fed by two major rivers, i.e. Ketar and Meki River, and has one outflow in the south, the Bulbula River which flows into Lake Abiyata (LFDP 1993).

Five bigger islands are situated in Lake Zeway (Appendix 2): Tulu Gudo (4. 8 km<sup>2</sup>), Tsedecha (2. 1 km<sup>2</sup>), Funduro (0 .4 km<sup>2</sup>), Debre Sina (0 .3 km<sup>2</sup>) and Galila (0. 2 km<sup>2</sup>). While the latter two have only a few inhabitants, the three bigger ones are populated with several hundreds of people (Anon. 1999).

The population in the vicinity of Lake Zeway belongs to two major ethnic groups: the farming and rearing Oromos (Kushistic) who occupy most of the farmland around the lake, and the Zeway and a minority of Semitic origin who are inhabiting the islands. Orthodox Christians and Muslims form the backbone of the religious tradition in the area; Catholics and Protestants are only a minority (LFDP 1993).

Lake Zeway is under the administrative control of two zones of the Oromia Region, i.e. the western part belongs to East Shoa zone while the eastern part belongs to Arsi zone. At the western shore two Weredas are bordering the lake, Dugda Wereda with the Meki as district capital and Adami Tulu Wereda with Zeway as district capital. The fishery of this part of the lake is administered from these two towns. The eastern and southern shore belongs to the Zeway na Dugda Wereda, district capital is Habura, but it is managed from the Arsi zone capital Asella (Anon. 1999).

#### **1.2.4 Lake Zeway fisheries**

Lake Zeway fisheries have benefited from the Phase I (1981-84) and Phase II (1991-98) fishery development projects assisted by the European Development Fund (EDF). Thus, it is the most developed with maximum contribution of all lakes in the Oromia Region. Fishing is carried out with beach seine, gill nets and hook and line. During 1995 there were 1760 regular (full time) fishers on Lake Zewai (LFDP 1996). 2470 gill nets and 124 beach seines were operated on the lake during the same period. An increase of 55% in the number of fishers, 115% in gill nets and 15% in beach seine was observed during 3 years from 1993 to 1995 (LFDP 1996).

Fishing has seasonal pulse on Lake Zeway, as it is in most other lakes in the country, with high fishing activity and increased landings during January - March. This is influenced by the high demand for fish during the fasting period of Orthodox Christians and the apparent increase in catch rate. The increase in the catch rate during this season could be associated to the spawning aggregation of the tilapia to the shallow inshore grounds becoming easily vulnerable to the beach seine fishing practices (Schoder 1984, Tadesse 1988) Similar increase in catch rate is reported for catfish fished in shallow areas during its spawning season in Lake Tana (Wudneh 1998).

The catch from Lake Zeway consists of almost exclusively *Oreochromis niloticus* (Tilapia). Since recent years, however, *Clarias gariepinus* (catfish), and *Caracius caracuis*, (crucian carp) have appeared in small amounts in the total catch (LFDP 1994). There is a number of landing points around the lake from where fish is collected either by boat or trucks and brought to the major landing point adjoining Zeway town. Fish Production and Marketing Enterprise, FPME (a semi-autonomous government enterprise) and private traders coming from the capital city, Addis Ababa and nearby towns perform fish trading.

### **1.2.5 Management**

At present access to Lake Zeway like other lakes in the country is basically open to all. There is no control either on the quantity or the quality of the fishing effort. Until the change of government of the country in 1991 only cooperatively organized fishermen were fishing. These cooperatives still exist nowadays, but most of them are only on paper. Since 1991 many people started fishing without being organized. The most common regulatory measures used by the local fishery officers were gear restrictions such as mesh size regulations, catch limits or quotas, closed seasons or areas (LFDP 1996). The minimum allowed mesh size for gill nets were 10 cm (stretched) and 8 cm for beach seines (in the wings and codend). These measures have not been followed by most of the fishermen. The use of illegal and non-sustainable fishing gear has become a common practice. Fish catch per unit effort and the average size of the fish caught have continued to show a declining trend, implying the fish stocks are getting depleted (LFDP 1998). This is an indication that the management regulations that have been implemented were either ineffective, inappropriate or have not been enforced adequately.

## **CHAPTER TWO**

### **2.1 RESEARCH PROBLEM**

Failures that are taking place in fisheries of developed world are making the situation even more difficult for the developing countries, which are trying to emulate the techniques being used by the former. The centralized management approach, which makes little or no use of fishers' capacity to manage themselves and does little effective consultation of the resource users, is often not suited for developing countries with limited financial means and expertise to manage fisheries resources in widely dispersed fishing grounds (Berkes *et al.* 2001). For this reason, user participation in fisheries management has received an increasing amount of attention in recent years.

Fisheries management policies in Ethiopia have been guided by the conservation paradigm, that is a biologically based philosophy, focusing on the protection of fish stocks. The approach to fisheries management has been government centered. Any control and regulation of fishing activities have been made by directives from the Bureau of Agriculture, who prepare and issue fishery regulations based on available biological information (Wudneh 1998). Unfortunately, this approach has proved to be disastrous in Lake Zeway and some other lakes in the country, where fish catch per unit effort and the average size of the fish caught have continued to show a declining trend, implying the fish stocks are getting depleted (LFDP 1996). This is an indication that the management regulations that have been implemented were either ineffective, inappropriate or have not been enforced adequately.

At present access to the lake is basically open to all, any one who wants may start to fish. There is no control either on the quality or the quantity of the fishing effort. The number of fishermen on the lake is increasing from time to time. The use of illegal and non-sustainable fishing gear is a common practice. This situation is clearly untenable. The issue of appropriate management is an urgent need to address if the contribution of the fishery as a source of food, income and employment and a means

of promoting community stability for the majority of the population around the lake is to be continued. This can be done either by the government or by the fishing communities themselves or by both. But as experience in this lake or many practical examples elsewhere show, the state control alone has not been successful in sustaining long-term productive use of natural resource systems. Hence, to find out management option that might have resource users support, this study investigate local people's attitudes and perceptions related to status of the stock, management issues and measures and management in partnership.

## **2.2 PROFESSIONAL CONTRIBUTION OF THE STUDY**

The research finding will contribute to the knowledge base of fisheries management. There is a noted problem that traditional scientific approach to sustainable fisheries management alone are not enough. There have been efforts to involve users in managing their resources as a better alternative to management. An understanding of users attitude and perception related to management issues and measures and to management in partnership will add to this knowledge.

The value of such information for a management exercise is that it fixes crucial reference points for design of new or for the review of existing arrangements and their effectiveness as tools to promote responsible resource conservation and use. In the context of the small-scale fisheries of Lake Ziway, planners and fisheries authorities can thus consider a range of options for developing new or improving the existing regulation of fishing, limitation of access, and allocation of management duties, with the benefit of some background knowledge on which measures are likely to command widespread community support.

Managers can use the findings for developing, implementing and evaluating their managerial responsibility. Researchers can use findings of the study as a foundation to further research. Study results provide unique opportunity to quantitative and qualitative measure of users group's response and therefore offer reasonable excellent possibility for transfer of information between managers and community. Therefore findings have contributions towards management for sustainable fisheries and therefore development.



### **2.3 OBJECTIVES OF THE STUDY**

The main objective of this study is to investigate resource users attitude and perceptions towards fisheries management issues and measures on Lake Zeway so as to provide background information for improved management planning exercise. In pursuit of the main objectives, the following are specific objectives:

- To assess local people's attitudes and perceptions related to the state of the stocks and possible options to regulate fishing.
- To probe their opinion towards possible co-management arrangement.
- To identify their occupational problems.

## **CHAPTER THREE**

### **3.1 CONCEPTUAL FRAMEWORK: LITERATURE REVIEW**

Most of the world's fishery science has been devoted to stock assessment, with geographic focus on countries of the North. The disciplinary focus has been on biology and, to some extent, economics. Without the inclusion of much social science, conventional approaches have not adequately addressed the socio-economic needs of fishing populations and the potential benefits of collaborative governance. People were at the periphery, not the center, of conventional fisheries management. Such fishery science has not served well the fishery management needs of the South, including countries that primarily depend on small stocks, often exploited by small-scale fisheries on a community basis (Berkes *et al.* 2001)

The biological 'top-down' approach has proven to be more costly to implement and enforce the regulation (Hanna 1995). In many fisheries, the end result of this has been that the fish resources have often been over exploited, and sometimes to extinction (Pinkerton 1989). Although most conventional fishery management concerns itself mainly with biological or bio-economic methods, fishery management is really 'people management,' as recognized by generations of fishery managers (Gulland 1974). As pointed out by Ludwig *et al.* (1993), natural resource management principals has to include human responses and motivation as part of the system to be studied and managed.

In response to the failure of centralized (top-down) management and the need to search for improved approaches, users participation in fisheries management have received an increasing amount of attention from government around the world in recent years (Pomeroy and Williams 1994). It has also been recognized that '... the efficiency and implementability of the management measures are often highly dependent on the support gained from the interested parties' (FAO 1997, Berkes *et al.* 2001, Jontoft and McCay 1995). Moreover, international experience testifies that without support from the fishermen the chances for fisheries regulation to succeed are very poor because fishermen in most cases find ways of by-passing regulations (Copes 1986, Jontoft 1989, Rettig, *et al.* 1989, Hanna 1995, Mikalsen 1996).

The focus of this study is to assess users attitude and perception towards fisheries management, the concept that is missing in conventional fisheries management system. The main idea is to find out management measures and issues that have resource users support and to probe their attitude towards management in partnership. It is a step forward in an effort to involve users in managing their resources.

## **3.2 METHODOLOGY**

### **3.2.1 General overview**

This study was conducted at Southern part of Lake Zeway, Ethiopia (Appendix 2). It involved gathering information on the attitudes of users towards management on the lake using two semi-structured questionnaires for two months. These include:

- Form 1: Fisher interviews questionnaire (Fishing unit affiliation; basic biodata; attitudes and opinions related to management issues – perceptions of state of fisheries, possible regulatory mechanisms, etc.)
- Form 2: Trader/processor interview questionnaire (Type of enterprise, basic biodata; attitudes and opinions, etc.) (Appendix 3)

The survey thus sought to pay particular attention to such questions of resource access and use rights, restrictions on gear and catch, and measures to protect stocks through seasonal and/or areal closures. Also of key importance were prospects for establishing mechanisms of co-management—an approach that involves all stakeholders, government and user groups alike, in a collaborative or joint process of setting out management objectives and defining and implementing the measures needed for their operation and enforcement. These formed the backbone of the study.

