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UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA
Joint ECA/FAO Agricultural Division

REPORT ON AN ADVISORY MISSION TO BURUNDI
ON MEASURES FOR IMPROVING THE DESIGN AND IMPACT
OF ARTISANAL FISHERIES DEVELOPMENT PROJECT

Addis Ababa
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INTRODUCTION

During the period October 6 to 14 1990, a mission was undertaken to Burundi by the Regional Adviser in Food and Agricultural Policy and Planning of the Joint ECA/FAO Agriculture Division of the United Nations Economic Commission for Africa (ECA). The mission was undertaken following the receipt by ECA of a request from the Government of Burundi for advisory assistance on measures for improving the design and effectiveness of artisanal fisheries development projects in the country. The mission was then carried out and advisory service provided in conformity with Programme Element 2.1 (i)(c) of the approved United Nations Regular Programme of Technical Cooperation (Section 24) for the 1990-1991 Biennium which calls for advisory services to member countries of the Gisenyi - based Multi-lateral Programming Center (MULPOC) on measures for developing the fisheries sector in the region at the national and sub-regional levels.

II. MISSION ACTIVITIES

The objectives of the mission included the following:

- (1) To assess the performance of the several artisanal fisheries development projects in Burundi (both on-going and abandoned).
- (2) To assess how the projects have effected the artisanal fishermen in the country with a view to identifying both the "success" and "failure" aspects of the projects with regards their relevance and desirability for the artisanal fishermen.
- (3) To assess how the projects have succeeded or floundered in their intended efforts to benefit the artisanal fishermen and make them more self-reliant.
- (4) To propose measures that should be taken into account in the design and implementation of future artisanal fisheries development projects in the country and in the sub-region.

The activities undertaken during the mission included the following:

- (1) Consultation with officials of the relevant government ministries and agencies, projects, donor community and bilateral agencies on the artisanal fisheries development situation in the country;

- (2) Review of the operation of both on-going and abandoned artisanal fisheries development projects in the country;
- (3) After mission assessment, meetings with senior government officials to report the highlights of the mission findings and obtain guidance on the development of ideas to be recommended to the government.

A list of the persons met during the mission is attached to this report as an annex. During the mission, several trips were undertaken to selected Fisheries Development Centres and Fisheries Development Stations in the country to obtain a first hand familiarity with artisanal fisheries development activities. During these trips discussions were held with Fisheries Officials in the field as well as with the artisanal fishermen themselves. Visits were also made to fish markets both in the villages and in the urban centres.

III. MISSION FINDING

Burundi which became independent in July 1962 is ranked as Africa's 13th poorest country with an estimated Gross National Product (GNP) per capita in 1982 of US\$ 240.00. The economy of the country is almost entirely based on agriculture. With a total land area of 27,834 Km² and a population (1988) of 5,153,000, Burundi is one of the continent's most densely populated countries. The country has few natural resources and is constrained by weak infrastructures. The management and planning of the economy by the government is therefore influenced by the predominance of agriculture, the high population density, weakness of infrastructures and low state revenue base.

The most important food crops in the country are cassava, bananas sweet potatoes, pulses, beans, maize and sorghum. Most of these crops are produced largely by subsistence oriented farmers. Cash crops, the most important of which are coffee, cotton, palm oil, pyrethrum, and tobacco, are also grown by peasant farmers on small family owned plots. Livestock in the country include cattle, sheep and goats raised by traditional herdsmen using traditional methods. Most of the fishing in the country takes place in Lake Tanganika where clupeoid fishes, in particular, Stolothrissa tanganyicae (ndagala) and Limnothrissa miodon and Percoid fishes, in particular Lates Luciolates strappersii (Mukeke) are the main species caught.

The government places a high priority on the reduction of protein energy malnutrition (PEM) which is estimated to have been increasing steadily over the last 10 years. The fisheries resources of the country are expected to play an important role in increasing the level of protein intake of the population. As a result, the government, with the assistance of the World Bank, initiated a major artisanal fisheries development project in the

country in 1985. This project which was expected to improve artisanal fisheries production in the country, increase the level of protein supply, and improve the wellbeing of the artisanal fishermen has largely floundered and has been abandoned without achieving most of its objectives. The main reason for the failure of this project is because it was ill conceived, poorly planned, and poorly executed.

