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LTR LAKEWIDE SOCIO-ECONOMIC SURVEY, 1997: BURUNDI

by

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FINNISH INTERNATIONAL DEVELOPMENT AGENCY

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# PREFACE

The Research for the Management of the Fisheries on Lake Tanganyika project (Lake Tanganyika Research) became fully operational in January 1992. It is executed by the Food and Agriculture Organization of the United Nations (FAO) and funded by the Finnish International Development Agency (FINNIDA) and the Arab Gulf Programme for United Nations Development Organizations(AGFUND).

This project aims at the determination of the biological basis for fish production on Lake Tanganyika, in order to permit the formulation of a coherent lake-wide fisheries management policy for the four riparian States (Burundi, Tanzania, Democratic Republic of Congo, and Zambia).

Particular attention will be also given to the reinforcement of the skills and physical facilities of the fisheries research units in all four beneficiary countries as well as to the buildup of effective coordination mechanisms to ensure full collaboration between the Governments concerned.

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# INTRODUCTION

This document has been prepared as a preliminary report on the 1997 LTR socio-economic (SEC) survey of the Burundi sector of Lake Tanganyika. It should be read in conjunction with LTR/TD 65 (Reynolds and Paffen 1997a) and LTR/TD 66 (Reynolds and Paffen 1997b), which provide background details on the planning, training, and other preparatory activities that laid the groundwork for the survey exercise lakewide. Particular reference should be made to LTR/TD 66, which gives a description of survey methods and sampling strategies, and includes, as annexes: a) specimen copies of the three data collection forms used by the national field teams (Form 1: -- general community features; Form 2: individual fishers; and Form 3: individual processors and traders); b) enumerator guides for questionnaire administration; c) additional instructions prepared for survey team supervisors; d) sampling tables used for initial selection of sites and respondents, together with a map of survey areas; and e) example printouts of data coding and entry sheets.

Reference should also be made to several earlier socioeconomic surveys and reviews of the small-scale fisheries within the Burundi sector Lake Tanganyika prepared under the auspices of two UNDP/FAO projects -- the Fisheries Statistics and Information Project (PNUD/FAO/BDI/OO2; see Bellemans 1991a, 1991b; 1991c) and the Regional Project for Inland Fisheries Planning (IFIP --RAF/87/099; see Bellemans 1991d, Horemans 1992, Leendertse and Bellemans 1991, Leendertse and Gréboval 1993). Five to six years have passed since these earlier studies were completed, and they may therefore serve as benchmarks against which findings of the present investigations may be compared and contrasted.

All of the national sector reports (Zambia -- TD67; Tanzania -- TD68; Democratic Republic of Congo (DRC) -- TD69; and Burundi -- TD70) follow a standard format. A description of team preparations is presented in Section 1, along with an itinerary of site visits and a brief account of fieldwork experiences. 2 summarises findings generated from Section preliminary analysis of the Form I data set on basic characteristics of sample landing sites. Sections 3 and 4 report on preliminary analyses of the data sets on individual respondents, fishers and processors/traders respectively. Concluding remarks are given in Section 5, and References Cited appear as Section 6. Additional statistical tables used to construct graphical presentations of survey findings for the fisher and post-harvest sample groups are found in Annexes 1 and 2. In order to expedite the reporting process, standard transitional and descriptive phrasings and table and figure formattings have been used wherever possible, taking into account the peculiarities of each of the national data sets.

#### 1. SURVEY BACKGROUND, PREPARATIONS, AND FIELDWORK

A combined training workshop was held in Bujumbura during the first week of July 1997 for members of the national survey teams formed to carry out SEC investigations of the Burundi and DRC sectors of Lake Tanganyika. Workshop participants were familiarised with the survey strategy and questionnaires and received 'hands-on' experience through practice site visit and interview sessions organised at Kadjaga/Gatumba in the vicinity of Bujumbura.

Although standardised sampling methods and instruments were designed for implementation of the survey lakewide (Reynolds and Paffen 1997b), Burundi presented a special case. The procedure of stratified random selection used to identify sample landing sites within the other national sectors of the lake could not be applied. Because of the security situation, only five landings along the entire Burundi coastline were being allowed to operate by the authorities. As shown in Fig. 1.1, these sites include Kadjaga/Gatumba, Nyamugari and Gitaza in Bujumbura Province, and Rumonge and Karonda in Bururi Province.

Survey fieldwork commenced immediately after the close of the training workshop. With only the five landing sites to cover, fieldwork was completed within one week. The enumeration team was divided into two groups, one to cover sites in Bujumbura Province and the other sites in Bururi Province. Both groups were supported with vehicle transport provided by the project. The Bujumbura Province group was supervised by Mr. Bashirwa and consisted of Messrs. Ndimunzigu, Bangiramana, Sinunguka and Sintuye as enumerators. Messrs. Tumba, Nibigira, Ndorimana and Hakizimana served as enumerators for the Bururi Province group, which was supervised by Mr. R. Kanyaru.

Administration of Form 1 on community features proved rather problematic due to the security measures in force and also because the settlements associated with the few open landing sites are very large and difficult to enumerate in a single visit.<sup>1</sup> The strategy for choosing fisher respondents for interviewing with Form 2 and fish traders and processors for interviewing with Form 3 was similar to that employed in the other national sectors. Interviews generally ranged from between 20 to 60 minutes per respondent.

Table 1.1 summarises the sites visited and the number of respondents contacted. The field teams conducted 217 interviews in all. Data entry work was carried out at LTR Headquarters in Bujumbura between 15 July and 1 August 1997 by DoF/Bujumbura enumerators Messrs. C. Butoyi, E. Gahungu, B. Nikomeze, and J.M Tumba.

 $<sup>^1{\</sup>rm The}$  landing Site at Karonda was closed by the Burundian authorities the day after the SEC survey team made its visit, making any follow up visit impossible.

 Table 1.1
 Field team itinerary and respondents interviewed per sample village

Start	Site	Quartier		Form 1 (Village)		F	Form 2		Form 3				
Date	Name	Name	Area		A	Artisana	l	Traditional			(Post-harvest)		
					Own.	Crew	Tot.	Own.	Crew	Tot.	Fem.	Male	Tot.
BUJUMB	URA PROVIN	ICE											
09-Jul-97	Kadjaga	Gatumba	1	1	3	13	16	3	5	8	0	4	4
11-Jul-97	Nyamugari	Buyenzi, Rama	1	1	3	14	17	2	4	6	0	9	9
13-Jul-97	Gitaza	Kirasa	1	1	7	13	20	1	0	1	0	10	10
<b>BURURI</b>	PROVINCE												
09-Jul-97	Rumonge	All	2	1	10	33	43	4	5	9	6	16	22
11-Jul-97	Karonda	Kigwena	2	1	5	24	29	1	5	6	2	15	17
	Tot	als		5	28	97	125	11	19	30	8	54	62

#### 2. LOCAL FISHING VILLAGE/LANDING SITES: BASIC FEATURES

#### 2.1 Population and Settlement

Whilst the field teams attempted to collect basic population data at the five Burundi landings accessible for survey, it proved impossible to come up with consistent figures. In some cases, population information referred only to the inhabitants of the *quartier* immediately around the landing site, numbering from a few hundred (Nyamugari and Gitaza) to over twenty thousand (Karonda). For the landings at Kadjaga/Gatumba and Rumonge, figures were reported for the entire population of the associated towns and amounted to scores of thousands of inhabitants.

Three out of the five survey sites monitored register an increase in overall population size compared with the situation 5 years ago (Table 2.1). Growth is attributed primarily to 'influx of people'attendant upon 'security problems,' with 'search for fishing opportunities' also being noted in one case. Two sites reported a decrease in population size over the past five years, a trend likewise attributed to 'security problems' but this time associated with the displacement of people to other locations.



Fig. 1.1 Lake Tanganyika, Northcast Shore. Map showing relative locations of sample landing sites in Burundi Area I (Bujumbura Province) and Area II (Bururi Province). Area III landings (Makamba Province) were closed due to security reasons and were thus not surveyed.

	Site name	Quartier	Site No.	Tot.Pop. (Est.)	Growth from 5 yrs ago	Reason
А.	BUJUMBURA	A PROVING	CE		• •	
1)	Nyamugari	Buyenzi, Ramba	2	260	More	'Security problems' (Influx of people displaced from other locations)
2)	Gitaza	Kirasa	3	386	Less	'Security problems' (Displacement of people to other locations)
3)	Gatumba/ Kadjaga	All	1	000's	Less	'Security problems' (Displacement of people to other locations)
В.	BURURI PRO	OVINCE				
1)	Karonda	Kigwena	5	10 x 000's	More	'Security problems' (Influx of people displaced from other locations)
2)	Rumonge	All	4	10 x 000's	More	<ul><li>a) 'Security problems' (Influx of people displaced from other locations).</li><li>b) 'Fishing opportunities.'</li></ul>

 Table 2.1
 Reasons cited for change in population size over previous five years, Burundi survey sites

#### 2.2 Access and Transportation Links

Reference to Table 2.2 shows that all of the sample landing sites have road access to the national transportation network. Indeed, a major road connects the entire Burundian shoreline from the border with the DRC to the most southern major village, Nyanza Lac, in Makamba Province close to the Tanzanian border. Unlike the situation in other countries, none of the Burundi landing sites are served with regular water transport services.

# 2.3 Basic Facilities Inventory

The inventory of key facilities and services run by the survey teams at all sample sites, also shown in Table 2.2, indicates that there is relatively high level of infrastructural development in comparison to other national sectors of the lake. Most landings monitored have basic medical facilities, primary and secondary schools, retailing establishments, and fishing gear/equipment supply/service agents. However, amenities including protected water supplies, electricity, telephone/radio call service, post offices, and banks are lacking at all sites except for Rumonge. All sites are served by Fisheries Department extension staff. Local fisher committees are recorded for Kadjaga/Gatumba, Karonda and Rumonge.

Site name	Site No.	Area No.	Households	Buildings	Type road access	Reg. road transp. service?	Reg. water transp. servicc?	Type water transport	Mkt Vendors	Shops/ Kiosks	Bar/ Restr.	Fuel service	Gear/ Equip Supply/ Service	Water supply	Electricity	Hospital/ Clinic	Primary school	Second. school	Mobile cinema	Telephone	Post office	Bank	Fisheries staff	Fish committee
BUJUMBURA PROV.			75	00	Downd	Vac	Ma	DNA	4	10	11	0	16	Dinad	No	No	3	1	Veg	No	No	No	Ves	No
Nyamugari	2	1	15	90	Paveu	res	INO	DNA	4	10		0	10	Tipeu	110	1NU NT		1	103	140	110	110 NI-	100	NL.
Gitaza	3	1	90	90	Paved	Yes	No	DNA	2	24	5	0	1	Stream	No	No	1	1	NO	N0	NO	INO	INO	INO
Gatumba/ Kadjaga	1	1			Paved	Yes	No	DNA	2	63	52	2	1	Piped	No	Yes	3	1	No	No	No	No	No	Yes
BURURI PROV.																								
Karonda	5	2	2,503	3,343	Paved	Yes	No	DNA	10	40	34	2	23	Piped	Yes	Yes	3	0	N.D.	No	No	No	Yes	Yes
Rumonge	4	2	1,806	3,000	Paved	Yes	No	DNA	28	72	30	4	11	Piped	Yes	Yes	9	6	No	Yes	Yes	Yes	Yes	Yes

 Table 2.2 Access/transportation links and basic facilities inventory of Burundi survey sites, July 1997\*

\* N.D. = No data; DNA = Docs not apply.