Prior to, and during fieldwork, various resourceful persons were consulted for gathering needed information and for familiarization with study area.

### **3.2.2 Field work**

Local language ‘Amharic’ was used to collect information. At first the respondents were collectively informed of the background and objectives of the research and the procedures. The data collection forms both for fishers and traders/processor were

tested to a group of eight respondent and necessary corrections were made. Then, interviews were conducted with individual fishers and processors/traders.

### **3.2.3 Sampling**

Eight landing sites were randomly selected for the survey (Appendix 2). But making a truly random selection of fisher respondents in a given landing site were impossible and hence, they were simply identified out of the collection of those they happened to be found at the time of survey visit. However, recognizing that gear type was the main determinant of fishing unit structure and the role played by the various participants in the unit operation, attempt were made to include as wide range of 'traditional' and 'artisanal' gear types as possible while selecting fishers for interview. Moreover, effort was also made to include different categories of individuals associated with fishing operation (gear owner, owner and operator, and crew/laborer). Therefore, though making a truly random selection of fisher respondent was impossible; they were selected on the basis of their roles in the fishing industry.

Trader/processors interviews were conducted with a sample of traders who bought their fish on the beach. Since there was no basis for estimating total numbers of trader/processor beforehand and then select respondent from this population that changed everyday, the selection mechanism for small scale traders/processors was to interview as many as possible during the hectic fish buying time each morning.

In this manner, a total of 8 landing sites, 42 fishers, and 16 processors/traders were selected for inclusion in the survey sample.

Statistical Package for Social Science (SPSS) and MS-Excel programs were used to analyze. They helped to statistically describe and compute specified percentile values of data.

### **3.3 SCOPE OF THE STUDY AND LIMITATIONS**

The study is mainly concentrated on investigation of what resource users think about: the status of stocks and the reason for any change, fisheries management issues and measures and management in partnership on Lake Zeway fisheries. The study didn't involve any biological analysis, investigation or comparison, for example with regard

to the status of the stock. It is mainly concerned with the attitude and perception of users with regard to management options on the lake.

The problem of the availability and accuracy of data had effects to the study. Sufficient and good quality data was lacking. For example, there were no record of fishermen and traders/processors for the lake that could be used to sample respondent from this population, to estimate number of people employed in the fishing industry and secondary or allied sectors.

The fact that primary data are based on respondent's memory may have effects on the study. There are many variables, which involved the respondents estimating quantities. These estimates should be treated as having high error terms. Certainly, biological data about fish catches should not be inferred from any estimates of fish quantities. They should be used for comparisons only. Moreover, some questions ask respondents to make comparisons with their current situation and that of a specific time in the past such as 'over the past year' or 'compared with when you first became a fisher.' The actual times in these questions should be taken as representing no more than the respondent's description of secular trends that he or she perceives.

It was practically difficult in terms of time and financial resources to cover the whole of the lake for this survey. Thus, the survey was concentrated mainly the southern part of the lake.



## **CHAPTER FOUR**

### **4.0 RESULT**

#### **4.1 RESPONDENT BACKGROUND CHARACTERSTICS**

##### **4.1.1 Sample composition**

The sample composition of this survey consists of 42 fishers and 16 post-harvest respondents. A breakdown of fisher sample respondents interviewed by the main gear operated by their unit, as shown in Table 4.1, indicates that 61.9 % are associated with ‘artisanal’ gear kits comprised of beach seines and 38.1% are associated with ‘traditional’ kits that consist of gillnet and long line.

The result of the post-harvest sector sample group is mostly composed of those who practice both fish processing and trading together, as opposed to specializing in either one or the other (Table 4.2). These individuals are comprised of those operating locally within 5 km radius of their landing site (31.3%), non-locally beyond 5 km radius (37.5%) and both locally and non-locally (31.3%) (Table 4.3).

The sample population of fisher can further be broken down in terms of the different roles played by respondents within their respective fishing units. Functional categories consist of those who are:

- ‘Owners’                      Owners of main gear operated who do not directly participate in fishing trips.
- ‘Owners/Operators’      Owners of main gear operated who directly participate in fishing trips.
- ‘Crew/ Operator’        Operators who do not own the main gear (e.g. net setters and pullers).

In order to facilitate data presentation in the following sections, these categories and that of processors and/traders have been simplified into four basic respondent types: a) artisanal owners; b) artisanal crew; c) traditional fishers; and d) post-harvest respondents.

Table 4.1 Sample fishing unit respondents by main gear type.

Main gears used	No.	%
‘Artisanal’ Beach seines	26	61.9
‘Traditional’ Gillnet	6	14.3
Long line	6	14.3
Long line and Gillnet	4	9.5
Total	42	100.0

Table 4.2 Post-harvest sample respondents by enterprise type.

Main enterprise type	No.	%
Processing+trading	13	81.3
Trading (rarely processing)	3	18.8
Total	16	100.0

Table 4.3 Post-harvest respondent by area of operation.

Area of operation	No	%
Local (5 km radius)	5	31.3
non-local (>5 km radius)	6	37.5
Local & non-local	5	31.3
Total	16	100.0

#### 4.1.2 Gender, age, and formal education

All fisher sample respondents and 75% of the post-harvest respondents are male. Characteristics in term of age are displayed in Tables 4.4. Traditional fishers and artisanal owners tend to be older (majority >30 years) than artisanal crew members and post-harvest group (majority <30 years). Data on levels of formal education attainment were not systematically collected during the survey.



Table 4.4 Age structure of fisher sample respondents by type of fishery and fisher category and post-harvest respondents.

Age range (yrs)	Artisanal				Traditional		Post-harvest	
	Crew <sup>1</sup>		Owner		(Owner + Crew)		(Processor +Trader)	
	%	Cum%	%	Cum%	%	Cum%	%	Cum%
<15	0.0	0.0	0.0	0.0	0.0	0.0	00.0	00.0
15 - 18	14.3	14.3	0.0	0.0	6.3	6.3	00.0	0.0
19 - 21	21.4	35.7	0.0	0.0	0.0	6.3	6.3	06.3
22 - 25	14.3	50.0	0.0	0.0	18.8	25.1	31.3	37.6
26 - 29	7.1	57.1	0.0	0.0	18.8	43.9	43.8	81.4
30 - 39	28.6	85.7	27.3	27.3	31.3	75.2	18.8	100.0
40 - 49	14.3	100.0	63.6	90.9	25.0	100.0	00.0	100.0
>49	0.0	100.0	9.1	100.0	0.0	100.0	00.0	100.0

<sup>1</sup>Missing one cases

#### 4.1.3 Marital Status and Dependents

Data pertaining to respondent marital status and dependents are presented in Tables 4.5 and 4.6 respectively. All of artisanal owner and substantial majorities (>60%) of fisher respondents in other categories and post-harvest report being married and bearing responsibility for the welfare of one or more dependents. Incidence of nil dependents is somewhat higher amongst artisanal crew and post-harvest respondents as compared to traditional fishers – a state of affairs that seems to tally with the relatively younger age composition of the crew and post-harvest group.

Table 4.5 Marital status of sample fisher respondents by type of fishery and fisher category and post-harvest respondents, in %.

Marital status	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
Married	66.7	100.0	68.8	62.5
Not married	33.3	0.0	31.3	37.5

Table 4.6 Dependents reported by sample fisher respondents and post harvest respondents, in %.

Any dependents	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor +Trader)
Yes	60.0	100.0	87.5	62.5
No	40.0	0.0	12.5	37.5

#### 4.1.4 Fishing and Post-harvest Enterprise and Income Status

All of artisanal owner and substantial majority traditional fisher (86%) and almost half of artisanal crew (53%) and most of post-harvest group (75%) report that they are engaged in fishing and fish processing/trading, respectively, on a ‘full-time’ basis, in the sense that it is the activity that takes up most working time per month (Table 4.7). Artisanal crew score highest for reported ‘part-time’ involvement in fishing, with a rate of around 47%.

Artisanal crew and post-harvest respondents as a groups have less of a work history in fishing and fish business respectively (majority less than 10 years’ experience) than do artisanal owners or traditional fishers (Table 4.8).

Table 4.7 Extent participation in fishing and fish business, sample fisher respondents by type of fishery, fisher category and post-harvest respondents respectively, in %.

Participation	Artisanal		Traditional	Post-harvest
	Crew	Owner <sup>1</sup>	(Owner + Crew)	(Processor + Trader)
Full time	53.3	100.0	87.5	75.0
Part time	46.7	0.0	12.5	25.0

<sup>1</sup> Missing one case

Table 4.8 Years involvement in fishing and trading, sample fisher respondent by type of fishery, fisher category and post-harvest respondents, in %.

Age range (yrs)	Artisanal				Traditional		Post-harvest	
	Crew <sup>1</sup>		Owner		(Owner + Crew)		(Processor + Trader)	
	%	Cum%	%	Cum%	%	Cum%	%	Cum%
1 - 2	7.1	7.1	0.0	0.0	0.0	0.0	0.0	0.0
3 - 5	14.3	21.4	0.0	0.0	0.0	0.0	50.0	50.0
6 - 10	35.7	57.1	0.0	0.0	26.7	26.7	37.5	87.5
11 - 15	14.3	71.4	18.2	18.2	20.0	46.7	6.3	93.8
>15	28.6	100.0	81.8	100.0	53.3	100.0	6.3	100.0

<sup>1</sup> Missing one case

Almost half of the respondents reported that they don’t have other job than fishing and fish business (Table 4.9). Subsistence farming (i.e. for family food production) is secondary form of employment for those respondents claim to be involved in other

job, with artisanal owners representing the highest rate of 50% and post-harvest group lowest rate of about 19%. This involvement on subsistence farming is usually of a very small-scale nature, on family plots ranging from 0.25 to 2.50 ha (avg. =0.86 ha, of n= 27). Data presented in Table 4.10 indicate that 43% of artisanal crew, 46% of artisanal owner, 69% of traditional fishers and 31% of post-harvest group claim to at least some land, no matter how small the parcel may be.