IV. MISSION RECOMMENDATIONS

The mission concluded that there is still considerable potential for increasing artisanal fisheries production in the country which needs to be fully tapped in order to meet the protein needs of the country. To accomplish this objective, the mission made the following recommendations:

- (1) The development of artisanal fishing should now be the focus of the fisheries development strategy of the country. There is however need for the government to assess the needs and objectives of the artisanal fisheries sub-sector of the country. There is no doubt that there is development potential of this sub-sector in a number of directions. However, before this potential can be effectively exploited, a realistic assessment of all aspects of artisanal fisheries production, processing, and distribution should be undertaken.
- (2) Socio-cultural variables are important factors affecting the attitude of fishermen to new innovations associated with artisanal fisheries development projects and these variables must be taken into account in the design and implementation of future artisanal fisheries development projects in the country.
- (3) All development activities of future artisanal development projects should be bottom - up rather than being introduced from the top down in ways which are incompatible with existing conditions and circumstances facing the artisanal fishermen.
- (4) The provision of credit will continue to be an important component of any effective artisanal fisheries development project in the country. However, the effectiveness with which the credit system is organized and managed will determine the success not only of the credit system itself, but also of the entire project. The government should therefore pay particular attention to the organization and management

of the credit component of future artisanal
fisheries development projects in the country.

A report has been prepared and sent to the Government of Burundi which attempts to transform the above recommendations into measures that should be adopted by the government in the future design and implementation of artisanal fisheries development projects in the country. A copy of the report is attached to this report as an annex.

REPORT TO THE GOVERNMENT OF BURUNDI
ON MEASURES FOR IMPROVING THE DESIGN AND
IMPACT OF ARTISANAL FISHERIES DEVELOPMENT
PROJECTS IN THE COUNTRY

is Ababa
October, 1990

I. BACKGROUND

Burundi gained independence on July 1 1962 after having been administered by Belgium as part of the United Nations trust territory of Rwanda-Urundi for 42 years. The country has a total land area of 27,834 Km² and a water area of 2,150 Km². With a total population estimated at 5.15 million in 1988, the country has one of the highest population density in Africa. The population is projected to be growing at an average annual rate of 3.1 percent which means that, if present trends continue, the total population will be almost 8 million by the year 2000.

The GNP per caput was estimated at \$240 in 1986 which makes the country the 13th poorest country in Africa. Life expectancy at birth was estimated at 48 years in 1986, 47 years for men and 50 years for women. According to recent estimates, 60 percent of Burundians of primary school age were enrolled in 1989 while about 8 percent of those of secondary school age were enrolled in secondary schools. Less than two percent of those of University age had university education available to them.

Agriculture is the principal activity of the Burundi economy. The principal objective of the Burundi government is to develop the agricultural sector to enable it keep pace with the food requirements of its rapidly growing population, to increase the production of export crops as a means of earning foreign exchange, and to increase the incomes of farmers, livestock herders and fishermen, so that the country's rural sector can be modernized and developed.

The performance of the agriculture sector, has, however, been unable to keep pace with the rate of growth of the population. During the last 15 years agricultural production grew at an average annual rate of about 1.0 per cent as compared with 2.7 per cent for the population. During the period, the level of food imports increased at an average annual rate of 10 per cent comprising mostly wheat, dairy products and vegetable oils. The government is greatly concerned about these trends and is aware that significant changes must occur in the agricultural sector if the trends are to be reversed.

Crops Production

Crops production in Burundi is carried out mostly by small-scale farmers with an average farm size of 0.8 hectares. Their agricultural productivity is low, soil fertility is declining rapidly and the use of modern inputs is minimal. Their farming systems comprises many crops and are oriented primarily towards satisfying household requirements. As population pressure has mounted, farming is increasingly moving into marginal lands resulting in lower yields and increasing incidences of land degradation.

The most important export crop is coffee accounting for about 85 per cent of the country's foreign exchange earnings; other export crops include tea and cotton.

The government has so far pursued a project by project approach to agricultural development, but is now concerned that this strategy may be diffusing contradictory messages to the same farmers, thus, resulting in low rates of adoption of new technologies. The government is aware of the wide variety of ecological conditions and cropping systems in the country and the need to generate and adapt agricultural technologies to these conditions and systems.

Options currently being considered for increasing food and agricultural production in the country include:

- (1) Bringing cultivable land into production including hillsides and swamps: Special emphasis is being placed on bringing available land in the eastern parts of the country into cultivation.
- (2) Intensification of agricultural production at the peasant level: This would involve the conduct of agricultural research aimed at introducing new technologies, diffusing the use of new inputs, and providing infrastructural support in the form of credit, markets, etc.
- (3) Achieving regional specialization as a means of maximizing production on the basis of ecological zones.

Livestock Production

In 1987 the livestock herd in Burundi included 360,000 cattle, 390,000 sheeps, and 865,000 goats. Although, the country has a long livestock raising tradition, the production and availability of livestock products in the country is relatively low compared to its animal protein needs. The current average consumption levels of livestock and livestock products has been estimated at 3.3 litres of milk and 3.0kg of meat per inhabitant per year. The trends indicate that livestock production and, hence, consumption is likely to decrease in the future as a result of expected decrease in pasture areas brought about by increasing pressures on cultivatable land.