#### 3. LOCAL FISHERS: KEY SOCIO-ECONOMIC INDICATORS AND VIEWS

#### 3.1 Fisher Sample Composition

The Burundian survey team worked with a total of 155 individuals representing an estimated 64 separate fishing units (45 artisanal vs. 19 traditional units, averaging around 3 vs. 1.5 respondents per unit respectively -- see Reynolds and Paffen, 1997b). A breakdown of respondents per main gear operated by their units, as shown in Table 3.1, indicates that some 80% are associated with 'artisanal' gear kits consisting either of standard lift nets, 'Apollo' lift nets, or beach seines. The remaining 20% work with 'traditional' gear kits, comprising handlines, longlines, gilinets, or lusenga (scoop) nets.<sup>2</sup>

The number of respondents interviewed per type of main gear operated by the unit can be regarded as a representative sample of Burundi traditional and artisanal fisheries according to the results of the 1995 Frame Survey (Bambara, 1995; Paffen *et al.*, 1997; Reynolds and Paffen, 1997b). The FS confirmed that most fishers were involved in gill net and lift net operations. No evidence of night beach seining or chiromilla seine fishing was recorded during the 1995 survey.

Aain gear type	Fisher respon	dents per type
	No.	%
'Traditional'		
Hand lines	6	3.9
Long line	1	0.6
Gillnets	21	13.5
Lusenga nets	2	1.3
Sub-total	30	19.3
'Artisanal'		
Lift net	97	62.6
Apollo	21	13.5
Day beach seine	7	4.5
Night beach seine	0	0.0
Chiromilla seine	0	0.0
Sub-total	125	80.6
Total cases	155	100.0

#### Table 3.1 Sample fishing unit respondents by main gear type, Burundi

Fishing units may operate with one or more work boats, distinguished according to function performed. For survey purposes, 'fishing boats' are defined as those which which carry the main gear of fishing units (never more than one boat per unit). As indicated in Table 3.2, the Burundi sample units typically operate with catamarans (doubled-up planked canoes), which account for 77% of all the craft enumerated.. Dugout canoes are of quite rare occurrence, and single-hulled planked canoes represent just over 20% of the total craft associated

 $^2$  See Challe and Kihakwe 1994 and Bambara 1995 for a description of common gear types found in the Lake Tanganyika fishery.

with sample fishing units. Only four respondents are attached to 'light boats'(special craft that carry lamps for night fishing operations), and no additional 'auxiliary' boats are represented.

	Fish	ing boat	Cases of associated boats						
Smallcraft type	(Main ge	ear 1/ unit)	Ligh	t boat	Auxiliary boat				
	No.	%	No.	%	No.	%			
<b>Dugout canoe</b>	3	1.9	0	0.0	0	0.0			
Planked canoe	33	21.3	4	100.0	0	0.0			
Catamaran	119	76.8	0	0.0	0	0.0			
Report cases	155	100.0	4	100.0	0	0.0			
vg. No. Boats/ Artisanal	unit =	1.03							
Avg. No. Boats/ Traditiona	al unit =	1.00							

# Table 3.2Sample fishing units by craft type, Burundi

The sample population for Burundi 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.
•	'Owner/Operators'	Owners of main gear operated who directly participate in fishing trips.
•	'Operator/Captains'	Operators who do not own the main gear but who act as fishing leaders or captains.
•	'Crew/labourers'	Operators who do not own the main gear (e.g. net setters and pullers).
•	Light/auxiliary boat	Owners or operators of auxiliary light boats for owners/operators night fishing operations.

On this basis, the Burundi sample respondent population has the following composition:

Table 3.3	Respondents	by	fisher	category,	Burundi

Category	Arti	sanal	Trad	itional	Com	bined
	No.	%	No.	%	No.	%
Owner	20	16.0	3	10.0	23	14.8
<b>Owner/Operator</b>	8	6.4	8	26.7	16	10.3
<b>Operator/Captain</b>	35	28.0	4	13.3	39	25.2
Crew/labourers*	62	49.6	13	43.3	75	48.4
Auxiliary boat owners/operators	0	0.0	2	6.7	2	1.3
Report cases	125	100.0	30	100.0	155	100.0
Missing cases	0		0		0	
* Avg. No. Crew/fishing unit =	6 Ar	tisanal	2 Tra	ditional		

In order to facilitate data presentation in the following sections, these categories have been simplified into three basic respondent types: a) artisanal owners; b) artisanal crew; and c)

traditional fishers (including 11 owners and 19 crew). Auxiliary boat owners/operators are classified as crew as they do not own the main gear operated by the unit with which they are associated.

# 3.2 Fisher Respondent Background Characteristics

# 3.2.1 Gender, age, and formal education

All respondents in the Burundi fisher sample are male. Characteristics in terms of age and formal education attained are displayed in Tables 3.4 and 3.5 respectively. Traditional fishers and artisanal crew tend to be younger (nearly half <30 years) than artisanal owners (majority >30 years). Levels of formal education attainment are relatively low. Artisanal owners seem to rate highest on this measure, with just under one-third reporting possession of a primary school certificate. Corresponding figures for artisanal crew members and traditional fishers are about 16% and 23% respectively. Rates of secondary school certification are marginal in all instances.

Age range		Artis	Traditional				
(Yrs)	Ov	vner	C	rew	(Owner +Crew)		
	%	Cum%	%	Cum%	%	Cum%	
<15	0.0	0.0	1.0	1.0	3.5	3.5	
15 - 18	0.0	0.0	5.2	6.2	10.3	13.8	
19 - 21	0.0	0.0	8.2	14.4	17.2	31.0.	
22 - 25	3.7	3.7	10.3	24.7	10.3	41.3	
26 - 29	14.8	18.5	24.7	49.5	6.9	48.2	
30 - 39	33.3	51.9	33.0	82.5	24.1	72.3	
40 - 49	33.3	85.2	17.5	100.0	13.8	86.1	
50 - 59	7.4	92.6	0.0	100.0	10.4	96.5	
≥ <b>60</b>	7.4	100.0	0.0	100.0	3.5	100.0	
Total %	100.0	100.0	100.0	100.0	100.0	100.0	
<b>Report cases</b> (n = 153)		27	ç	97	4	29	
Missing cases		1		0		1	

Table 3.4	Age structure of sample respondents by type of fishery and fisher category, Burundi

	Artis	anal	Traditional
Primary School	Owner	Crew	(Owner+Crew)
Certificate			
'No' %	67.9	84.4	76.7
'Yes' %	32.1	15.6	23.3
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 154)	28	96	30
Missing cases	0	1	0
Secondary School			
Certificate			
'No' %	96.4	97.9	93.3
'Yes' %	3.6	2.1	6.7
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 154)$	28	96	30
Missing cases	0	1	0

 Table 3.5
 Formal education certificate level of sample respondents by type of fishery and fisher category, Burundi

# 3.2.2 Marital Status and Dependents

Data pertaining to respondent marital status and dependents are presented in Tables 3.6 and 3.7. Substantial majorities ( 60%) of fisher respondents in all categories report being married and bearing responsibility for the welfare of one or more dependents. Artisanal owners score 100% on each of these measures. Incidence of both unmarried status and nil dependents is higher amongst artisanal crew and traditional fishers, -- a state of affairs that seems to tally with the relatively younger age composition of these groups.

Marital status	Artis	Traditional	
	Owner	Crew	(Owner+Crew)
'Not married' %	0.0	26.0	40.0
'Married' %	100.0	74.0	60.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 154)$	28	96	30
Missing cases	0	1	0

 Table 3.6
 Marital status of sample respondents by type of fishery and fisher category, Burundi

Table 3.7	Dependents reported	l by sample re	espondents by type o	f fishery and fis	her category, Burundi
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Any dependents?	Artis	Traditional	
	Owner	Crew	(Owner+Crew)
'No' %	0.0	28.9	40.0
'Yes' %	100.0	71.1	60.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(N = 155)$	28	97	30

# 3.2.3 Place of birth and reasons for migration

Reference to Table 3.8 shows that most artisanal owners and traditional fishers claim to originate from their current landing site bases, whereas most artisanal crew report their birthplace as another place. Of those respondents born elsewhere, 'return to original family place' (place of parents' birth) is by far the most common reason cited for migration to sample landing sites, as indicated in Table 3.9.

Table 3.8	Reported place of birth,	sample respondents by ty	ype of fishery and fisher category	, Burundi
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Place of birth	Artis	anal	Traditional
	Owner	Crew	(Owner+Crew)
At site/vicinity %	71.4	45.2	63.3
Within 50 km %	25.0	41.9	26.7
Beyond 50 km %	3.6	12.9	10.0
Total %	100.0	100.0	100.0
Report cases (n = 151)	28	93	30
Missing cases	0	4	0

<b>Reason for migration</b>	Artis	Traditional	
-	Owner	Crew	(Owner+Crew)
'Original family place' %	75.0	73.7	100.0
'With family/ relatives' %	0.0	0.0	0.0
'For fishing/ fish trading' %	12.5	7.9	0.0
'For farming' %	12.5	18.4	0.0
'For better conditions' %	0.0	0.0	0.0
'For security reasons/ refugee' %	0.0	0.0	0.0
'Other' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
Tot. cases 'Not born here' $(n = 68)$	8	51	9
Missing cases	0	13	2

 Table 3.9
 Reported reason for migration to site, sample respondents by type of fishery and fisher category, Burundi

# 3.3 Fishing Enterprise and Income Status

Over 80% of respondents across all categories claim to be involved in fishing on a 'full-time' basis, in the sense that it is the activity that takes up most working time per month (Table 3.10). Sample fishers as a group also seem to have a fairly extensive work history in fishing. At least half of those in each category report having worked in the sector for more than 10 years (Table 3.11).

Participation	Artis	Traditional	
	Owner	Crew	(Owner+Crew)
Full time %	82.1	98.9	86.7
Part time %	17.9	1.1	13.3
Total %	100.0	100.0	100.0
<b>Report cases</b> (N = 152)	28	94	30
Missing cases	0	3	0

Table 3.10	Extent participation in fishing, sample respondents by type of fishery and fisher category	' <b>,</b>
	Burundi	

# Table 3.11 Years involvement in fishing, sample respondents by type of fishery and fisher category, Burundi

Year range	Artisanal Owner Crew			Traditional (Owner+Crew)		
	%	Cum%	%	Cum%	%	Cum%
<1	3.8	3.8	5.4	5.4	3.3	3.3
1 - 2	15.4	19.2	2.2	7.5	6.7	10.0
3 - 5	19.2	38.5	8.6	16.1	23.3	33.3
6 - 10	11.5	50.0	23.7	39.8	16.7	50.0
>10	50.0	100.0	60.2	100.0	50.0	100.0
Total %	100.0	100.0	100.0	100.0	100.0	100.0
Report cases (n = 149)	2	26	ç	93		30
Missing cases		2		4		0

'Full-time' **fisheries employment** does not preclude involvement in other forms of work, as shown by Table 3.12. Across the sample as a whole, secondary employment most often takes the form of farming, either on a 'subsistence' basis only (i.e. for family food production) or in combination with some cash cropping. Data presented in Table 3.13 indicate that around 82% of artisanal owners and 65% of artisanal crew claim access to at least some land, as against only 40% for traditional fishers.