Table 4.9 Involvement in other work, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Other work	Artisanal		Traditional	Post-harvest
	Crew <sup>1</sup>	Owner <sup>2</sup>	(Owner + Crew) <sup>3</sup>	(Processor + Trader)
Subsistence farming	25.0	50.0	33.3	18.8
Subsist. + cash farming	0.0	0.0	6.7	0.0
Salary job	8.3	0.0	13.3	18.8
No other job	66.7	50.0	46.7	62.5

<sup>1</sup> Missing three cases; <sup>2</sup> Missing one case; <sup>3</sup> Missing one case

Table 4.10 Reported ownership of land, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Any land ownership	Artisanal		Traditional	Post-harvest
	Crew <sup>1</sup>	Owner	(Owner + Crew)	(Processor + Trader)
Yes	42.9	45.5	68.8	31.3
No	57.1	54.5	31.3	68.8

<sup>1</sup> Missing one case

Information collected on respondents' estimated monthly incomes is assembled in Table 4.11 for 'good' fishing/working periods and in Table 4.12 for 'poor' fishing/working periods. Figures are given in US\$ equivalents of those reported in local currency amounts during interviews. During 'good' months, artisanal fishers as a group seem to outperform their traditional counterparts. Over 60% of traditional fishers report 'good' period monthly incomes at or below US\$ 100 as compared with about 53.3% of artisanal crew and 36% of artisanal owners. Amongst artisanal fishers themselves, more than half of the owners claim to be earning over US\$ 200 per month during 'good' periods, whereas the substantial majority of crew report earning US\$ 100 or less.

During ‘poor’ periods artisanal owners seem to maintain some advantage over the two other categories of fishers, though differences in monthly income performances are much less marked. Most fishers of all types report income levels equivalent to US\$ 50 or less in ‘poor’ periods.

For post-harvest group, reported monthly income levels for ‘good’ and ‘poor’ periods of work are relatively comparable to artisanal owner and all type of fishers, respectively. Three-quarters of all respondents earn US\$ 200 or less during ‘good’ periods. Like most fishers, respondents mostly (>60%) earn the equivalent of US\$ 50 or less during ‘poor’ periods.

Table 4.11 Estimated income during 'good' fishing and fish business months, sample fisher respondents by type of fishery and fisher category and post-harvest respondents respectively.

Income range (US\$/mo) <sup>1</sup>	Artisanal				Traditional		Post-harvest	
	Crew		Owner		(Owner + Crew)		(Processor + Trader)	
	%	Cum%	%	Cum%	%	Cum%	%	Cum%
<25	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0
25 - 50	20.0	40.0	0.0	0.0	12.5	12.5	0.0	0.0
51- 100	13.3	53.3	36.4	36.4	62.5	75.5	25.0	25.0
101 - 200	20.0	73.3	9.1	45.5	18.8	93.8	50.0	75.0
201- 500	26.7	100.0	45.5	91.0	6.3	100.0	25.0	100.0
>500	0.0	100.0	9.1	100.0	0.0	100.0	0.0	100.0

<sup>1</sup> Exchange rate of US\$ 1 = Ethiopian Birr 8.36

Table 4.12 Estimated income during 'poor' fishing and fish business months, sample fisher respondents by type of fishery and fisher category and post-harvest respondents respectively.

Income range (US\$/mo) <sup>1</sup>	Artisanal				Traditional		Post-harvest	
	Crew		Owner		(Owner + Crew)		(Processor + Trader)	
	%	Cum%	%	Cum%	%	Cum%	%	Cum%
<25	66.7	66.7	18.2	18.2	25.0	25.0	18.8	18.8
25 - 50	6.7	73.4	45.5	63.7	68.8	93.8	43.8	62.5
51 - 100	26.7	100.0	27.3	90.9	6.3	100.0	37.5	100.0
101 - 200	0.0	100.0	0.0	90.9	0.0	100.0	0.0	100.0
201- 500	0.0	100.0	9.1	100.0	0.0	100.0	0.0	100.0
>500	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0

<sup>1</sup> Exchange rate of US\$ 1 = Ethiopian Birr 8.36

## 4.2 RESPONDENT VIEW ON SECTOR PROBLEM AND PROSPECTS

The next segment of fisher and post-harvest interview sessions dealt with a series of questions intended to elicit evaluative information pertaining to shared resources use, management, and occupational outlooks. Results are discussed below under five question group headings, viz.: ‘personal circumstances and preferences;’ ‘state of resources and use rights;’ ‘possible regulations on access, gear, and methods;’ ‘role of government and fisheries authorities;’ and ‘obstacles to occupational success.’

### 4.2.1 Personal circumstances and preferences

Both fishers and post-harvest sample respondents are mostly in favor of continued involvement in their respective work (Table 4.13). This commitment is a very strong amongst artisanal owners as a group (100%), moderately strong for artisanal crew (73%) and traditional fishers (75%) and is majority sentiment amongst post-harvest group, though with a much slimmer margin (ca. 55% ‘yes’ versus 45% ‘no’). Both respondent at the same time are mostly inclined to remain at their present operational bases (Table 4.14), though once again the resolve of artisanal owner appears to be

Table 4.13 Stated preference for continuing in fishing and trading occupation, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, %.

Preference to Continue?	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
Yes	73.3	100.0	75.0	56.3
No	26.7	0.0	25.0	43.7

Table 4.14 Stated preference for staying in present location, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Preference to stay?	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
Yes	80.0	81.8	62.5	68.8
No	20.0	18.2	37.5	31.3

highest than that of the other groups.

Commitment to continued involvement in fishing and fish business among the sample respondents is not strongly evident according to another sort of measure, as demonstrated in Table 4.15. In answering a hypothetical question about how one would use a year's worth of savings from fishing or fish business work (assuming this amount was all together in one place at one time), respondents were asked to mention their first, second, and third preferences. Since preference at all level were not collected systematically, only the first order preferences are presented. At this level, artisanal crew mention fisheries related uses (acquisition of gears or equipment) at high frequency, whereas traditional fisher mention this uses with the same frequency as family welfare uses (house improvements, children's education, etc), whilst both artisanal owner members and post-harvest group clearly favour family welfare above other purpose.

Table 4.15 Stated preference for use of one year's saving, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

First Stated Use Preference	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
All fisheries related	<b>53.3</b>	0.0	<b>43.8</b>	0.0
Business/shop	6.7	0.0	0.0	0.0
Family welfare purposes	13.3	<b>81.8</b>	<b>43.8</b>	<b>68.8</b>
Invest farming	26.7	18.2	12.5	0.0
Invest processing/trading	0.0	0.0	0.0	31.3
Others	0.0	0.0	0.0	0.0

#### 4.2.2 State of resources and use rights

##### *Perceived state of the fish stocks*

Both the fishers in all category and post-harvest respondents share very negative perceptions of recent catch trends in the lake and what the immediate future holds in store. All of the respondents reckon that catches have declined over the years from when they first started to engage in fishing or the fish business. Moreover, when asked for their assessments of catch trends over the next five year period, all of the respondents in all categories respond that they expect a continued pattern of decline unless some possible measures undertaken to curb the problem.

Reasons put forward to explain these perceived trend have mostly imputed too much fishing pressure (increased number of fisher and/or fishing gears) as the primary

factor. They have also attributed to the use of small mesh size/fishing for juveniles and on the breeding grounds (Table 4.16).

Table 4.16 Reasons cited for catch decrease from before, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Reason cited	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trade)
Fishing on the breeding grounds	20.0	25.0	27.6	13.8
Environmental change	10.0	8.3	0.0	3.4
Lack of control	5.0	12.5	10.3	6.9
Too many fishers/gears	<b>45.0</b>	<b>29.2</b>	<b>34.5</b>	<b>41.3</b>
Use of small mesh size/fishing for juveniles	30.0	20.9	27.6	34.4

#### *Views on resource use rights*

Prevailing negative perceptions of recent and projected catch trends in Lake Zeway amongst both sample fishers and post-harvest operators appear to be strongly matched by a reluctance to endorse a policy of unlimited access to the lake's fish resources. Indeed, when faced with the rather abstract proposition that 'everyone' should be allowed to fish 'everywhere,' the response is decidedly negative (>73% against -- Fig. 4.1).

The same is true for responses to the proposition when it is cast in the more specific terms of 'fishing outside one's own administrative district' (Fig 4.2). Very heavy majorities (>66%) in all fisher categories and post-harvest group seem to object this idea.

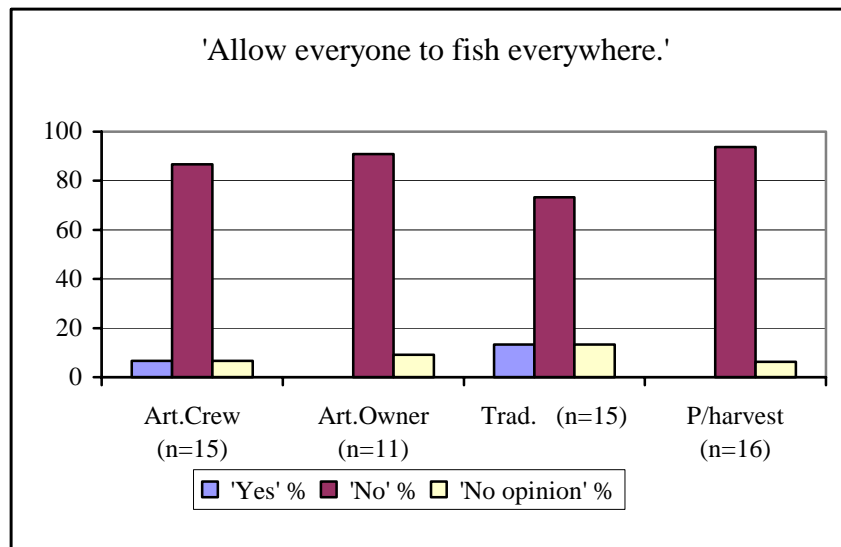


Figure 4.1 View of respondents on allowing everyone to fish everywhere in lake

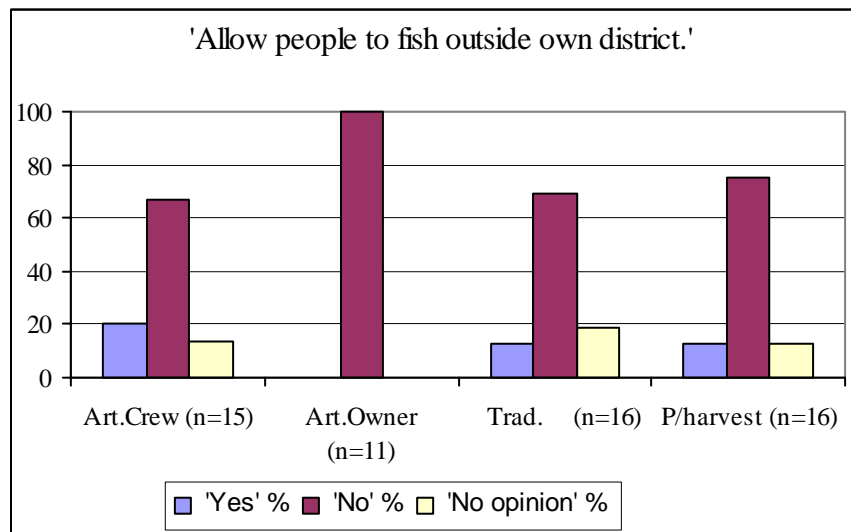


Figure 4.2 View of respondents on allowing people to fish outside own district

The use-right proposition can again be seen in relation to respondents' perceptions of resource abundance in the context of data shown in Fig. 4.3. Fishers in all categories and post-harvest group are very much of the opinion that there will not 'always be enough fish for everybody,' and again blame this supposed state of future affairs on the adverse effects of fishing pressure on the stocks.