Other work	Artis	Traditional	
	Owner	Crew	(Owner+Crew)
Subsistence farming %	23.1	38.9	21.4
Subsist. + Cash farming %	50.0	41.1	46.4
Fish trading %	3.8	14.4	10.7
Labourer %	3.8	1.1	3.6
Salary job%	3.8	0.0	10.7
Business %	0.0	2.2	7.2
More than one other job	15.4	2.2	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 144)$	26	90	28
Missing cases	2	7	2

 

 Table 3.12
 Involvement in other work, sample respondents by type of fishery and fisher category, Burundi

Table 3.13Reported ownership of land, sample respondents by type of fishery and fisher category,<br/>Burundi

Any land ownership?	Artis	Traditional		
<b>y 1</b>	Owner	Crew	(Owner+Crew)	
No %	17.9	35.4	60.0	
Yes %	82.1	64.6	40.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> $(n = 154)$	28	96	30	
Missing cases	0	1	0	

Infomation collected on respondents' estimated monthly incomes is assembled in Table 3.14, for 'good' fishing periods, and in Table 3.15, for 'poor' fishing 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\$ 50, as compared with about half of artisanal crew and only 16% of artisanal owners. Amongst artisanal fishers themselves, more than half of the owners claim to be earning over US\$ 100 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 perfermances are much less marked. Most fishers of all types report income levels equivalent to US\$ 20 or less in 'poor' periods.

Income range		Artis	Traditional			
(US\$/mo)*	Ow	vner	C	rew	(Owne	r+Crew)
	%	Cum%	%	Cum%	%	Cum%
< 25	8.0	8.0	18.9	18.9	26.7	26.7
25 - 50	8.0	16.0	30.5	49.5	36.7	63.4
51 - 100	28.0	44.0	40.0	89.5	33.3	96.7
101 -200	36.0	80.0	8.4	97.9	3.3	100.0
201 - 500	16.0	96.0	2.1	100.0	0.0	
> 500	4.0	100.0	0.0		0.0	
Total %	100.0	100.0	100.0	100.0	0.0	100.0
<b>Report cases</b>		25	(	95		30
(n = 150)						
<b>Missing cases</b>		3		2		0

Table 3.14Estimated income during 'good' fishing months, sample respondents by type of fishery and<br/>fisher category, Burundi

\* Exchange rate of US\$ 1 = Burundi Francs 500 applies.

# Table 3.15Estimated income during 'poor' fishing months, sample respondents by type of fishery and<br/>fisher category, Burundi

Income range		Artis	anal		Traditiona			
(US\$/mo)*	Ow	vner	C	rew	(Owner+Crew)			
	%	Cum%	%	Cum%	%	Cum%		
< 10	36.0	36.0	51.6	51.6	46.7	46.7		
10 - 20	20.0	56.0	33.7	85.3	33.3	80.0		
21 - 50	20.0	76.0	10.5	95.8	20.0	100.0		
51 -100	4.0	80.0	4.2	100.0	0.0			
101 - 250	12.0	92.0	0.0		0.0			
> 250	8.0	100.0	0.0		0.0			
Total %	100.0	100.0	100.0	100.0	0.0	100.0		
<b>Report cases</b> (n = 150)	2	25	9	95		30		
Missing cases		3		2		0		

\* Exchange rate of US\$ 1 = Burundi Francs 500 applies.

# 3.4 Fisher Opinions/Views on Sector Problems and Prospects

The last segment of fisher interview sessions dealt with a series of questions intended to elicit evaluative information pertaining to shared resource 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.'

# 3.4.1 Personal circumstances and preferences

Respondents in all three fisher categories seem very much inclined to continue in their fishing work (Table 3.16). This commitment registers most strongly amongst artisanal crew members (92%), followed by traditional fishers (86%) and artisanal owners (82%).

Table 3.16	Stated preference for continuing in fishing occupation,	sample respondents by type of
	fishery and fisher category, Burundi	

Preference	Artis	anal	Traditional
to continue?	Owner	Crew	(Owner+Crew)
'Yes' %	82.1	91.6	85.7
'No' %	17.9	8.4	14.3
'No opinion' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 151)	28	95	28
Missing cases	0	2	2

Burundi sample fishers also by and large express a desire to continue working out of their present landing site bases (Table 3.17), though artisanal crew and traditional operators seem rather more positive in this regard than do artisanal owners.

Table 3.17	Stated preference for staying in present location, sample respondents by type of fishery and
	fisher category, Burundi

Preference	Artis	Traditional		
to stay?	Owner	Crew	(Owner+Crew)	
'Yes' %	55.6	74.7	78.6	
'No' %	40.7	25.3	17.9	
'No opinion' %	3.7	0.0	3.5	
Total %	100.0	100.0	100.0	
<b>Report cases</b> (n = 150)	27	95	28	
Missing cases	1	2	2	

Commitment to continued involvement in fishing amongst the Burundi sample informants is only weakly manifest according to another sort of measure, as demonstrated in Table 3.18. In answering a hypothetical question about how one would use a year's worth of savings from fishing work (assuming this amount was all together in one place at one time), respondents were asked to mention their first, second, and third preferences. At the first preference level, artisanal owners mention fisheriesrelated uses (acquisition of gear or equipment) with the same frequency as family welfare uses (house improvements, children's education, etc.), whilst both artisanal crew members and traditional fishers clearly favour family welfare above other purposes.

Fisheries-related uses score equally with business/shop investments amongst artisanal owners at the second preference level, but again are not as popular as other purposes amongst artisanal crew and traditional fishers.

At the third order level fisheries-related investments rank well behind other preferences for all categories of fishers.

First Stated Use Preference	Ari	tisanal	Traditional
	Owner	Crew	(Owner+Crew)
Fishing gear %	21.4	25.0	20.7
Fishing lamps %	0.0	0.0	0.0
Boat %	0.0	0.0	0.0
O/B Engine %	14.3	0.0	0.0
Invest processing/trading %	0.0	0.0	0.0
Invest farming %	3.6	18.8	17.2
Invest business/shop %	25.0	17.7	13.8
Family welfare purposes %	35.7	38.5	48.3
Other %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 153)$	28	96	29
Missing cases	0	1	1
Second Stated Use Preference	A rt	isanal	Traditional
Second Stated Ose Preference	Owner	Crew	(Owner+Crew)
Fishing gear %	21.4	11.6	17.2
Fishing lamps %	0.0	0.0	0.0
Boat %	0.0	0.0	0.0
O/B Engine %	7.1	0.0	0.0
Invest processing/trading %	0.0	0.0	0.0
Invest farming %	17.9	26.3	41.4
Invest business/shop %	28.6	28.4	17.2
Family welfare purposes %	10.7	33.7	24.1
Other %	14.3	0.0	0.0
Total %	100.0	100.0	100.0
Report cases (n = 86)	28	95	29
No second mention	0	1	0
Missing cases	0	1	1
Third Stated Use Preference	Art	isanal	Traditional
	Owner	Crew	(Owner+Crew)
Fishing gear %	16.0	5.8	14.8
Fishing lamps %	0.0	0.0	0.0
Boat %	0.0	0.0	0.0
O/B Engine %	4.0	1.2	0.0
Invest processing/trading %	0.0	1.2	0.0
Invest farming %	20.0	15.1	22.2
Invest business/shop %	28.0	34.9	33.3
Family welfare purposes %	32.0	41.9	29.6
Other %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 60)	25	86	27
No third mention	3	10	2
Missing cases	0	1	1

# Table 3.18 Stated preferences for use of one year's savings, sample respondents by type of fishery and fisher category, Burundi

# 3.4.2 State of resources and use rights

Perceived state of commercial fish stocks

The fishers surveyed in Burundi are on the whole moderately pessimistic in their view of catch trends in the recent past (Table 3.19). Fully half of artisanal owners and outright majorities of traditional fishers and artisanal crew say that they see a 'decrease' in catch levels over the time since they first became involved in fishing, as opposed to 'increased' or 'similar' levels. Decline is attributed to a variety of factors, including overfishing, environmental change, and the civil unrest and security restrictions that have caused widespread beach closures and population displacements (Table 3.20).

Table 3.19	View of catches	compared	to wh	en first	started	fishing,	sample	respondents	by	type	of
	fishery and fisher	category,	Burun	di							

Change from when	Artis	Traditional	
first started?	Owner	Crew	(Owner+Crew)
'Increase' %	46.4	35.4	34.5
'Decrease' %	50.0	54.2	62.1
'Similar' %	3.6	5.2	3.4
'No opinion' %	0.0	5.2	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 153)	28	96	29
Missing cases	0	1	1

# Table 3.20 Reasons cited for catch decrease from before, sample respondents by type of fishery and fisher category, Burundi

<b>Reasons cited</b>	Arti	sanal	Traditional
	Owner	Crew	(Owner+Crew)
'Don't know' %	0.0	7.0	0.0
'God's will' %	0.0	2.4	0.0
'Over-fishing/stock decline' %	21.4	30.2	30.8
'Industrial fishing' %	0.0	0.0	0.0
'Use of small mesh sizes' %	0.0	0.0	0.0
'Presence foreign fishers' %	0.0	0.0	0.0
'Poor fishing methods' %	14.3	9.3	0.0
'Environmental change' %	7.1	11.6	46.2
'Regulations weak' %	0.0	0.0	0.0
'Improved gear' %	0.0	0.0	0.0
'Security problems' %	57.2	39.5	23.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 70)	14	43	13
Missing cases	0	9	5

There is no solid body of opinion about prospects for the immediate future (Table 3.21). Considerable minorities of artisanal owners (44%), artisanal crew (47%) and traditional

fishers (43%) assert that catches are likely to increase, perhaps in the expectation that security restrictions on fishing activity will ease to some degree. Others are divided between expecting decreases simple uncertainty about what will happen.

Artis	anal	Traditional
Owner	Crew	(Owner+Crew)
44.4	47.3	42.9
25.9	27.4	28.6
0.0	9.5	3.5
29.6	15.8	25.0
100.0	100.0	100.0
27	95	28
1	2	2
	Artis Owner 44.4 25.9 0.0 29.6 100.0 27 1	Artisanal Owner44.447.325.927.40.09.529.615.8100.0100.0279512

# Table 3.21View of catches anticipated in for next five years, sample respondents by type of fishery and<br/>fisher category, Burundi

Views on resource use rights

Though they had generally negative evaluations of past catch trends, and are divided in their opinions about what the future holds in store, Burundi fisher respondents do not on the whole seem prepared to limit access to the lake's fish resources. When faced with the rather abstract proposition that 'everyone' should be allowed to fish 'everywhere', the response pattern is quite positive amongst artisanal fishers (Fig. 3.1)? Traditional fishers are almost evenly divided in their views~ with half expressing opposition and just under half expressing support.

When the proposition is cast in more specific terms, i.e. that people should be allowed to fish outside of their own immediate administrative district (Fig. 3.2) and even outside of their own country (Fig. 3.3), respondents in all categories are much less reserved in their support for an open use approach (70% in favour). In this connection it can be noted that under normal circumstances, without security restrictions, Burundian fishers are known readily to shift their operations to the opposite side of the lake, outside of their own country, when they hear of higher catches there.

The use-right proposition responses can again be seen in relation to respondents' perceptions of resource abundance in the context of data shown in Fig. 3.4 and Table 3.22. Fishers in all categories are very much of the opinion that there will 'always be enough fish for everybody'. Reasons marshalled in support of this view largely relate to the associated expectations of 'improved



Fig. 3.1 'Allow everyone to fish everywhere.'

Fig. 3.2 'Allow people to fish outside own district.'



Fig. 3.3 'Allow people to fish outside own country.'



Fig. 3.4 'Always enough fish for everybody in future.'



FIGURE LEGEND ■ 'Yes' % 📓 'No' % 🖸 'No opinion' %

catches' and 'improved security.'

See Annex 1 for data tables on which Section 3 figures are based.

Reasons cited	Artis	anal	Traditional	
	Owner	Crew	(Owner+Crew)	
'Don't know' %	0.0	4.6	7.1	
'God's will' %	0.0	0.0	0.0	
Environmental change' %	8.3	4.6	0.0	
'Improved catches' %	58.3	25.6	28.6	
'Improved gear' %	8.3	14.0	21.4	
'Improved security' %	25.0	51.2	42.9	
Total %	100.0	100.0	100.0	
<b>Report cases</b> $(n = 69)$	12	43	14	
Missing cases	3	11	0	

Table 3.22Reasons cited for why always enough fish in future, sample respondents by type of fishery<br/>and fisher category, Burundi

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

Data on Burundi fisher respondents' views on various possible measures to regulate access to or the use of certain gear or methods in Lake Tanganyika' s fishery are presented in the next series of figures (Figs. 3.5 - 3.19). Results show a moderate to strong degree of shared opinion across the sample categories in response to most of the propositions presented. Thus, Burundi sample fishers overall tend to disagree that there should be any attempts to impose: a) provisions for closed fishing seasons or closed fishing areas (Figs. 3.5 - 3.6); b) restrictions on numbers of fishers (Fig. 3.7); c) minimum mesh sizes for gillnets (Fig. 3.9), beach seines (Fig. 3.10), or lift nets (Fig. 3.11); d) prohibitions on the use of beach seines (Fig. 3.15); e) restrictions on or outright prohibition of lift net operations (Fig. 3.16 - 3.17); and f) prohibition of 'katuli' fishing, or the method of setting a gill net and then scaring fish into it by beating the surface of the water (Fig. 3.18).

Artisanal and traditional fishers are also as a group strongly of the view that restrictions ought to be placed on the use of industrial gear (Fig. 3.12).

Less unanimity is found in response to three other propositions. Firm majorities of artisanal owners and crew agree to the idea of mesh size restrictions in general (Fig. 3.8), even if, in rather contradictory fashion, all restrictions are rejected when applied to specific types of nets (Figs. 3.9 -3.11). Opinion amongst traditional fishers on the principle of mesh size restriction is divided, with equal proportions for and against and a few cases of 'no opinion.'





Fig. 3.7 'Restriction on number of fishers.'



Fig. 3.9 'Restriction on gillnet mesh size.'



Fig. 3.11 'Restriction on lift net mesh size.'



Fig. 3.6 'Closed fishing areas/places.'



Fig. 3.8 'Restriction on mesh sizes.'



Fig. 3.10 'Restriction on beach seine mesh size.'



Fig. 3.12 'Restriction on industrial gear.'



With regard to placing an outright prohibition on the use of industrial gear, most artisanal owners disagree whilst most artisanal crew agree (Fig. 3.13). Traditional fishers are evenly split in their support and opposition to the idea.<sup>4</sup>

On the question of placing restrictions on time and/or place of beach seine operations, a slight majority of artisanal owners are in favour of such a move. Most artisanal crew and traditional fishers are against it (Fig. 3.14).

Fig. 3.13 'Prohibition on industrial gear.'



Fig. 3.15 'Prohibition on beach seines.'







Fig. 3.14 'Restriction on beach seines.'



Fig. 3.16 'Restriction on lift nets.'



Fig. 3.18 'Prohibition on "katuli" fishing.'



FIGURE LEGEND ■ 'Yes' % ■ 'No' % □ 'No opinion' %

# 3.4.4 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, publicising them, and encouraging compliance to

<sup>&</sup>lt;sup>4</sup>The industrial fleet in Burundi had more or less collapsed by the early 1990s (Coenen and Nikomeze, 1994; Paffen *et. al.* 1997).

them. Although as seen above there is broad rejection of various suggestions for control measures (fishing areas and times, operator quotas, gear specifications, etc.), Burundi fishers on the whole do not seem opposed to the idea of regulation *per Se*. Strong sentiment appears to exist in favour of the 'top-down' notion that fishing rules 'should only be decided by the Government' (Fig. 3.19), almost unanimously on the grounds that the state is the best equipped to fulfill this role, and has the responsibility to do so (Table 3.23).



Fig. 3.19 'Rules only to be decided by government.'

■ 'Yes' % ■ 'No' % □ 'No opinion' %

Table 3.23	Reasons cited	for w	hy fishing	restrictions	only to	be decided	by	government,	sample
	respondents b	y type o	of fishery an	d fisher cate	gory, Bur	undi			

Response	Artisanal		Traditional
-	Owner	Crew	(Owner+Crew)
<b>'Power/responsibity of gov't' %</b>	100.0	100.0	96.0
'Gov't has the knowledge' %	0.0	0.0	4.0
Shared responsibility, gov't + fishers' %	0.0	0.0	0.0
'Power/responsibity of fishers' %	0.0	0.0	0.0
'Fishers have the knowledge'	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 130)$	19	86	25
Missing cases	1	3	2

Figures 3.20 to 3.24 show breakdowns of polling results for propositions related to monitoring and enforcement mechanisms. In the survey questionnaire (Form 2), these were subsumed under the general question, 'If rules in the lake are made in future, how do you think they should be kept in force?' Burundi sample fishers express very solid support for actions to: a) increase the number of fisheries patrol boats (Fig. 3.20) and fisheries scouts (Fig. 3.21); b) punish fishers (fines, gear confiscation, and /or withdrawal of fishing permit) who violate fisheries regulations (Fiq. 3.23); and punish traders and consumers (fines, product confiscation, and/ or withdrawal of trading permit) who violate fisheries regulations (Fig. 3.24).

Opinion is generally against more direct police involvement in fisheries enforcement, however (Fig. 3.22).



Fig. 3.20 'Should be more patrol boats.'

Fig. 3.22 'Involve police more directly in enforcement.'



Fig. 3.21 'Should be more fishery scouts.'



Fig. 3.23 'Should punish offending fishers.'



Fig. 3.24 'Should punish offending traders/consumers.'





# 3.4.5 Obstacles to occupational success

The last item covered in the fisher interviews dealt with respondent accounts of their most serious job-related problems. Each individual was asked to list `the out three biggest problems you face as a fisher working here around the lake' in rank order starting with the most serious. The results of this open-ended query indicate a widely shared sense of frustration with gear problems and security issues 3.24 (Tables 3.26). \_ Gear problems stem either from its outright lack of availability or its inadequate availability in terms of either quantity or quality. The 'lack of/inadequate gear' theme is the one most frequently mentioned by artisanal crew and traditional fishers at all three rank order levels. Artisanal owners most frequently cite 'lack of security' at the first and second order problem levels, and 'lack of/inadequate gear' at the third order level. Under present circumstances in Burundi 'lack of security' relates to the severe restrictions on landing site operations and fishing areas imposed by the military authorities as well as to theft and raids by armed bands.

Response	Artisanal %		Traditional %	
-	Owner	Crew	(Owner+Crew)	
Lack of security	34.6	34.8	25.9	
Low catches/profit	11.5	7.6	11.1	
Seasonal fluctuations	0.0	0.0	0.0	
Lack of/inadequate gear	26.9	52.2	51.9	
Lack of engine/fuel	3.8	1.1	0.0	
Lack of/poor processing facilities	0.0	1.1	0.0	
Transport/marketing problems	3.8	0.0	0.0	
Problems with industrial companies	0.0	0.0	0.0	
Lack of /inadequate regulations	0.0	1.1	3.7	
Excessive regulations	11.5	0.0	7.4	
Excessive fees/taxes/levies	0.0	2.2	0.0	
Lack of Gov't aid	7.7	0.0	0.0	
Weather conditions	0.0	0.0	0.0	
Presence of foreigners	0.0	0.0	0.0	
Safety problems/poor working conditions	0.0	0.0	0.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> (n = 145)	26	92	27	
Missing cases	2	8	3	

 Table 3.24
 Most serious occupational problem cited, sample respondents by type of fishery and fisher category, Burundi

Table 3.25Second most serious occupational problem cited, sample respondents by type of fishery and<br/>fisher category, Burundi

Response	Artisanal %		Traditional %	
<b>F</b>	Owner	Crew	(Owner+Crew)	
Lack of security	41.7	34.8	22.2	
Low catches/profit	8.3	5.6	29.6	
Seasonal fluctuations	0.0	0.0	0.0	
Lack of/inadequate gear	37.5	43.8	47.6	
Lack of engine/fuel	4.2	4.5	0.0	
Lack of/poor processing facilities	0.0	0.0	0.0	
Transport/marketing problems	0.0	1.1	0.0	
Problems with industrial companies	0.0	0.0	0.0	
Lack of /inadequate regulations	0.0	0.0	3.6	
Excessive regulations	4.2	9.0	0.0	
Excessive fees/taxes/levies	0.0	0.0	0.0	
Lack of Gov't aid	4.2	1.1	0.0	
Weather conditions	0.0	0.0	0.0	
Presence of foreigners	0.0	0.0	0.0	
Safety problems/poor working conditions	0.0	0.0	0.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> $(n = 140)$	24	89	27	
No second problem mentioned	2	0	0	
Missing cases	2	8	3	

Response	Artisanal %		Traditional %	
Response	Owner	Crew	(Owner+Crew)	
Lack of security	33.3	26.6	22.7	
Low catches/profit	5.6	12.7	18.2	
Seasonal fluctuations	0.0	0.0	0.0	
Lack of/inadequate gear	44.4	50.6	40.9	
Lack of engine/fuel	0.0	3.8	4.6	
Lack of/poor processing facilities	0.0	0.0	0.0	
Transport/marketing problems	5.6	0.0	0.0	
Problems with industrial companies	0.0	0.0	0.0	
Lack of /inadequate regulations	0.0	0.0	0.0	
Excessive regulations	5.6	3.8	9.0	
Excessive fees/taxes/levies	5.6	0.0	4.6	
Lack of Gov't aid	0.0	2.5	0.0	
Weather conditions	0.0	0.0	0.0	
Presence of foreigners	0.0	0.0	0.0	
Safety problems/poor working conditions	0.0	0.0	0.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> $(n = 119)$	18	79	22	
No third problem mentioned	8	10	5	
Missing cases	2	8	3	

Table 3.26Third most serious occupational problem cited, sample respondents by type of fishery and<br/>fisher category, Burundi

# 4. LOCAL FISH PROCESSORS AND TRADERS: KEY SOCIO-ECONOMIC INDICATORS AND VIEWS

# 4.1 Processor/Trader Sample Composition

Following the sampling procedure established for all the national sectors, which recognised that there was no basis for estimating total numbers of local fish processors and traders beforehand, the Burundi survey team keyed its processor/trader sampling rate to the fishing unit rate (Reynolds and Paffen 1997b). This in effect established a quota of 64 post-harvest operators to be interviewed, their distribution throughout the sample sites being dictated by the distribution of sample fishing units. The field team actually was able to make contact with 62 of the projected 64 processors/traders.

The resulting post-harvest sector sample group is mostly composed of those who specialise in trading and rarely if ever engage in processing or a combination of processing and trading (Table 4.1). Some three-quarters of these individuals operate only on a local scale, i.e. within a 5 km radius of their respective landing site bases (Table 4.2).

Main enterprise type	<b>Respondents per type</b>		
	No.	%	
Processing (rarely trades)	12	19.4	
<b>Processing</b> + trading	12	19.4	
Trading (rarely processes)	38	61.3	
Total cases	62	100.0	

 Table 4.1
 Post-harvest sample respondents by enterprise type, Burundi

# Table 4.2 Post-harvest sample respondents by area of operation, Burundi

Area of operation	Processors + traders	
Local (5 km radius) %	75.8	
Non-local (>5 km radius) %	14.5	
Both local & non-local %	9.7	
Total %	100.0	
<b>Report cases</b> (N =)	62	
Missing cases	0	

# 4.2 Processor/Trader Respondent Background Characteristics

# 4.2.1 Gender, age, and formal education

The gender balance of the post-harvest sample weighs heavily in favour of men, who make up 87% of the total group (Table 4.3). Fifty-four men are represented in the sample group as against only 8 women.<sup>5</sup>

Gender	Processors	Proc./traders	Traders	Combined
Male %	91.7	91.7	84.2	87.1
Female %	8.3	8.3	15.8	12.9
Total %	100.0	100.0	100.0	100.0
Report cases (N = 62)	12	12	38	62

# Table 4.3 Post-harvest sample respondents by gender, Burundi

<sup>5</sup>In view of the very small number of women respondents, subsequent data tabulations are not broken down by gender, as in the other national sector reports.
Sample characteristics in terms of age and formal education attained are displayed in Tables 4.4 and 4.5 respectively. Respondents tend to be over thirty years of age and only around 20% claim to hold a primary school leaving certificate. Hardly any report having completed secondary school.