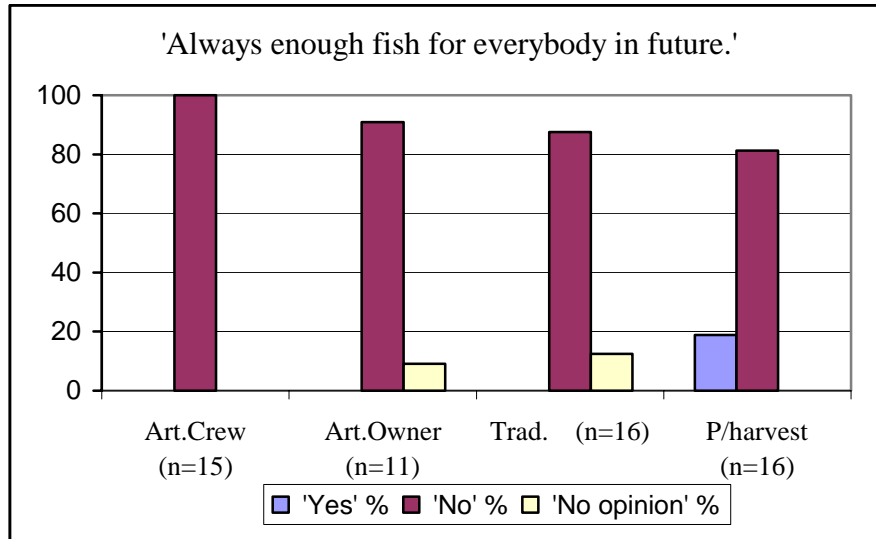


Figure 4.3 View of respondents on always enough fish for everybody in future

#### 4.2.3 Possible regulations on access, gear, and methods

Data on fisher and post-harvest sample respondents' views on various possible measures to regulate access to or the use of certain gear or methods in Lake Zeway's fishery are presented in the next series of figures (4.4 - 4.9). Results show a remarkable degree of shared opinion right across fisher categories and post-harvest group in response to nearly all the propositions presented. Thus, there is substantial majorities of from around 60% and greater sentiment in favour of those measures which would impose: a) closed fishing periods/ seasons or closed fishing areas/places (Figs. 4.4 - 4.5); b) restriction on numbers of fishers/gears and catch/quotas (Fig. 4.6 -4.7); c) restrictions on minimum mesh sizes (gillnet and beach seining) allowed in the fishery (Fig. 4.8); and d) at least some restriction on beach seine operations (Fig. 4.9).

Opinion is divided as to whether it is worthwhile to prohibit beach seine operations (Fig. 4.10). Firm majority of traditional fishers agree while moderate to strong majorities of artisanal fishers (crew and owner) oppose to the idea of beach seine prohibition. On the other hand, opinion is divided amongst post-harvest group in this issue, with almost equal proportions for and against and 'no opinion.'

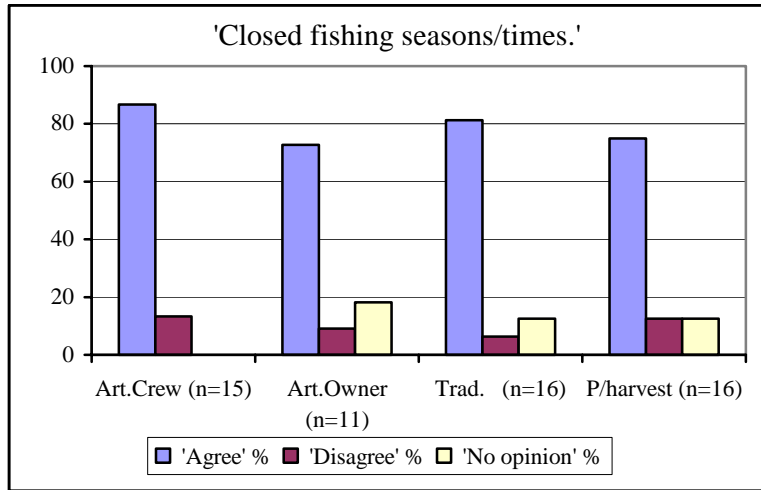


Figure 4.4 View of respondents on closed seasons/times.

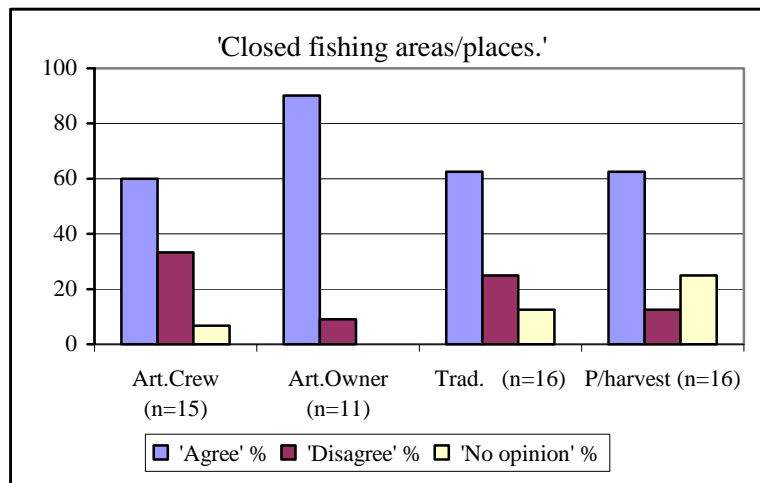


Figure 4.5 View of respondents on closed areas/places.

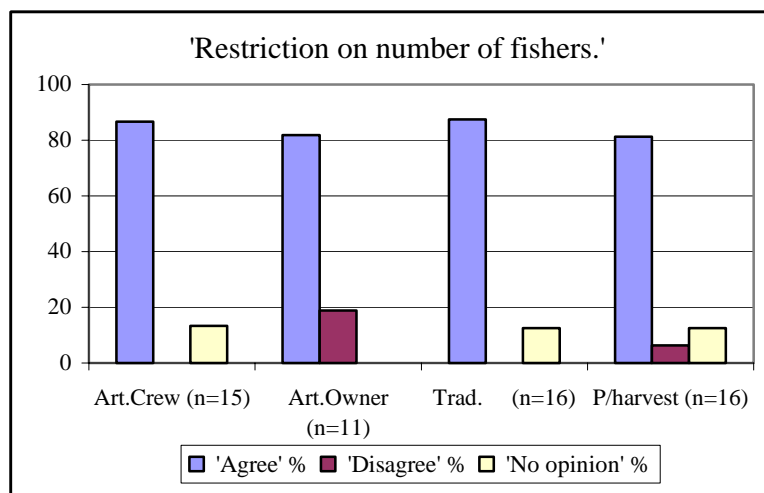


Figure 4.6 View of respondents on restriction of numbers of fishers

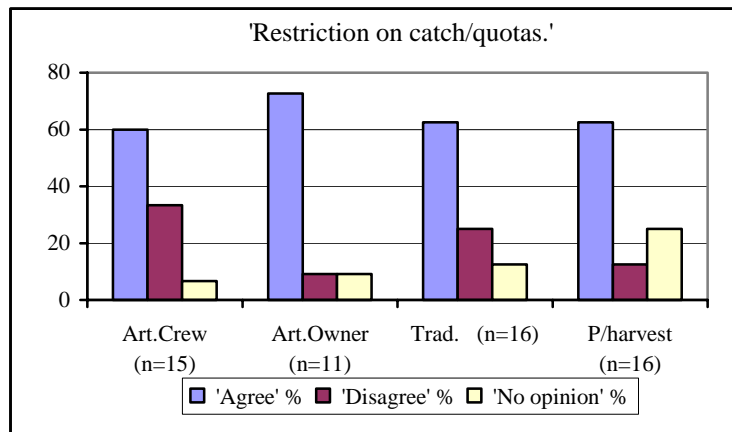


Figure 4.7 View of respondents on restriction on catch/quota

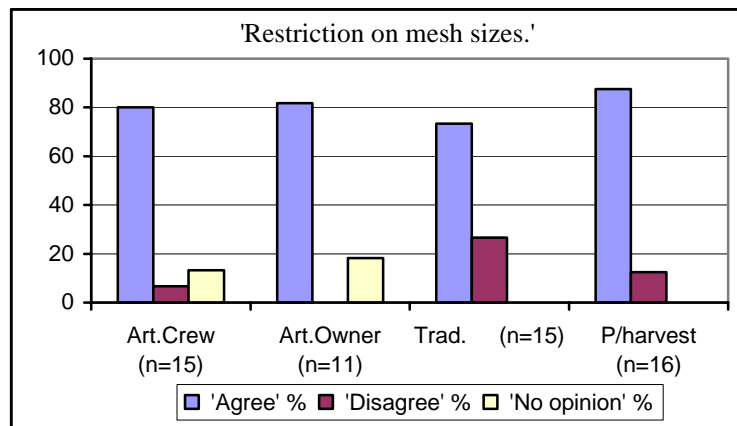


Figure 4.8 View of respondents on restriction of mesh sizes (gillnets and beach seine)