## Table 4.4 Age structure of post -harvest sample respondents, Burundi

Age range (yrs)	Т	otal
	%	Cum%
<15	0.0	0.0
15 - 18	0.0	0.0
19 - 21	1.6	1.6
22 - 25	3.2	4.8
26 - 29	8.1	12.9
30 - 39	45.2	58.1
40 - 49	24.2	82.3
50 - 59	12.9	95.2
>59	4.8	100.0
Total %	100.0	
Report cases (N =)	6	52

# Table 4.5 Formal education certificate level, post-harvest sample respondents, Burundi

Primary School Certificate	Totals
'No' %.	79.0
'Yes' %.	21.0
Total%	100.0
Report cases (N =)	62

Secondary School Certificate

'No' %	96.8
'Yes' %.	3.2
Total %	100.0
Report cases (N = )	62

#### 4.2.2 Marital Status and Dependents

Data on marital status and dependents presented in Tables 4.6 and 4.7 confirm the post-harvest sample as a group of mature individuals with spouse and family obligations. Around 86% are married, and 93% report bearing responsibility for the support of one or more dependents.

Table 4.6	Marital status,	post-harvest sam	ple res	pondents,	Burundi
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Marital status	Totals
Not married %	14.5
Married %	85.5
Total %	100.0
<b>Report cases</b> (N =)	62

Table 4.7 Dependents reported, post-narvest sample respondents, Durun	Table 4.7	Dependents reported,	post-harvest sam	ole respondents	, Burundi
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Any dependents?	Totals
'No' %	6.5
<b>'Yes' %</b>	93.5
Total %	100.0
<b>Report cases</b> (N =)	62

# 4.2.3 Place of birth and reasons for migration

Reference to Table 4.8 shows that most post-harvest group respondents are native-born residents of the sample sites. Of the 42% born elsewhere, leading reasons cited for migration to present place of residence are 'search for better conditions' (37%) and 'search for fishing/fish trading opportunities' (32%).

## Table 4.8 Reported place of birth, post-harvest sample respondents, Burundi

Place of birth	Totals
At site/vicinity %	58.1
Within 50 km %	22.6
Beyond 50 km %	19.3
Total %	100.0
<b>Report cases</b> (N =)	62

Table 4.9	Reported reason	for migration to	o site, post-harvest	sample respond	lents, Burundi
		L.7			

<b>Reason for migration</b>	Totals
'Original family place' %	10.5
'With family/relatives' %	0.0
'For fishing/fish trading' %	31.6
'For farming' %	0.0
'For better conditions' %	36.8
'For security reasons/refugee' %	21.1
Total %	100.0
Total cases 'Not born here' (n = )	19
Missing cases	7

#### 4.3 Post-harvest Enterprise and Income Status

Nearly 94% of the Burundi post-harvest sample respondents claim to be involved in fish processing/trading on a 'full-time' basis, in the sense that this is the activity that takes up most working time per month (Table 4.10). The respondent group as a whole also appears to have a rather extensive history of involvement in fish processing/trading work, with over 60% reporting more than 10 years' worth of experience (Table 4.11).

Table 4.1V Extent participation in fish business, post-harvest sample respondents, burun	Table 4.10	Extent partici	pation in fish	1 business,	post-harvest sam	ple respondent	s, Burundi
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Participation	Totals
Full time %	93.5
Part time %	6.5
Total %	100.0
<b>Report cases</b> (N =)	62

 Table 4.11
 Years involvement in fish processing/trading, post-harvest sample respondents, Burundi

Year range	Т	Totals			
	%	Cum %			
<1	1.6	1.6			
1 - 2	9.7	11.3			
3 - 5	14.5	25.8			
6 - 10	12.9	38.7			
>10	61.3	100.0			
Total	100.0				
<b>Report cases</b> (N =)		62			

'Full-time' fish processing or trading employment may also be supplemented by other forms of work (Table 4.12). Just under a third of the post-harvest group members claim secondary employment in some aspect of fishing (either as direct participants or as gear/equipment owners). Some 45% of respondents report secondary employment in either subsistence or combined food crop-cash crop farming. A fair-sized majority (>60%) of the sample reports ownership of at least some land, no matter how small the parcel (Table 4.13).

Other work?	Totals
Subsistence farming %	19.5
Subsist. + Cash farming %	25.8
Fishing %	30.6
Labourer`%	1.6
Salary job %	1.6
<b>Business %</b>	4.8
More than one other job %	14.5
No other job %	1.6
Total %	100.0
<b>Report cases</b> (N =)	62

 Table 4.12
 Involvement in other work, post-harvest sample respondents, Burundi

#### Table 4.13 Reported ownership of land, post-harvest sample respondents, Burundi

Any land ownership?	Totals
'No' %	38.7
<b>'Yes'</b> %	61.3
Total %	100.0
<b>Report cases</b> (N =)	62

Reported monthly income levels for 'good' and 'poor' periods of work are relatively low (Tables 4.14 and 4.15). Respondents mostly (>55%) earn the equtvalent of US\$50 or less during 'good' periods. Three-quarters of all respondents earn US\$ 20 or less during 'poor' periods.

 Table 4.14
 Estimated income during 'good' months, post-harvest sample respondents, Burundi

Income range (US\$/mo)*	mo)* Total	
	%	Cum%
< 25	29.0	29.0
25 - 50	27.4	56.5
51 - 100	24.2	80.6
101 - 200	16.1	96.8
> 200	3.2	100.0
Total	100.0	
Report cases (N = )	(	62

\* Exchange rate of US\$ 1 = Burundi Francs 500 applies.

Income range (US\$/mo)*	Total			
	%	Cum%		
< 10	45.2	45.2		
10 - 20	30.6	75.8		
21 - 50	17.7	93.5		
51 - 100	6.5	100.0		
> 100	0.0	100.0		
Total	100.0			
<b>Report cases</b> (N = )		62		

 Table 4.15
 Estimated income during 'bad' months, post-harvest sample respondents, Burundi

\* Exchange rate of US\$ 1 = Burundi Francs 500 applies.

## 4.4 Processor/Trader Opinions/Views on Sector Problems and Prospects

With minor adjustment to take their post-harvest orientation into account, the final section of the processor/trader interview form replicated that of the fisher form in probing for evaluative information on shared resource use~ management, and occupational outlooks. As with the review of fisher sample findings, 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.'

## 4.4.1 Personal circumstances and preferences

Post-harvest respondents are very inclined (ca.68%) to continue with their present line of work (Table 4.16). Respondents as a group also are strongly in favour (73%) of staying on in their present bases of operation (Table 4.17).

Preference to continue?	Totals
'Yes' %	67.7
'No' %	30.6
'No opinion' %	1.6
Total %	100.0
Report cases (N =)	62

Table 4.16	Stated preference for continuing in fish proc	cessing/trading, post-harvest sample r	espondents,
	Burundi		

 Table 4.17
 Stated preference for staying in present location, post-harvest sample respondents, Burundi

Preference to stay?	Totals
'Yes' %	72.6
'No' %	25.8
'No opinion' %	1.6
Total %	100.0
<b>Report cases</b> (N =)	62

As with the fishers, members of the post-harvest sample group in Burundi were asked the hypothetical question on how one would use a year's worth of savings from work earnings, listed according to first, second, and third level preferences. Results appear in

First stated preference	Totals					
Fishing gear %	11.3					
Fishing lamps % 16.						
Boat %	<b>Boat %</b> 0.0					
O/B Engine %	0.0					
Invest processing/trading %	25.8					
Invest farming %	19.4					
Invest business/shop %	9.7					
Family welfare purposes %	17.7					
Other %	0.0					
Total %	100.0					
Report cases (N =)	62					
Second stated preference	Totals					
Fishing gear %	0.0					
Fishing lamps %	0.0					
Boat %	10.0					
O/B Engine %	0.0					
Invest processing/trading %	20.0					
Invest farming %	35.0					
Invest business/shop %	10.0					
Family welfare purposes %	25.0					
Other %	0.0					
Total %	100.0					
<b>Report cases</b> (n =)	60					
No second preference	2					
Third stated preference	Totals					
Fishing gear %	6.9					
Fishing lamps %	0.0					
Boat %	6.9					
O/B Engine %	0.0					
Invest processing/trading %	6.9					
Invest farming %	13.8					
Invest business/shop %	25.9					
Family welfare purposes %	39.7					
Other %	0.0					
Total %	100.0					
<b>Report cases</b> (n =)	58					
No third proference	4					

Table 4.18, and reinforce the impression of commitment to fishing-related jobs. As a first order preference, the majority (53%) of respondents opts for investment either in fishing gear/equipment or in further processing/trading activity. Farming-related investments figure as the most frequent mention for the second preference level, and family welfare purposes for the third.

#### 4.4.2 State of resources and use rights

Perceived state of commercial fish stocks

Burundi fish processors/traders appear to be even more pessimistic than their fisher counterparts in remarking on changes in the fishery in recent years. Some two-thirds of postharvest sample individuals are of the opinion that catches have decreased from the time they first became involved in the fish business (Table 4.19). Asked to explain why such decline has occurred, just over half (53%) of these respondents attribute the perceived trend to overfishing and associated stock reductions (Table 4.20). 'Security problems,' meaning the civil unrest and restrictions that have brought beach closures and population displacements, is the second most frequently cited factor.

Table 4.19	View	of	catches	compared	to	when	first	started	in	fish	business,	post-harvest	sample
	respon	ıde	nts, Bur	undi									

Change from when first started?	Totals		
'Increase' %	25.8		
'Decrease' %	66.1		
'Similar' %	4.8		
'No opinion' %	3.3		
Total %	100.0		
Report cases (N =)	62		

•

Reasons cited	Totals	
'Don't know' %	0.0	
'God's will' %	0.0	
Over-fishing/stock decline' %	52.8	
'Industrial fishing' %	2.8	
'Use of small mesh sizes' %	0.0	
'Presence foreign fishers' %	0.0	
'Poor fishing methods' %	13.9	
'Environmental change' %	5.6	
'Regulations weak' %	0.0	
'Improved gear' %	2.8	
'Security problems' %	22.1	
Total %	100.0	
<b>Report cases</b> (n =)	36	
Missing cases	5	

## Table 4.20 Reasons cited for catch decrease from before, post-harvest sample respondents by gender, Burundi

With regard to changes in catch levels anticipated within the near future, post-harvest sample group members are somewhat more optimistic in their assessments (Table 4.21). A slight majority is of the opinion that catches will increase, mostly on the basis of expectations that security restrictions on fishing activity will be eased (Table 4.22).

Change anticipated?	Totals
'Increase' %	51.6
'Decrease' %	29.0
'Similar' %	3.2
'No opinion' %	16.2
Total %	100.0
<b>Report cases</b> (N =)	62

 

 Table 4.21
 View of catches anticipated for the next five years, post-harvest sample respondents, Burundi

Table 4.22 Reasons cited for anticipated catch increase, post-harvest sample respondents, Burundi

Reasons cited	Totals	
'Don't know' %	0.0	
'God's will' %	3.8	
'Environmental change' %	0.0	
'Improved gear/catches' %	23.1	
'Security improvements %	73.1	
Total %	100.0	
<b>Report cases</b> (n =)	26	
Missing cases	6	

Views on resource use rights

Burundi post-harvest respondents are strongly supportive of open access when responding to propositions about who should be allowed to exploit the lake's fish resources. Substantial proportions are in favour of suggestions that 'everyone should be allowed to fish everywhere' (73% - Fig. 4.1),<sup>6</sup> that 'people should be allowed to fish outside their own administrative district (89\% -- Fig. 4.2), and that 'people should be allowed to fish outside their 3.2% -- Fig. 4.3).