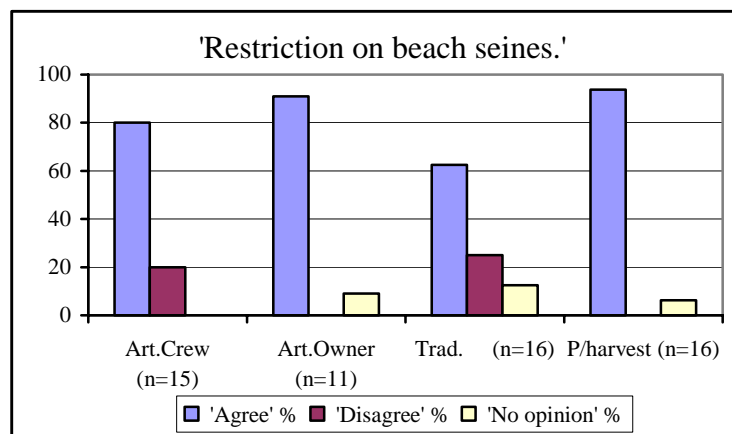


Figure 4.9 View of respondents on restriction of beach seine operations

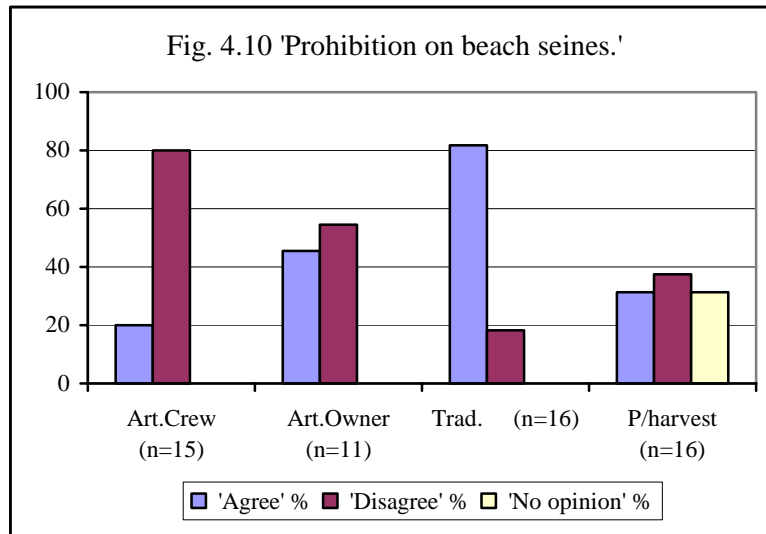


Figure 4.10 View of respondents on prohibition of beach seine operations

#### 4.2.4 Role of government and fisheries authorities

Questions of possible effort and gear regulation naturally give rise to a further set of issues bearing on which agencies or parties should be responsible for elaborating management mechanisms. Just as in the matter of principle of regulation reviewed above, results displayed in the following set of figures show a pattern of strong consensus between the different categories of fisher respondents and post-harvest group, whether for or against the particular proposition being posed.

To begin with, there appears to be a strong measure of sentiment against the idea that fishing rules 'should only be decided by the government' (Fig. 4.11). The smallest margin of majority against such an approach is found with artisanal crew who nevertheless register at a rate of 60%. Their owner counterparts weigh in with a rate of almost 90% dissent, whilst amongst traditional fishers and post-harvest group figures above 80% are recorded. It is clear from reference to Table 4.17 which arrays the proportions of reasons cited for negative responses to the 'only Government' proposition, that most respondents regard the elaboration of a regulatory code as something that should be shared between officials and local community members.

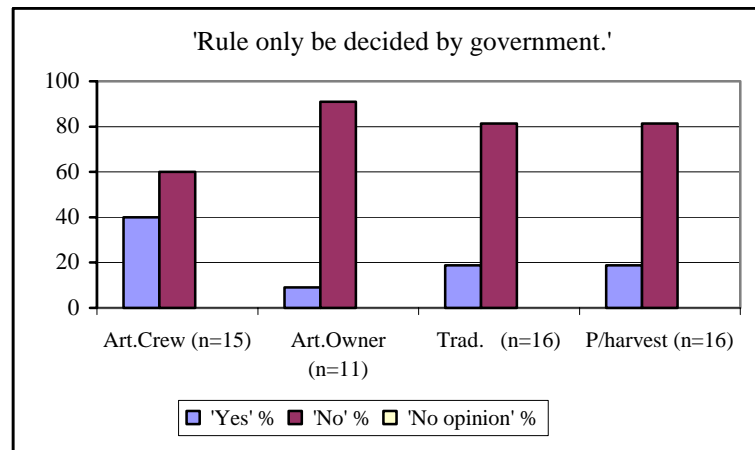


Figure 4.11 View of respondents on the idea that fishing restrictions only to be decided by government

Table 4.17 Reason cited for why fishing restrictions should not only be decided by government, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Response	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
Power/responsibility of gov't	0.0	0.0	0.0	0.0
Gov't has the knowledge	0.0	0.0	0.0	0.0
Shared responsibility, gov't + fishers	<b>62.5</b>	<b>77.8</b>	<b>92.3</b>	<b>92.9</b>
Power/responsibility of fisher	37.5	11.1	0.0	7.1
Fishers have the knowledge	0.0	11.1	7.7	0.0
No opinion	0.0	0.0	0.0	0.0

#### 4.2.5 Obstacles to occupational success

The last item covered in both fisher and post-harvest interview dealt with respondent accounts of their most serious job-related problems. Each individual was asked to list out 'the three biggest problems you face as a fishers or trader working here around the lake' in rank order starting with the most serious. The result of this open-ended query are tabulated only for the first and second most serious orders of problems (Tables 4.18 - 19), because a sizeable number of respondents did not mention a third order problem.

The tabulation of first order response indicates that problems associated with low catches and profit levels (e.g. catch of juvenile fish, reduction of catch from time to time/poor supply of fish, over fishing, low price of fish, low income/profit) are

dominant worries both among fishers and post-harvest respondents. 'Lack of/inadequate supply of input is the second most serious obstacle to occupational successes among fisher in all categories. This input supply problem relate not only to an absolute lack of gear and/or equipment supplies, but also to inadequate supplies in terms of quantity and/or quality available 'Marketing problems,' which can involve lack of transport and/or high transport costs, and lack of or poor storage and/or selling facilities as well as simple low demand for product, figure as the most frequently cited theme at second order level by post-harvest respondent group.

Table 4.18 Most serious occupational problem cited, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Response	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew)	(Processor + Trader)
Lack of security	0.0	0.0	6.3	0.0
Low catch/profit	<b>60.0</b>	<b>63.6</b>	<b>37.5</b>	<b>50.0</b>
Seasonal fluctuations	6.7	0.0	0.0	0.0
Lack of/inadequate gears	0.0	9.1	25.0	0.0
Lack of /poor processing facilities	0.0	0.0	0.0	18.8
Transport/marketing problem	0.0	0.0	12.5	12.5
Lack of/inadequate regulation	6.7	9.1	12.5	18.8
Weather condition	20.0	0.0	6.3	0.0
Safety problem/poor working condition	6.7	18.2	0.0	0.0

Table 4.19 Second most serious occupational problem cited, sample fisher respondents by type of fishery, fisher category and post-harvest respondents, in %.

Response	Artisanal		Traditional	Post-harvest
	Crew	Owner	(Owner + Crew) <sup>1</sup>	(Processor + Trader)
Lack of security	0.0	0.0	6.7	0.0
Low catch/profit	7.7	20.0	20.0	12.5
Seasonal fluctuations	0.0	0.0	0.0	0.0
Lack of/inadequate gears	<b>30.7</b>	<b>40.0</b>	<b>26.7</b>	0.0
Lack of /poor processing facilities	0.0	0.0	0.0	0.0
Transport/marketing problem	0.0	0.0	20.0	<b>68.8</b>
Lack of/inadequate regulation	23.1	20.0	20.0	18.8
Weather condition	15.4	20.0	6.7	0.0
Safety problem/poor working condition	15.4	0.0	0.0	0.0
No second problem mentioned, no.	2	1	0.0	0.0

<sup>1</sup> Missing one case

## **CHAPTER FIVE**

### **5.0 DISCUSSION**

#### **5.1 Introduction**

In this survey, attempt were made to gather information on respondent background characteristics along with their opinion and view towards the different management issues in varying degrees of details through the survey interview forms for fishers (Form 1) and processors/traders (Form 2). The basic intention is to use personal history and occupational data to set out a general context within which respondents' opinions and views on sector problems and prospects -- with all their implications of giving a background information for improved fisheries management on the lake-- could be appreciated.

With a view towards the objective of finding out management option that might have resource users support, it is to these management implications that the concluding observations of this overview are addressed. Important points for consideration can be set out according to the approach suggested in the 'Fisheries Management' module of the *FAO Technical Guidelines for Responsible Fisheries* (FAO 1997). As stated in the module section on 'management measures and approaches' (section 3),

...the only mechanism available to maintain the biomass and productivity of a resource at a desirable level, at least in wild capture fisheries, is controlling fishing mortality by regulating the amount of fish caught, when they are caught and the size and age at which they are caught. In regulating fishing mortality there are a number of approaches which can be used, and each one will have different implications and different efficiencies for regulating fishing mortality, and impact on fishers, feasibility of monitoring, control and surveillance and other facets of fisheries management (45).

The module section then proceeds to review possible management measures along with critical issues of equity and accommodation of user interests under the headings of 'options to regulate fishing,' 'limiting access,' and 'management in partnership.' In what follows, and under the same headings in the same order, an attempt is made to relate the main themes reviewed in the Technical Guidelines to the Lake Zeway situation as portrayed through this survey finding.

## **5. 2 OPTIONS TO REGULATE FISHING**

### **5.2.1 Technical measures**

#### **5.2.1.1 Gear restrictions**

Modalities of gear restriction noted in the *Guidelines* and observed in the survey include those pertaining to: type of gear (e.g. gillnet); and gear characteristics (e.g. net mesh size)

The gears operating on lake Zeway are beach seine, gill nets and hook and line. The first two are the main gears that contribute to most of the landing of the fish (LFDP 1996). Hence, fishers and post-harvest operators were polled on first two possible gear restriction measures on these main gears used on the lake during the survey. ‘Type’ questions include those pertaining to some measure of control or outright prohibition on the use of the common fishing gear on the lake -- viz., the beach seines set by the artisanal fishery. ‘Gear characteristic’ questions include those on mesh size restriction for gill net and beach seine, which were addressed to all respondents.

Because the demand for fish is high during the fasting season of Orthodox Christians and low the rest of the year, the fishing effort is the highest during the months of January, February and March which also are the peak breeding period for Tilapia (Getaneh and Maria 1979). Because of their characteristics, the beach seines operate in the rather shallow coastal areas of the lakes, areas that are presumably important as spawning and breeding grounds for this species. Since tilapia is a mouth brooder, this gear affects particularly the reproduction of this species (LFDP 1996). The beach seine is therefore commonly considered as a very destructive fishing gear and calls for its total banning have been issued regularly. As opinion of respondents on restrictions on type of gear (beach seine) indicates that substantial majority of them (Fig. 4.9) support exists for some measure of restriction of beach seine operation. According to LFDP (1996) it is possible to restrict the use of the beach seines to relatively large open water areas where they will interfere less with the breeding of tilapia by putting minimum lengths on the wings. However, respondents view on prohibition of this gear is quite different. This idea is rejected by moderate to strong majority of artisanal fishers and accepted by majority of traditional fishers. Opinion is divided amongst post-harvest group in this issue (Fig. 4.10). Of course total banning has a social and economic impact to the owners of the gears. Beach seine is relatively expensive gear.



According to personal communication with fishermen, the price for one beach seine is nearly 479 US\$<sup>2</sup> and for gill net is between 60-84 US\$. Besides, most of the fishers do not have other job (Table 4.9) and fishing is their main occupation (Table 4.7) and their income is below their subsistence level (Table 4.11 and 4.12). On the other hand, the size of their dependent family is large (Table 4.6). These might be some of the reasons that artisanal fishers did not accept the total ban of beach seining, as they are the one that are going to be affected by the measure.

According to LFDP (1993) with regard to gear characteristics (mesh size), the minimum allowed mesh size for gillnets were 10 cm (stretched) and 8 cm for beach seines (in the wings and the codend). However, most fishermen did not follow this rule (LFDP 1993 and LFDP 1996). The use of small mesh size gill nets and beach seines is still widespread as reference to respondents' statement on their occupational problem and one of the reasons they gave for decline of catch trend indicates (Table 4.16). This is obvious as small mesh size allow to catch a lot of premature fishes that can easily lead to a recruitment overfishing, i.e. the remaining spawning stock may become too little to replenish the losses (King 1995). Hence, in the survey, respondents were polled on the possible mesh size restriction on gill net and beach seines. The idea has found solid support amongst all categories of fishers and post-harvest respondents.

In general, result for restriction of gear show that there is a remarkable degree of shared opinion favoring the measures right across all respondents group except for the reluctance of artisanal fishers for prohibition of beach seine. Reference to respondents' statements on the 'most serious problems' they face in their work and the reason they cited for catch decrease suggests some underlying reasons for such strong support of the measure. Both fishers and post-harvest respondents tend to rank low catches and profit problems as 'most serious' occupational obstacles. Some of the reasons they attributed for this low catch and hence profit is use of small mesh size/destructive fishing and fishing in the breeding area mainly with beach seine.

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<sup>2</sup> Exchange rate of US\$ 1 = Ethiopian Birr 8.36

These reflect their awareness of the problem with its possible reasons. Hence, they showed positive response, at least in principle, to measures related to gear restriction. However, as long as the fisheries are essentially open access, there is no incentive for any fisherman to use the appropriate technology. As Van Marlen (1991) notes, the structure of the fishing industry where many competitive entrepreneurs are harvesting an open access resource is not ideal for conservation as each fisherman acts individually, driven by self interest (the 'tragedy of the commons'). This militates against the choice of appropriate gear, for example, even if they are aware of the deleterious effects associated with bad technology. If an individual fisherman were to use a larger mesh, for instance, he would suffer extra production costs as more hauls would be required to maintain a given weight of the catch but would lower the long run cost of production for all fishermen (Turvey 1964). However, since the fisherman can not be assured that other fishermen will reciprocate, he has no incentive to choose large meshes.

#### **5.2.1.2 Area and time restrictions**

Time and area restrictions define open and closed 'windows' for the application of fishing effort, as for example with 'no fishing zones' in known breeding and nursery grounds during specific time period to protect particular vulnerable stages in the life cycle of a stock, or with aquatic reserves for the conservation of critical habitat and biomass (FAO 1997).

Whilst it is theoretically possible to use seasonal and spatial restrictions '...to regulate total fishing mortality on a resource' (FAO 1997: 47), their implementation may be extremely problematic. To be effective, they must not only be established with reference to appropriate biological considerations, and with due concern for effort concentration or transfer effects (too much effort during 'open window' conditions or excessive effort displacement to other areas); they must also be accepted and respected by user groups. In this regard the survey indicated that strong majority of both fishers and post-harvest respondents group give approval to the idea of instituting fishing closures during certain seasons or times in order to allow fish to breed and/or grow (Fig. 4.4). And, area or place closures in known breeding and nursery grounds in order to protect breeding and growing habitats also find strong majority support amongst both groups (Fig. 4.5).

To be effective, the specific moment and place that the stock is vulnerable has to be clearly identified for seasonal closure and the size and precise location has to be set for area closure (LFDP 1996). These and other biological knowledge of the stock might be a challenge to manager in implementing area and time closure as a management tool.

### **5.2.2 Input (effort) and output (catch) controls**

Input control can be used to regulate fishing mortality through the imposition of limit on fishing capacity and effort. Typical mechanisms include licensing ceilings, individual effort quotas on fishing units, and the use of technical specifications to limit the harvesting power of vessels and/or their gear kits (FAO 1997)

Output control is a commonly encountered management measure that theoretically ‘...allows estimation and implementation of the optimal catch to be taken from a stock by a given harvesting strategy’ (FAO 1997: 50). It typically entails ‘...setting a total allowable catch (TAC) which is then sub-divided into individual quotas.

Although this survey did not probe for respondents’ views on input and output controls through specific questions covering all possible mechanisms, indications of local opinion or predisposition can be read from responses to questions relating to preference for continued involvement in fisheries-related work, perceptions of recent catch trends and expectations for the immediate future, the idea of placing quotas on the total number of fishers allowed to operate on the lake and/or catch quotas, and the possible imposition of restrictions of one kind or another for certain fisheries.

Direct questions to fisher and post-harvest respondents on future occupational and residential preferences reveal that solid majorities in both sample group sets would like to stay with their present line of work and remain at their present bases of operation (Table 4.13 and 4.14). However, their commitment to continued work in the sector is not so definite when gauged according to respondents’ stated investment preferences (Table 4.15). This might be because of their negative perception of recent catch trend in the lake and what the immediate future holds in store. Increased number of fishers and/or gears beyond the capacity of the lake is one of the reasons they

attributed to this trend. Hence, substantial majorities within all sample groups voice favoring to the idea of imposing restrictions on the overall number of fishers allowed to operate on the lake and imposition of catch quotas (Fig. 4.6 and 4.7).

From the survey findings, one can possibly argue that resource users know and understand the usefulness of regulation. This argument is in agreement with the observation of Baily and Jentoft (1990) that actors with long involvement in the industry fully appreciate problems associated with exploitation and are likely to feel that they have a stake in managing the resources for sustainable harvest than short-term gains. This indicates resource users' readiness to support management measures but lack incentive for compliance due to the absence of property right.

### **5.3 LIMITING ACCESS**

As remarked in the *Technical Guidelines*, use right regimes in free-range resource exploitation systems such as fisheries can broadly be divided into open access and limited access system. Ethiopian fisheries in general and Lake Zeway fisheries in particular operate under open access regime. This situation is clearly untenable. Open access is basically a 'free-for-all' or 'first come, first served' condition which, if left totally unregulated, '...will invariably lead to over-exploited resources and declining returns for all participants' (FAO 1997: 52). Even in situation where controls on exploitation levels are put in place, such as quota or seasonal closures, '...open access systems are characterized by a race to fish in which all participants strive to catch as much of the resource ... as they can, before their competitors do so' (ibid).

It is generally recognized that, for a fishery to be sustained, the 'free-for-all' situation must give way to one of access limitation in some form. According to Charles, limited access arrangement in small-scale fisheries may be particularly effective when constituted as fishing rights allocated at the group or community level. There is '...an incentive for the community collectively to (a) ensure that the resource is managed wisely, (b) efficiently manage allocation of catches and fishery access (also helping to prevent the 'rush to fish'...), and (c) develop local enforcement tools' (Charles, 1994: 208). Jentoft (2000) also argues that resource rights vested in communities are among the most potent vehicles at hand in creating those community qualities that are crucial for sustaining the resource.

The survey dealt directly with the issue of access and its possible limitation by posing two propositions for use right cast at different levels of abstraction, and indirectly through a question on respondents' views of resource abundance. Indicators of these access limitations suggest that respondents' responses to the most abstract open access proposition ('everyone/everywhere' 'out of own district') are clear. In principle one should expect a strong association between respondents' view regarding resource access limitations, on the one hand, and their expectations regarding future resource abundance on the other hand. It has been found from the survey that respondents are mostly in favor of restricted access conditions that are matched with expectations of low future abundance. Moderate to stronger majority of the respondents in all group do not subscribe to the view that 'everybody should be allowed to fish everywhere' (Fig. 4.1) and disagree with the idea that people should be allowed to fish outside of their immediate administrative district (Fig.4.2). At the same time they tend to think that fish resources in the lake will not 'always be enough for everybody' (Fig.4.3). They know that it is a limited resource that can support a limited number of fishers in a sustainable way.

Therefore, the future sustainability of Lake Zeway fisheries requires a transformation of the present rather loose 'open-access-within-national-jurisdictions' regime into one that allocates fishing rights to local communities and their respective territories on equitable principles. However, in moving from a system of open access to one of limited access, the greatest problem is almost certainly in determining which of the previous users should be granted access and which denied access (FAO 1997). In this regard, when responding to the proposition of limiting the number of fishers (Fig. 4.6 and 4.7), many of the respondents said that fishing is practiced not only by the regular fishers, but also by others such as hotel owner, merchants and government employees. These latter groups usually appear in the lake with their gears during the month of January to March when the demand for fish becomes high. It was also pointed out that fishing right should be given to regular fishers who depend on it for their daily livelihood and who have no other income.