The use-right proposition responses can again be seen in relation to respondents' perceptions of resource abundance in the context of data shown in Fig. 4.4 and Table 4.23. Like their fisher counterparts, post-harvest respondents are generally (60%) of the opinion that there will 'always be enough fish for everybody,' -- a view that seems largely based on expectations of 'improved security.'

<sup>&</sup>lt;sup>6</sup> See Annex 2 for data tables on which Section 4 figures are based.



Fig. 4.1 'Allow everyone to fish everywhere.' (Burundi P/harvest group)

(N=62)

Fig. 4.2 'Allow people to fish outside own district.' (Burundi P/harvest group)



(N=62)

Fig. 4.3 'Allow people to fish outside own country.' (Burundi P/harvest group)



(N=62)

Fig. 4.4 'Always enough fish for everybody in future.' (Burundi P/harvest group)



FIGURE LEGEND ■ 'Yes' % ■ 'No' % □ 'No opinion' %

Reasons cited	Totals
'Don't know' %	0.0
'God's will' %	3.4
'Environmental change' %	0.0
'Improved catches' %	28.6
'Improved gear' %	21.4
'Improved security' %	42.9
Total %	100.0
<b>Report cases</b> (n = )	14
Missing cases	0

Table 4.23Reasons cited for why always enough fish in future, post-harvest sample respondents,<br/>Burundi

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

Data on Burundi post-harvest respondents' views on various possible measures to regulate access to Lake Tanganyika's fishery resources or to ban or otherwise restrict the use of certain gear or methods for harvesting them are presented in the next series of figures (Figs. 4.5 - 4.14). Substantial majorities of from around 70% and greater oppose those measures which would: a) limit access by season or area (Figs. 4.5 - 4.6); b) restrict the number of fishers allowed to operate (Fig. 4.7); c) prohibit or otherwise restrict beach seine net operations (Figs. 4.11 - 4.12); or d) prohibit or otherwise restrict lift net operations (Figs. 4.13 - 4.14).

A slight to moderate majority of processors/traders are in favour of measures to impose minimum net mesh sizes (Fig. 4.8), and to prohibit or otherwise restrict industrial gear operations (Figs. 4.9 - 4.10).



FIGURE LEGEND ■ 'Agree' % ■ 'Disagree' % □ 'No opinion' %



Fig. 4.10 'Prohibition on industrial gear.'

■ 'Agree' % ■ 'Disagree' % □ 'No opinion' %

## 4.4.4 Role of government and fisheries authorities

As noted earlier in the review of fisher sample findings, a further set of issues bearing on which agencies or parties responsible should be for elaborating and implementing management mechanisms is implied by the questions on possible effort and gear regulation. The post-harvest sample group appears solidly in favour of the idea that fishing rules 'should only be decided by the Government.' 84% Some of the processors/traders interviewed agree to this proposition (Fig. 4.1 5), primarily because the state us deemed to have both the reponsibility and the means to perform such a function (Table 4.24).

Fig. 4.9 'Restriction on industrial gear.'



Fig. 4.15 'Rules only to be decided by government.' (Burundi P/harvest group)

□ 'Yes' % ■ 'No' % □ 'No opinion' %

Table 4.24	Reasons cited for why fishing restrictions should only be decided by government, post
	harvest sample respondents, Burundi

Response	Total	
'Power/responsibity of gov't' %	94.2	
'Gov't has the knowledge' %	3.8	
' Shared responsibility, gov't + fishers' %	1.9	
'Power/responsibity of fishers' %	0.0	
'Fishers have the knowledge'	0.0	
'No opinion' %	0.0	
Total %	100.0	
<b>Report cases</b> (n =)	52	

Figures 4.16 to 4.20 show breakdowns of polling results for propositions related to monitoring and enforcement mechanisms. In the same manner as for the fisher survey questionnaire (Form 2), these propositions were presented in the processor/trader questionnaire (Form 3) under the heading of the general question. 'If rules in the lake are made in fixture, how do you think they should be kept in force?' Burundi post-harvest sample respondents express overall support for mechanisms that would entail: a) more fisheries patrol boats (Fig. 4.16); b) more fisheries scouts for enforcement; c) more direct involvement of police for enforcement; d) punishment of fishers (fines, gear confiscation, and/or withdrawal of fishing permit) who violate regulations (Fig. 4.19); and e) punishment of traders and consumers (fines, product confiscation, and/or withdrawal of trading permit) who violate regulations (Fig. 4.20).



Fig. 4.18 'Involve police more directly in enforcement.' (Burundi P/harvest group)







Fig. 4.19 'Should punish offending fishers.' (Burundi P/harvest group)



Fig. 4.20 'Should punish offending traders/consumers.' (Burundi P/harvest group)





## 4.4.5 Obstacles to occupational success

Following the routine used for the fisher interviews, processor/trader informants were asked as a final interview item to talk about the three most serious job-related problems they confront. A tabulation of first order responses (Table 4.25) indicates that problems associated with low catches and profit levels (e.g. 'poor supplies of fish,' 'high prices of fish,' `overfishing,' `low income,' and 'catching of juvenile fish') are dominant worries within the post-harvest group overall, followed by concerns over 'security problems' (theft, civil unrest, and harassment by police or military personnel, etc.). 'Marketing problems,' which can involve lack of transport and/or high transport costs, and poor storage and/or selling facilities as well as simple low demand for product, figure as the most frequently cited theme at both the second and third order levels (Tables 4.26 - 4.27).

Response	
-	Total
Lack of security	24.6
Low catches/profit	36.1
Seasonal fluctuations	1.6
Lack of/inadequate gear	3.3
Lack of engine/fuel	0.0
Lack of/poor processing facilities	13.1
Transport/marketing problems	9.8
Problems with industrial companies	0.0
Lack of /inadequate regulations	0.0
Excessive regulations	3.3
Excessive fees/taxes/levies	3.3
Lack of Gov't aid	1.6
Weather conditions	0.0
Presence of foreigners	0.0
Safety problems/poor working conditions	3.3
Total %	100.0
<b>Report cases</b> (n =)	61
Missing cases	1

 Table 4.25
 Most serious occupational problem cited, post-harvest sample respondents, Burundi

 Table 4.26
 Second most serious occupational problem cited, post-harvest sample respondents, Burundi

Response	
	Total
Lack of security	14.8
Low catches/profit	16.7
Seasonal fluctuations	0.0
Lack of/inadequate gear	9.3
Lack of engine/fuel	0.0
Lack of/poor processing facilities	5.6
Transport/marketing problems	29.6
Problems with industrial companies	0.0
Lack of /inadequate regulations	0.0
Excessive regulations	0.0
Excessive fees/taxes/levies	14.8
Lack of Gov't aid	0.0
Weather conditions	3.7
Presence of foreigners	0.0
Safety problems/poor working conditions	5.6
Total %	100.0
<b>Report cases</b> (n =)	54
No second problem mentioned	7
- Missing cases	1

Response	
	Total
Lack of security	20.4
Low catches/profit	4.1
Seasonal fluctuations	0.0
Lack of/inadequate gear	0.0
Lack of engine/fuel	0.0
Lack of/poor processing facilities	18.4
Transport/marketing problems	24.5
Problems with industrial companies	0.0
Lack of /inadequate regulations	0.0
Excessive regulations	8.2
Excessive fees/taxes/levies	16.3
Lack of Gov't aid	6.1
Weather conditions	0.0
Presence of foreigners	0.0
Safety problems/poor working conditions	2.0
Total %	100.0
<b>Report cases</b> (n =)	49
No third problem mentioned	12
- Missing cases	1

#### Table 4.27 Third most serious occupational problem cited, post-harvest sample respondents, Burundi

#### 5. CONCLUSION

#### 5.1 Summary Review

The 1997 LTR socio-economic survey of the Burundi sector of Lake Tanganyika was carried out during the second week in July. Sample sites could not be chosen through the stratified random sampling strategy followed in the other national sectors, as only five landings were operational due to security restrictions imposed by the military authorities. It was therefore decided that the Burundi field team would simply visit all five of these sites and carry out data collection in accordance with standard procedures for the survey lakewide, using Form 1 to gather information on general community features, Form 2 to guide interviews with individual fishers, and Form 3 to guide interviews with individual processors and traders (Reynolds and Paffen 1 997b).

Interviews were conducted with 155 Burundi sample fishers in total. The sample group is mostly constitued of individuals associated with fishing units operating artisanal gear (standard lift nets, 'Apollo' lift nets, or beach seines), including both unit 'owners' and their 'crew.' The latter may include fishing unit leaders or captains (as non-owners of main gear) as well as unit labourers (net pullers, setters, etc.). Sorted in this way, Burundi artisanal fisher respondents comprise 28 owners and 97 crew. The same owner-crew distinction can be applied to the traditional fishery (hand lines, longlines, gillnets, and lusenga nets). Owing to the very limited number (11 owners and 19 crew) of traditional fishers actually encountered, however, these two categories were treated analytically simply as one overall 'traditional' fisher group, comprising a total of 30 individuals.

The field team also conducted interviews with 62 processors and traders, or 'post-harvest' sample respondents. Of this group, some 60% specialise in trading and rarely if ever engage in processing or a combination of processing and trading. Unlike the fisher sample population, which is exclusively male, the post-harvest sample includes a small proportion (13%) of women.

The present report, in providing a preliminary review of survey findings covering selected key topics, follows the overall sequence and stmcture of the three field data collection forms. Thus, a review of basic sample landing site features (Section 2) in terms of population and settlement, infrastructure, and service availability precedes descriptive accounts of the sample fisher and post-harvest populations (Sections 3 and 4 respectively) in terms of respondent background characteristics, fishing-related enterprise, and views on sector problems and prospects.

## 5.2 Principal Findings

#### Local fishing villages

- 1) It was not possible to collect systematic information on sample site population sizes, but it is apparent that site-associated *quartiers* and towns range from a few hundred to scores of thousands of inhabitants.
- 2) Three of the five sample sites register an increase in overall population compared with the situation five years ago, a trend that is attributed to displacement of people from other locations due to civil unrest. The net loss of population reported at the other two sites is also attributed to security problems.
- 3) Road access to sample sites is excellent, as all are served by the major highway that skirts the Burundi coastline of the lake.
- 4) There is relatively high level of infrastructural development in comparison to other national sectors of the lake. Most of the settlements monitored have basic medical facilities, primary and secondary schools, retailing establishments, and fishing gear/equipment supply and service agents.

#### Local fishers -- background characteristics

5) All respondents in the Burundi fisher sample are male. Traditional fishers and artisanal crew tend to be younger (almost half <30 years) than artisanal owners (majority >30 years).