#### 5.4 MANAGEMENT IN PARTNERSHIP

Co-management, or what the *Technical Guidelines* refer to as ‘management in partnership,’ is a tenet of responsible fisheries. Fisheries typically involve a complex of interests that share different or even contradictory aims. Responsible management endeavors to accommodate such interests and recognizes that ‘...the efficiency and implementability of the management measures are often highly dependent on the support gained from the interested parties’ (FAO 1997: 55).

The *Guidelines* go on to note that:

Management in partnership encompasses the various arrangements, which formally recognize the sharing of fisheries management responsibility and accountability between a fisheries management authority and institutions either public, such as local level government, or private, such as a group of interested parties. Hence, ...(it) is likely to ...(have) a decentralized and unstandardized nature. It often reflects a concern for efficiency or equity at the state or management level, coupled with proven capacity for self-governance, self-regulation, and active participation at the level of the interested parties concerned (ibid)

Depending on circumstances, co-management arrangements may feature higher or low degree of intervention and support by the state -- higher where local-level commitment and capabilities are weak, lower where they are strong (Sen and Nielsen 1996)

The guideline characterize monitoring, control, and surveillance (MCS) as indispensable to effective management. However, Fisheries administration across much of the developing world currently labour under severe financial and operational constraints (FAO 1997), and as shown by Oromia economic studies, Ethiopia (Anon. 1999), the Lake Zeway situation is no exception. In this connection, greater use of co-management arrangements in relation to MCS activities may also offer substantial advantage in terms of cost-reduction and efficiency gains (FAO 1997).

Local attitudes towards possible co-management arrangements were probed during survey interviews through a final set of propositions dealing with the general issue of

shared decision-making responsibility. According to the survey indicators, respondents seem to favor 'participatory' or 'partnership' approach to the management of the fisheries. They tend to reject the proposition that 'fishing rules should only be decided by Government' (Fig. 4.11). It is clear from reference to Table 4.17 which arrays the proportions of reason cited for negative response to the 'only government' proposition, that most respondents regard the elaboration of regulatory code as something that should be shared between officials and local community members. Pomeroy and Berkes (1997) argue that an impetus is needed to propel co-management forward. Particularly, awareness of resource-related problems prompt stakeholder to enter into collective action. As indicated earlier, sample respondent assign critical importance to stock reduction as a 'most serious' occupational problem and hence, that would be an important motivation for them to support a co-management arrangement. This is good indication of their willingness to share management responsibility with the fisher officials. However, there are many factors at the fishery environment and within the nature of the fishing village and communities and other factors that need to be assessed for the future development of co-management arrangement. ICLARM (see Pomeroy and Williams, 1994) provide a set of criteria that can be used to assess the potential for developing co-management arrangements.

## **CHAPTER SIX**

### **6.0 CONCLUDING OBSERVATIONS AND RECOMMENDATIONS**

The survey findings suggest that local stakeholder populations broadly accept, at least in principle, that exploitation of their common resource base should be subject to some sort of governing framework. This is implicit in the widespread concern expressed for the state of stocks and the high approval ratings on propositions related to access limitation and variables that management can manipulate.

Respondents know and agree that the fishery is in undesirable state and the reason for being so. However, the open access nature of the resource provides them no incentives for conservation efforts. They reckon that catch and average size of the fish caught have been declining over the last few years. Most often they cited too many fishers and gears, use of small mesh size/fishing for juveniles and on the breeding grounds as the reason for stock reduction. They expect a continued pattern of decline unless some possible measures undertaken to curb the problem.

Sample respondents are, for most part, supportive of management. Most of them understand the importance of the variables that management can manipulate and agree on some fundamental element of a common management strategy. With the exception of negative reaction on the possibility of imposing prohibition on beach seining by artisanal fishers, there is a pattern of strong consensus among respondents on one way or another on specific measures that could possibly be useful for controlling fishing mortality. Thus, substantial majority of support are registered in response to suggestions that: a) minimum mesh size specifications be applied for gillnet and beach seines; b) area and time restrictions be established, as for example to protect breeding or juvenile fish communities; c) some form of controls be placed on the use of beach seining; d) restriction on numbers of fishers/gears and catch/quotas be applied; and e) access to the fishery be conditioned by certain criteria.

Moreover, the initial reaction of respondents to the idea of participating in the management of the lake fisheries is positive. They showed motivation and willingness to share management responsibility with the fisher officials. However, there are many factors that need to be assessed for the future development of co-management arrangement. Since this arrangement offers obvious advantages in terms of long-term



effectiveness, planners need to encourage and promote the involvement of local stakeholder group in management decision-making and in fashioning modalities of enforcement and compliance.

Limited access is widely considered to be essential for efficient and responsible fisheries. It has been observed that this arrangement in small-scale fisheries may be particularly effective when constituted as fishing rights allowed at the group or community level. Incentives are thereby created to use resources (i.e. group 'property') in a sustainable fashion through the application of local catch and access controls and the use of local enforcement mechanisms. Therefore, managers and legislators must be encouraged to accept the need for, and benefits of, control of access and fishing rights at local community levels together with organising and empowering them. They must move to enshrine those rights in relevant legislation. Besides, a move to foster economic diversification to reduce pressure on the fishery resource base is suggested.

As Hilborn *et al.* (1995) have argued, the consolidation of small-scale community coupled with local control of resource base access and active involvement in the management thereof, are crucial ingredients for achieving true success – i.e. long term sustainability – in the exploitation of fishery resources.

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### APPENDIX 3

#### FORM 1: FISHERS INTERVIEW QUESTIONNAIRE

Village/landing site: \_\_\_\_\_

Name of the respondent \_\_\_\_\_

#### A. RESPONDANT IDENTIFICATION

- |                       |                          |
|-----------------------|--------------------------|
| 1. Main gear used:    | 2. Respondent is:        |
| Hand line _____       | Owner _____              |
| Long line _____       | Owner and operator _____ |
| Gillnet _____         | Operator/crew _____      |
| Castnet _____         | Others(specify) _____    |
| Beach seines _____    |                          |
| Others(specify) _____ |                          |

#### B. RESPONDANT PERSONAL HISTORY

- Gender: Female \_\_\_\_\_ Male \_\_\_\_\_
- Age: (specify) \_\_\_\_\_ Yr.
- Formal education:
  - Yr primary school? (specify) \_\_\_\_\_
  - Yr secondary school? (specify) \_\_\_\_\_
  - Other formal education/training? (specify) \_\_\_\_\_
- Religious affiliation:  
Christian Orthodox \_\_\_\_\_  
Christian protestant \_\_\_\_\_  
Christian catholic \_\_\_\_\_  
Muslim \_\_\_\_\_
- Marital/Family status:  
Now married Yes \_\_\_ No \_\_\_  
No. of dependant children < 18 yrs? (specify) \_\_\_\_\_  
No of other dependants? (specify) \_\_\_\_\_

#### C. RESPONDANT FISHING INFORMATION/INCOME STATUS

- Fishing history:
  - Are you involved in fishing on a full-time basis? Yes \_\_\_\_\_ No \_\_\_\_\_
  - How long have you been involved in fishing? (specify) \_\_\_\_\_ Yr.
  - Why did you start fishing?(specify reason) \_\_\_\_\_  
\_\_\_\_\_
  - Were you involved with other work before fishing?  
Yes \_\_\_\_\_ No \_\_\_\_\_  
Which work? (specify) \_\_\_\_\_
- Type, sale/use of catch after a fishing trip/night:
  - What type of fish species you want to catch? why (specify reason) \_\_\_\_\_  
\_\_\_\_\_

(b) How do you sell your catch/share of catch?

	Catch sold to:	Most sales to:
Fishing company	_____	_____
Consumer direct	_____	_____
Local market	_____	_____
Beach traders	_____	_____
Others (specify)	_____	

3. Other work, income estimates:

(a) What other work/business do you have besides fishing?

Farming for food only \_\_\_\_\_  
Farming for food + cash \_\_\_\_\_  
Fish trade \_\_\_\_\_ (specify details) \_\_\_\_\_  
Labor \_\_\_\_\_ (specify details) \_\_\_\_\_  
Salary job \_\_\_\_\_ (specify details) \_\_\_\_\_  
Business \_\_\_\_\_ (specify details) \_\_\_\_\_  
Others (specify details) \_\_\_\_\_

(b) Does most of the money you earn on average each month come from fishing or from some other work/ business?(tick as applies)

From fishing \_\_\_\_\_  
From other work \_\_\_\_\_ (specify details) \_\_\_\_\_

(c) Thinking over the past year, about how much money do you earn from fishing during:

Good months (specify amount) \_\_\_\_\_  
Poor month? (specify amount) \_\_\_\_\_

4. Land:

(a) Do you own any land? Yes \_\_\_\_\_ No \_\_\_\_\_

If, YES, how many hectares ? (specify) \_\_\_\_\_

If YES, how do you use them? (specify) \_\_\_\_\_

#### D. RESPONDENT OPINIONS/VIEWS

1. If you have a choice would you like to continue in your occupation?

Yes \_\_\_\_\_ No \_\_\_\_\_ No opinion \_\_\_\_\_

If NO, what would you like to do (response) \_\_\_\_\_

Why? (response) \_\_\_\_\_

2. If you had a choice, would you like to stay in this place?

Yes \_\_\_\_\_ No \_\_\_\_\_ No opinion \_\_\_\_\_

If NO, where would you like to go ? (response) \_\_\_\_\_

Why? (response) \_\_\_\_\_

3. If you had all the money usually earned from 1 year of fishing or business, saved up all together to spend or use now, on whatever you liked, what would be your first, second and third preference to do with it? (response)
- (first) \_\_\_\_\_
- (second) \_\_\_\_\_
- (third) \_\_\_\_\_
4. Thinking about the catches when you first became involved with fishing compared with the catches now, have they:
- Increased \_\_\_\_\_ Decreased \_\_\_\_\_
- Stay the same \_\_\_\_\_ No opinion \_\_\_\_\_
- What do you think is the reason for this? (response) \_\_\_\_\_
- \_\_\_\_\_
5. Do you think that the catches over the next 5-year will:
- Increased \_\_\_\_\_ Decreased \_\_\_\_\_
- Stay the same \_\_\_\_\_ No opinion \_\_\_\_\_
- Why? (response) \_\_\_\_\_
- \_\_\_\_\_
6. About those people who live around the lake, do you think that:
- (a) Everybody should be able to catch as much as they like?
- Yes \_\_\_ No \_\_\_ No opinion \_\_\_
- (b) In any place in the lake they like, even outside their own district?
- Yes \_\_\_ No \_\_\_ No opinion \_\_\_
7. Do you think that there will always be enough fish for everybody
- Yes \_\_\_ No \_\_\_ No opinion \_\_\_
- (a) For what reasons do you think this? (response:) \_\_\_\_\_
- \_\_\_\_\_
8. What do you think of the following ideas for controlling fishing on the lake in the future:
- (a) Closed seasons/times when fishing is not allowed? (e.g. certain months to allow fish to breed/grow) Agree \_\_\_ Disagree \_\_\_ No opinion \_\_\_
- (b) Permanent closed areas/places where fishing is never allowed?
- Agree \_\_\_ Disagree \_\_\_ No opinion \_\_\_
- If you AGREE, can you suggest any specific areas? (response) \_\_\_\_\_
- \_\_\_\_\_
- (c) Limitation on the number of people who are allowed to fish?
- Agree \_\_\_ Disagree \_\_\_ No opinion \_\_\_
- Who SOULD be allowed to fish? (response) \_\_\_\_\_
- \_\_\_\_\_
- Who should NOT be allowed to fish? (response) \_\_\_\_\_
- \_\_\_\_\_
- (d) Restriction on mesh sizes (can not be below a certain minimum)?
- Agree \_\_\_ Disagree \_\_\_ No opinion \_\_\_





**FORM 2: FISH PROCESSORS &/OR TRADERS INTERVIEW  
QUESTIONNAIRE**

Village/landing site: \_\_\_\_\_  
Name of the respondent \_\_\_\_\_

**A. RESPONDENT IDENTIFICATION**

- (1) Respondent is mostly engaged in:
  - Processing (rarely marketing) \_\_\_\_\_
  - Processing + trading \_\_\_\_\_
  - Trading (rarely processing) \_\_\_\_\_
- (2) Type of product handled:
  - Fresh fish \_\_\_\_\_
  - Dried fish ("kuanta") \_\_\_\_\_
  - Smoked fish \_\_\_\_\_
  - Other (specify) \_\_\_\_\_
- (3) The top three most frequent species handled are:
  - Most: \_\_\_\_\_
  - Second most \_\_\_\_\_
  - Third most: \_\_\_\_\_
- (4) For TRADERS, the area of operation is:
  - Does Not Apply (DNA) \_\_\_\_\_
  - Local (5 km radius) \_\_\_\_\_
  - Non-local (> 5 km radius) \_\_\_\_\_
  - Both local & non-local \_\_\_\_\_
- (5) For NON-LOCAL TRADERS, the principal market destination is: (specify)  
\_\_\_\_\_

The main way of transporting product to this market is:

- DNA \_\_\_\_\_
- Vehicle (bus, van, etc.) \_\_\_\_\_
- Transport boat \_\_\_\_\_
- Bicycle \_\_\_\_\_
- Head load \_\_\_\_\_
- Other (specify) \_\_\_\_\_

**B. RESPONDENT PERSONAL HISTORY**

- 1. Gender:           Female \_\_\_\_\_           Male \_\_\_\_\_
- 2. Age: (specify)   \_\_\_\_\_ Yr.
- 3. Formal education:
  - (a) Yr primary school? (specify) \_\_\_\_\_
  - (b) Yr secondary school? (specify) \_\_\_\_\_
  - (c) Other formal education/training? (specify) \_\_\_\_\_
- 4. Religious affiliation:
  - Christian Orthodox   \_\_\_\_\_
  - Christian protestant \_\_\_\_\_
  - Christian catholic    \_\_\_\_\_
  - Muslim                \_\_\_\_\_

5. Marital/Family status:

Now married Yes\_\_\_ No\_\_\_  
No. of dependant children<18yrs? (specify)\_\_\_\_\_  
No of other dependants? (specify)\_\_\_\_\_  
Living place of spouse/family? Here \_\_\_\_\_ Elsewhere\_\_\_\_\_

**C. RESPONDENT OCCUPATIONAL INFORMATION/INCOME STATUS**

1. Fishery employment history:

- (a) Are you involved in fish business (processing/trading) on a full-time basis (takes most of your working time/month)? Yes\_\_\_ No\_\_\_  
(b) How long have you been involved in this business? (specify) \_\_\_\_\_Yr.  
(c) Why did you start this business? (specify reason) \_\_\_\_\_  
(d) Were you involved with other work before this business? Yes\_\_\_ No\_\_\_  
(e) Which work? (Specify ) \_\_\_\_\_

2. Supply sources/ sale:

- (a) What type of fish species you want to buy? why (specify reason)\_\_\_\_\_

- (b) Where/from whom do you usually get your supplies of fish?

	Supplies from:	Mostly from:
Own family/fishing unit	_____	_____
Buy from fishers	_____	_____
Buy from processors	_____	_____
Buy from another trader	_____	_____
Buy from a fishing company	_____	_____
Others (specify)	_____	

- (c) Where/to whom do you usually sell your consignment of fish?

	Sales to:	Most sales to:
Local traders	_____	_____
Non-local traders	_____	_____
Direct to consumers	_____	_____
Local retail market	_____	_____
Fishing company	_____	_____
Other than indicated (specify)	_____	

- (e) Do you mostly sell to particular traders?

DNA \_\_\_ Yes\_\_\_ No\_\_\_  
Why/why not? (specify)\_\_\_\_\_

3. Other work, income estimates:

- (a) What other work/business do you have besides fishing?  
Farming for food only\_\_\_\_\_  
Farming for food + cash\_\_\_\_\_

Fish trade \_\_\_\_ (specify details) \_\_\_\_\_  
Labor \_\_\_\_\_ (specify details) \_\_\_\_\_  
Salary job \_\_\_\_ (specify details) \_\_\_\_\_  
Business \_\_\_\_\_ (specify details) \_\_\_\_\_  
Others (specify details) \_\_\_\_\_

(b) Does most of the money you earn on average each month come from fish business or from some other work/business? (tick as applies)  
From processing/trading \_\_\_\_\_  
From other work \_\_\_\_\_ (specify details) \_\_\_\_\_

(c) Thinking over the past year, about how much money do you earn from fish business during:  
Good months (specify amount) \_\_\_\_\_  
Poor month? (specify amount) \_\_\_\_\_

4.Land:

(a) Do you own any land? Yes \_\_\_\_ No \_\_\_\_  
If, YES, how many hectares? (specify) \_\_\_\_\_  
If YES, how do you use them? (specify) \_\_\_\_\_  
\_\_\_\_\_

#### D. RESPONDENT OPINIONS/VIEWS

1.If you have a choice, would you like to continue in your present occupation?  
Yes \_\_\_\_ No \_\_\_\_ No opinion \_\_\_\_  
If NO, what would you like to do (response) \_\_\_\_\_  
\_\_\_\_\_  
Why? (response) \_\_\_\_\_  
\_\_\_\_\_

2.If you had a choice, would you like to stay in this place?  
Yes \_\_\_\_ No \_\_\_\_ No opinion \_\_\_\_  
If NO, where would you like to go? (response) \_\_\_\_\_  
Why? (response) \_\_\_\_\_  
\_\_\_\_\_

3. If you had all the money usually earned from 1 year of your present occupation, saved up all together to spend or use now, on whatever you liked, what would be your first, second and third preference to do with it? (response)  
(first) \_\_\_\_\_  
(second) \_\_\_\_\_  
(third) \_\_\_\_\_

4. Thinking about the catches when you first became involved with the fish business compared with the catches now, have they:  
Increased \_\_\_\_ Decreased \_\_\_\_  
Stay the same \_\_\_\_ No opinion \_\_\_\_  
What do you think is the reason for this? (response:) \_\_\_\_\_  
\_\_\_\_\_

5. Do you think that the fish supply over the next 5 year will:  
 Increased\_\_\_\_\_ Decreased\_\_\_\_\_
- Stay the same\_\_\_\_\_ No opinion\_\_\_\_\_
- Why? (response)\_\_\_\_\_
- 
6. About those people who live around the lake, do you think that:
- (a) Everybody should be able to catch as much as they like?  
 Yes\_\_\_ No\_\_\_ No opinion\_\_\_
- (b) In any place in the lake they like, even outside their own district?  
 Yes\_\_\_ No\_\_\_ No opinion\_\_\_
7. Do you think that there will always be enough fish for everybody  
 Yes\_\_\_ No\_\_\_ No opinion\_\_\_
- (b) For what reasons do you think this? (response: )\_\_\_\_\_
- 
8. What do you think of the following ideas for controlling fishing on the lake in the future:
- (b) Closed seasons/times when fishing is not allowed? (e.g. certain months to allow fish to breed/grow) Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- (b) Permanent closed areas/places where fishing is never allowed?  
 Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- If you AGREE, can you suggest any specific areas? (response)\_\_\_\_\_
- 
- (c) Limitation on the number of people who are allowed to fish?  
 Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- Who SHOULD be allowed to fish? (response) \_\_\_\_\_
- 
- Who should NOT be allowed to fish? (response) \_\_\_\_\_
- 
- (d) Restriction on mesh sizes (can not be below a certain minimum)?
- Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- For gill nets?----- Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- For beach seines?----- Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- For others (specify)\_\_\_\_\_ Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- \_\_\_\_\_ Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- (e) Restriction of beach seines? (operate only some places/times)  
 Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- (f) Prohibition of beach seines? (can never operate)  
 Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- (g) Restriction of other gears? (operate only some places/times) (specify)  
 \_\_\_\_\_ Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_
- (h) Prohibition of other gears? (can never operate) (specify) \_\_\_\_\_  
 \_\_\_\_\_ Agree\_\_\_ Disagree\_\_\_ No opinion\_\_\_

9. Should restriction be decided only by government officers?

Yes\_\_\_ No\_\_\_ No opinion\_\_\_

(b) Why/Why not? (response)\_\_\_\_\_

\_\_\_\_\_

Other suggestions: (response)\_\_\_\_\_

\_\_\_\_\_

10. What are the 3 biggest problems you face in your occupation as a fish trader or processor working here around this lake? ( Rank response in order as most, second most and third most serious)

Most serious:

\_\_\_\_\_

\_\_\_\_\_

Second most serious:

\_\_\_\_\_

\_\_\_\_\_

Third most serious:

\_\_\_\_\_

\_\_\_\_\_