- 6) Levels of formal education attainment are relatively low, with the vast majority of fishers in all categories not being in possession of a primary school leaving certificate.
- 7) Substantial majorities (>60%) of fisher respondents in all categories report being married and bearing responsibility for the welfare of one or more dependents.
- 8) Most traditional fishers and artisanal owners claim to be native-born residents of sample sites. Most artisanal crew report being born in some other location. Of those born elsewhere, a wish to return to 'original family place' tends to be cited as the motivation for migration to present place of residence.
- 9) Over 80% of respondents in all categories are involved with their fishing full-time, meaning that this is the activity that involves most working time per month.
- 10) At least half of the sample fishers in each category report a work history in the sector that extends for more than ten years.
- 11) Secondary employment most often takes the form of farming. Around 82% of artisanal owners and 65% of artisanal crew claim access to at least some land, as against only 40% for traditional fishers.
- 12) Indicative information on estimated monthly incomes suggests that artisanal fishers as a group outperform their traditional counterparts during 'good' months, and that artisanal owners also tend to outperform their crew members. During 'poor' seasons, differences in monthly income performances between the fisher categories are much less marked. Earnings even at the best of times are very modest overall, usually amounting to no more than a hundred dollars (US\$) per month.

#### Localfishers -- opinions/views on sector problems and prospects

- 13) Respondents overwhelmingly express a wish to continue in fishing, and for the most part say they want to remain at their present work venue.
- 14) Commitment to fishing is not especially reflected in patterns of stated preferences for use of a hypothetical one year's saved earnings. Artisanal owners mention fisheriesrelated investments more frequently than do artisanal crew and traditional fishers, but family welfare uses and business/shop and farming-related investments figure quite strongly as well.
- 15) Burundi sample fishers are moderately pessimistic about recent catch trends in the lake, but form no solid body of

opinion about prospects for the immediate future.

- 16) Respondents do not on the whole seem prepared to limit access to the lake's fish resources on a territorial or citizenship basis. Strong majorities in all fisher categories would allow people to fish outside of their home districts and even outside of their home countries.
- 17) Data on fisher respondents' views vis-à-vis possible ways to regulate participation in the fisheries or the use of certain fishing gear or methods show a moderate to strong reluctance to accept any measures that would:
  - a) limit access by season;
  - b) limit access by area;
  - c) limit access through operator quotas;
  - d) restrict mesh sizes for common net gear;
  - e) prohibit the use of beach seines or lift nets;
  - f) otherwise restrict the use of lift nets; or
  - g) prohibit the use of 'active' gillnetting.
- 18) On the other hand, there is strong agreement that restrictions ought to be placed on the use of industrial gear.
- 19) Less unanimity is found in response to propositions to impose minimum net mesh sizes in general, outright prohibition of industrial gear, and restrictions on the time and place of beach seine operations.
- 20) The principle that some kinds of regulation are in order seems to be generally accepted. There appears to be a certain measure of sentiment in favour of the idea that fishing rules 'should only be decided by the Government.'
- 21) With regard to possible fisheries enforcement mechanisms, sample fishers show strong solidarity in advocating that there should be:
  - a) more fisheries patrol boats;
  - b) more fisheries scouts;
  - c) punishment of fishers who violate regulations (fines, gear confiscation, and/or withdrawal of fishing permit); and
  - d) punishment of traders and consumers who violate regulations (fines, product confiscation, and/or withdrawal of trading permit).
- 22) Group opinion is generally against `more direct police involvement in fishery enforcement.'
- 23) On the question of identifying the most serious obstacles to their occupational success, a widely shared sense of frustration with gear problems (lack of availability or inadequate availability) is evident. Security problems (theft, raids by armed bands, harassment by military personnel, etc.) is also commonly mentioned, especially amongst artisanal owners.

#### Local fish processors and traders -background characteristics

- 24) The gender balance of the post-harvest sample weighs heavily in favour of men, who make up 87% of the total group.
- 25) Respondents tend to be over thirty years of age and only around 20% claim to have a primary school leaving certificate.
- 26) Data on marital status and dependents confirm the postharvest sample as a group of mature individuals with spouse and family obligations.
- 27) Most post-harvest group respondents are native-born residents of sample sites. Of the 42% born elsewhere, leading reasons given for migration to present place of residence are 'search for better conditions' and 'search for fishing/fish trading opportunities.'
- 28) Over 90% of respondents claim to be involved in fish processing/trading on a 'full-time' basis, in the sense that this is the activity that takes up most working time per month. More than 60% of respondents claim to have more than 10 years of work experience in the fish business.
- 29) Most processors/traders report having secondary employment in some aspect of fishing (as crew or gear/equipment owners) or in farming. Over 6 in 10 respondents report ownership of at least some land.
- 30) Reported monthly income levels are relatively low. Respondents mostly earn the equivalent of US\$50 or less during 'good' periods, and US\$ 20 or less during 'poor' periods.

# Localfish processors and traders -- opinions/views on sector problems and prospects

- 31) Post-harvest group respondents are very inclined to continue with their present line of work, and usually claim a preference to continue operating out of their present locations.
- 32) Commitment to fisheries work is further reflected in patterns of stated preferences for use of a hypothetical one year's saved earnings, with a majority of informants mentioning fishing- or fish processing/trading-related investment themes as a first order preference.
- 33) Post-harvest sample operators are substantially (88%) of the opinion that catches have declined from the time they first became involved in the fish business.
- 34) A slight majority of processors/traders is of the opinion that catches will increase within the near future, mostly on the basis of expectations that security restrictions on

fishing activity will be eased.

- 35) Burundi post-harvest respondents are strongly supportive of open access when responding to propositions about who should be allowed to exploit the lake's fish resources.
- 36) Processor/trader majority opinion tends against measures which would impose:
  - a) closed fishing seasons;
  - b) closed fishing areas;
  - c) restrictions on numbers of fishers allowed to operate;
  - any prohibition or other restriction on beach seine operations; or
  - e) any prohibition or other restriction on lift net operations.
- 37) As for other possible measures, a slight to moderate majority of processors/traders favour minimum net mesh sizes and restriction or outright prohibition of industrial gear operations.
- 38) The post-harvest sample group appears solidly behind the idea that fishing rules 'should only be decided by the Government.'
- 39) With regard to possible fisheries enforcement mechanisms, post-harvest operators generally advocate arrangements that would entail:
  - a) more fisheries patrol boats;
  - b) more fisheries scouts;
  - c) more direct police involvement in enforcement;
  - d) punishment of fishers who violate regulations (fines, gear confiscation, and/or withdrawal of fishing permit); and
  - e) punishment of traders and consumers who violate regulations (fines, product confiscation, and/or withdrawal of trading permit).
- 40) Responses to a query on most serious obstacles to occupational success indicate that problems associated with low catches and profit levels (e.g. 'poor supplies of fish,' 'high prices of fish,' 'low income,' 'overfishing,' and 'catching ofjuvenile fish') are dominant worries within the postharvest group overall, followed by concerns over 'security problems' (theft, civil unrest, harassment by authorities, etc.).

#### 5.3 Final Observations

The national data sets generated through the three survey forms are very large and contain a wealth of detail that simply could not be dealt with at present due to constraints of time. More comprehensive analytical treatment is certainly warranted, in order both to probe further into the selected key topics covered in the respective country reviews and to extend investigation into other critical areas. In this connection, it should be noted that the complete data sets (including original questionnaire forms submitted by the field team) for all four lacustrine countries are deposited as part of permanent LTR archives in the project Documentation Centre at regional headquarters in Bujumbura. Furthermore, arrangements are being made through the LTR sub-stations to ensure that a copy of each national set is available at the relevant counterpart agency office (DoF/Bujumbura, Burundi; CRH Uvira, DRC; TAFIRI/Kigoma, Tanzania; and DoF/Mpulungu, Zambia).

In the case of Burundi in particular, it would be a useful exercise to examine the fisher and post-harvest group sample data in greater depth against the background of the earlier studies of the country's small-scale fisheries conducted under the auspices of the Fisheries Statistics and Information Project (PNUD/FAO/BDI/002; see Bellemans 1991a, 1991b; 1991c) and the Regional Project for Inland Fisheries Planning (IFIP -- RAF/87/099; see Bellemans 1991d; Horemans 1992; Leendertse and Bellemans 1991; Leendertse and Gréboval 1993).

The 1991 IFIP report (Leendertse and Bellemans 1991) is of special relevance because, like the present LTR exercise, it was part of a larger lakewide socio-economic survey of small-scale fisheries within the four national sectors of Lake Tanganyika. It should be borne in mind however that the LTR survey was not intended simply to replicate the earlier survey. The IFIIP survey concentrated especially on characteristics of gear and fishing unit operations, equipment kits, and personal backgrounds of sample fishers. A considerable body of descriptive material was thereby produced on boat and gear types, engines, replacement and maintenance costs, details of fishing operations, etc., as well as an extensive collection of biodata on fisher sample respondents (employment histories, family situation, ownership of productive assets, farming activities, etc.). Whilst many of these topical areas were covered in greater or lesser detail in the LTR survey interview forms for fishers (Form 2) and processors/traders (Form 3 -- see Reynolds and Paffen, 1997b), the basic intention was to use personal history and occupational data along with information collected on local community features (Form 1) to set out a general context within which respondents' opinions and views on sector problems and prospects -- with all their implications for fisheries planning and management concerns -- could be appreciated.

The IFIP survey of Burundi artisanal and traditional fisheries in the lake also dealt to some extent with local perceptions of sector problems and prospects, and care was taken in designing the LTR individual interview forms to create as much overlap as possible between the two surveys in addressing these particular questions. Preliminary review suggests that the earlier IFIP findings on fishers' commitment to present occupation -- i.e., that most would choose to stay in fishing work -- are corroborated by the present survey. On the other hand, whereas the IFIP findings suggested that investment preferences were weighed rather heavily in favour of fishing gear and equipment purposes, the present investigation reveals that family welfare-, business-, or farming-related purposes are accorded equal if not higher priority. Also, whereas the IFIP study indicated that outboard engine costs and lack of availability were viewed as major operational constraints, along with low and irregular catches, LTR findings indicate that local fishers now feel more hampered by problems of gear supply, either because it is extremely limited or lacking altogether. Furthermore, and given events of the last five or six years not surprisingly, the security situation on the lake is far more worrisome and threatening to fishers along the Burundi coast than was previously the case.

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#### ANNEX 1

#### ADDITIONAL STATISTICAL TABLES -- BURUNDI FISHER SAMPLE

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Yes' %	63.0	57.3	46.7
'No' %	37.0	40.6	50.0
'No opinion' %	0.0	2.1	3.3
Total %	100.0	100.0	100.0
Report cases (n = 153)	27	96	30
Missing cases	1	1	0

Table A1.1View on allowing everyone to fish everywhere in lake, sample respondents by type of fishery and<br/>fisher category, Burundi

# Table A1.2 View on allowing people to fish outside own district, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Yes' %	71.4	77.1	73.3
'No' %	25.0	22.9	26.7
'No opinion' %	3.6	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 154)	28	96	30
Missing cases	0	1	0

 Table A1.3
 View on allowing people to fish outside own country, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Yes' %	71.4	71.6	73.3
'No' %	28.6	27.4	26.7
'No opinion' %	0.0	1.1	0.0
<b>Total %</b>	100.0	100.0	100.0
<b>Report cases</b> (n = 153)	28	95	30
Missing cases	0	2	0

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Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
<b>'Yes'</b> %	53.6	58.1	48.3
'No' %	42.9	39.8	44.8
'No opinion' %	3.6	2.2	6.9
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 150)$	28	93	29
Missing cases	0	4	1

Table A1.4View on always enough fish for everybody in future, sample respondents by type of fishery and<br/>fisher category, Burundi

Table A1.5 View on closed seasons/times, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	44.4	26.1	30.0
'Disagree' %	55.6	73.9	70.0
'No opinion' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 149)	27	92	30
Missing cases	1	5	0

Table A1.6 View on closed areas/places, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	37.0	21.5	24.1
'Disagree' %	63.0	78.5	69.0
'No opinion' %	0.0	0.0	6.9
Total %	100.0	100.0	100.0
Report cases (n =149)	27	93	29
Missing cases	1	4	1

Response	Artis	Artisanal	
	Owner	Crew	(Owner+Crew)
'Agree' %	3.6	10.5	10.0
'Disagree' %	96.4	89.5	90.0
'No opinion' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 153)$	28	95	30
Missing cases	0	2	0

 Table A1.7
 View on restriction of numbers of fishers, sample respondents by type of fishery and fisher category, Burundi

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 Table A1.8
 View on restriction of mesh sizes, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	59.3	59.1	46.7
'Disagree' %	37.0	39.8	46.7
'No opinion' %	3.7	1.1	6.6
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 150)$	27	93	30
Missing cases	1	4	0

Table A1.9View on restriction for gillnet mesh size, sample respondents by type of fishery and fisher category,<br/>Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	40.7	47.9	33.3
'Disagree' %	55.6	52.1	63.4
'No opinion' %	3.7	0.0	3.3
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 151)$	27	94	30
Missing cases	1	3	0

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew
'Agree' %	37.0	44.7	30.0
'Disagree' %	59.3	54.3	66.7
'No opinion' %	3.7	1.1	3.3
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 151)	27	94	30
Missing cases	1	3	0

Table A1.10 View on restriction for beach seine mesh size, sample respondents by type of fishery and fisher category, Burundi

Table A1.11 View on restriction for lift net mesh size, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	33.3	38.3	23.3
'Disagree' %	63.0	61.7	73.3
'No opinion' %	3.7	0.0	3.4
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 151)	27	94	30
Missing cases	1	3	0

 

 Table A1.12 View on restriction for industrial gear, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	65.4	73.1	72.4
'Disagree' %	23.1	26.9	27.6
'No opinion' %	11.5	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 148)	26	93	29
Missing cases	2	4	1

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	37.0	53.7	50.0
'Disagree' %	59.3	45.3	50.0
'No opinion' %	3.7	1.1	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 152)$	27	95	30
Missing cases	1	2	0

 

 Table A1.13 View on prohibition for industrial gear, sample respondents by type of fishery and fisher category, Burundi

Table A1.14 View on restrictions for beach seines, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	51.9	36.5	23.3
'Disagree' %	44.4	62.5	73.3
'No opinion' %	3.7	1.0	3.4
<b>Total %</b>	100.0	100.0	100.0
<b>Report cases</b> $(n = 153)$	27	96	30
Missing cases	1	1	0

Table A1.15 View on prohibition for beach seines, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	18.5	12.5	6.7
'Disagree' %	81.5	87.5	90.0
'No opinion' %	0.0	0.0	3.3
<b>Total %</b>	100.0	100.0	100.0
<b>Report cases</b> (n = 153)	27	96	30
Missing cases	1	1	0

Response	Artisanal		Traditional
	Owner	Crew	(Owner+Crew)
'Agree' %	40.7	29.2	20.0
'Disagree' %	59.3	69.8	80.0
'No opinion' %	0.0	1.0	0.0
Total %	100.0	100.0	100,0
<b>Report cases</b> (n = 153)	27	96	30
Missing cases	1	1	0

Table A1.16 View on restrictions for lift nets, sample respondents by type of fishery and fisher category, Burundi

Table A1.17 View on prohibition for lift nets, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
•	Owner	Crew	(Owner+Crew)
'Agree' %	11.1	7.3	3.4
'Disagree' %	88.9	92.7	96.6
'No opinion' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 153)	27	96	30
Missing cases	1	1	0

 

 Table A1.18 View on prohibition for 'katuli' fishing, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
-	Owner	Crew	(Owner+Crew)
'Agree' %	15.4	16.3	16.0
'Disagree' %	84.6	83.7	84.0
'No opinion' %	0.0	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 143)$	26	92	25
Missing cases	2	5	5

Response	Artisanal		Traditional
-	Owner	Crew	(Owner+Crew)
'Yes' %	71.4	93.7	93.2
'No' %	28.6	5.3	3.4
No opinion' %	0.0	1.1	3.4
<b>Total %</b>	100.0	100.0	100.0
<b>Report cases</b> $(n = 152)$	28	95	29
Missing cases	0	2	1

Table A1.19 View on fishing restrictions only to be decided by government, sample respondents by type of fishery and fisher category, Burundi

Table A1.20 View on 'should be more patrol boats,' respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
-	Owner	Crew	(Owner+Crew)
'Agree' %	89.3	76.8	76.7
'Disagree' %	10.7	23.2	23.3
'No opinion' %	0.00	0.0	0.0
Total %	100.00	100.0	100.0
<b>Report cases</b> $(n = 153)$	28	95	30
Missing cases	0	2	0

Table A1.21 View on 'more fishery scouts for enforcement,' respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional	
-	Owner	Crew	(Owner+Crew)	
'Agree' %	73.0	89.4	90.0	
'Disagree' %	27.0	10.6	10.0	
'No opinion' %	0.0	0.0	0.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> $(n = 152)$	28	94	30	
Missing cases	0	3	0	

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Response	Artisanal		Traditional
_	Owner	Crew	(Owner+Crew
'Agree' %	39.3	44.7	46.7
'Disagree' %	60.7	53.2	50.0
'No opinion' %	0.0	2.1	3.3
Total %	100.0	100.0	100.0
<b>Report cases</b> $(n = 152)$	28	94	30
Missing cases	0	3	0

 Table A1.22 View on 'involve police more directly in fishery enforcement,' respondents by type of fishery and fisher category, Burundi

Table A1.23 View on 'punish offending fishers,' respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional	
	Owner	Crew	(Owner+Crew)	
'Agree' %	82.1	77.9	80.0	
'Disagree' %	17.9	20.0	20.0	
'No opinion' %	0.0	2.1	0.0	
<b>Total %</b>	100.0	100.0	100.0	
<b>Report cases</b> $(n = 153)$	28	95	30	
Missing cases	0	2	0	

 

 Table A1.24 View on 'punish offending traders/consumers,' respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional
-	Owner	Crew	(Owner+Crew)
'Agree' %	96.4	96.8	96.6
'Disagree' %	0.0	3.2	3.4
'No opinion' %	3.6	0.0	0.0
Total %	100.0	100.0	100.0
<b>Report cases</b> (n = 152)	28	94	30
Missing cases	0	3	0

#### ANNEX 2

## ADDITIONAL STATISTICAL TABLES -- BURUNDI POST-HARVEST SAMPLE

1 abic A2.1			espondents, Burunul
	Response	Totals	
	'Yes' %	72.6	
	'No' %	25.8	
	'No opinion' %	1.6	
	Total %	100.0	
	<b>Report cases</b> (N =)	62	

Table A2.1 View on allowing everyone to fish everywhere in lake, post-harvest sample respondents, Burundi

Table A2.2 View on allowing people to fish outside own district, post-harvest sample respondents, Burundi

Response	Totals
'Yes' %	88.7
'No' %	9.7
'No opinion' %	1.6
Total %	100.0
Report cases (N =)	62

Table A2.3 View on allowing people to fish outside own country, post-harvest sample respondents, Burundi

Response	Totals
'Yes' %	82.3
'No' %	16.1
'No opinion' %	1.6
Total %	100.0
Report cases (N =)	62
Response	Totals
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'Yes' %	59.7
'No' %	30.6
'No opinion' %	9.7
Total %	100.0
Report cases (N =)	62

Table A2.4 View on always enough fish for everybody in future, post-harvest sample respondents, Burundi

Table A2.5	View on closed	seasons/times,	post-harvest sam	ple res	pondents,	Burundi
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Response	Totals
'Agree' %	1 <b>9.4</b>
'Disagree' %	75.8
'No opinion' %	4.8
Total %	100.0
Report cases (N =)	62

## Table A2.6 View on closed areas/places, post-harvest sample respondents, Burundi

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Response	Totals
'Agree' %	17.7
'Disagree' %	77.4
'No opinion' %	4.9
Total %	100.0
Report cases (N =)	62

# Table A2.7 View on restriction of numbers of fishers, post-harvest sample respondents, Burundi

Response	Totals
'Agree' %	1 <b>6</b> .1
'Disagree' %	80.6
'No opinion' %	3.3
Total %	100.0
<b>Report cases</b> (N =)	62

#### **ANNEX 1**

#### ADDITIONAL STATISTICAL TABLES -- BURUNDI FISHER SAMPLE

Response	Artisanal		Traditional	
-	Owner	Crew	(Owner+Crew)	
'Yes' %	63.0	57.3	46.7	
'No' %	37.0	40.6	50.0	
'No opinion' %	0.0	2.1	3.3	
Total %	100.0	100.0	100.0	
Report cases (n = 153)	27	96	30	
Missing cases	1	1	0	

Table A1.1View on allowing everyone to fish everywhere in lake, sample respondents by type of fishery and<br/>fisher category, Burundi

# Table A1.2 View on allowing people to fish outside own district, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional	
-	Owner	Crew	(Owner+Crew)	
'Yes' %	71.4	77.1	73.3	
'No' %	25.0	22.9	26.7	
'No opinion' %	3.6	0.0	0.0	
Total %	100.0	100.0	100.0	
<b>Report cases</b> (n = 154)	28	96	30	
Missing cases	0	1	0	

 Table A1.3
 View on allowing people to fish outside own country, sample respondents by type of fishery and fisher category, Burundi

Response	Artisanal		Traditional	
-	Owner	Crew	(Owner+Crew)	
'Yes' %	71.4	71.6	73.3	
'No' %	28.6	27.4	26.7	
'No opinion' %	0.0	1.1	0.0	
<b>Total %</b>	100.0	100.0	100.0	
<b>Report cases</b> (n = 153)	28	95	30	
Missing cases	0	2	0	

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Response	Totals
'Agree' %	0.0
'Disagree' %	88.7
'No opinion' %	11.3
Total %	100.0
Report cases (N =)	62

Table A2.12 View on prohibition for beach seines, post-harvest sample respondents, Burundi

Table A2.13 View on restrictions for lift nets, post-harvest sample respondents, Burundi

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Response	Totals
'Agree' %	19.4
'Disagree' %	69.4
'No opinion' %	11.2
Total %	100.0
Report cases (N =)	62

#### Table A2.14 View on prohibition for lift nets, post-harvest sample respondents, Burundi

Response	Totals
'Agree' %	0.0
'Disagree' %	88.7
'No opinion' %	11.3
Total %	100.0
Report cases (N =)	62

#### Table A2.15 View on fishing restrictions only to be decided by government, post-harvest sample respondents, Burundi

Response	Totals
'Yes' %	83.9
'No' %	12.9
'No opinion' %	3.2
Total %	100.0
Report cases (N =)	62

Response	Totals
'Agree' %	62.9
'Disagree' %	27.4
'No opinion' %	9.7
Total %	100.0
Report cases (N =)	62

## Table A2.16 View on 'should be more patrol boats,' post-harvest respondents, Burundi

### Table A2.17 View on 'more fishery scouts for enforcement,' post-harvest respondents, Burundi

Response	Totals
'Agree' %	88.7
'Disagree' %	4.8
'No opinion' %	6.5
Total %	100.0
Report cases (N =)	62

## Table A2.18 View on 'involve police more directly in fishery enforcement,' post-harvest respondents, Burundi

Response	Totals
'Agree' %	56.5
'Disagree' %	35.5
'No opinion' %	8.0
Total %	100.0
Report cases (N =)	62

## Table A2.19 View on 'punish offending fishers,' post-harvest respondents, Burundi

Response	Totals
'Agree' %	95.2
'Disagree' %	3.2
'No opinion' %	1.6
Total %	100.0
Report cases (N =)	62

Response	Totals	
'Agree' %	95.2	
'Disagree' %	3.2	
'No opinion' %	1.6	
Total %	100.0	
Report cases (N =)	62	

# Table A2.20 View on 'punish offending traders/consumers,' post-harvest respondents, Burundi