Current government policy is to develop livestock farming in the country along more efficient lines and to encourage research directed at improving livestock health and their integration into the overall agricultural production system.

Fisheries Production

Annual fish production has declined steeply from its 1976 level when it peaked at 20,000 tonnes in 1976. By 1984 it had fallen to 5,770 tonnes and since then has stagnated between 5,000 and 6,000 tonnes. An indication of the level of fish production in Burundi between 1979 and 1988 is given in Table 1. In describing fish production in Burundi, a distinction is usually made between traditional, artisanal and industrial production as indicated in Table 1.

Table 1. Fish Production in Burundi, 1979 - 1988 (kg.)

Year	Artisanal Fisheries	Traditional Fisheries	Industrial Fisheries	Total
1979	2.543.314	218.785	4.739.700	7.501.799
1980	4.261.481	116.252	6.205.580	10.583.31
1981	2.726.000	43.467	4.118.550	6.888.198
1982	4.461.044	28.620	3.640.910	8.130.574
1983	3.149.217	17.720	3.202.840	6.369.777
1984	2.287.861	28.701	3.453.580	5.770.142
1985	2.287.861	85.859	2.600.850	5.369.334
1986	4.175.953	124.757	2.333.150	6.633.860
1987	2.924.655	120.782	1.825.160	5.870.597
1988	4.945.976	185.638	1.545.054	6.676.668

Source: Annual Report 1988. Fisheries Department, Burundi.

The country currently faces inadequate supplies of animal protein for its inhabitants, a situation which is further aggravated by serious regional disparities in the distribution of available supplies. The contributions of the various food groups to the protein availability in the country is presented in Table 2.

Table 2. Contribution of Food Groups to Protein Supply
in Burundi (1982)

Food Group	<u>Contribution to Protein Supply</u>	
	Weight (gm)	Percent
Food Crops	60.72	91.0
Livestock	3.02	4.5
Fisheries	1.77	2.6
Net Importation	1.24	1.9
TOTAL	66.75	100.0

Source: National Agricultural Plan, 1982.

While the total protein available for consumption as indicated in Table 2 above appears adequate, the extremely low contribution of animal protein to the available supply in the face of regional disparities in absolute consumption levels, suggest the need for increased availability of animal protein. Although fish production in Burundi has stagnated or even declined during most of the last decade, it is of great importance in the country's economy. With increasing pressure on the land resources of the country and the attendant limitations on the availability of grazing lands for livestock, fish is bound to replace livestock as the main source of animal protein in the country. The average per caput supply of fish for direct human consumption was estimated by the FAO to be 1.3 Kg per head in 1980. This figure, however, conceals the wide regional disparity in fish consumption in the country. It is also estimated that in the 1989, the number of people in Burundi for whom fishing was a primary activity was around 4,000 while the number of people for whom it was a secondary activity was about 8,000. This represents a significant proportion of the economically active population.

II. THE FISHERIES SECTOR

Water Resources and Stocks

Burundi has a total water area of over, 2000 Km² of which Lake Tanganika contributes the overwhelming area. Table 3 provides an indication of the six lakes which comprise most of the water area of the country.

Table 3. Characteristics of the Lakes of Burundi

Lake	Altitude (meters)	Total Area (Km ²)	Area in Burundi (Km ²)	Potential Production Tonne
Tanganika	775	32,600.0	2,282.0	20,000 to 30,000
Rweru	1,324	102.0	80.0	600 to 800
Cohoba	1,351	85.5	61.3	400 to 650
Kanzigiri	1,324	7.5	7.5	56 to 75
Rwihinda	1,330	3.4	3.4	19 to 25
Gacamirinda	1,310	2.5	2.5	34 to 42
Total		32,800.9	2,364.4	21,169 to 21,564

Source: Adapted from ECA, Developpement Integre de l'Industrie de la pêche dans la CEPGL: Etude de Prefactibilite, JEFAD/APISS/87/11, May 1987.

In addition to those listed in Table 3 above there are a few other insignificant bodies of water in the country such as Narungazi, Gitamo, and Nwungere. Most of the country's fish catch, however, comes from Lake Tanganika although the fish production potential of Lake Rweru and Lake Cohoba are also significant. The analysis of the fisheries industry in this section will therefore be concerned mostly with the fishing activities around Lake Tanganika although reference will be made from time to time to the fisheries activities around the other northern lakes, particularly Lakes Rweru and Cohoba.

The fish stock in Lake Tanganika is highly differentiated comprising a large number of endemic species due largely to the isolation of the lake from neighboring river and lake systems. The principal resource of the lake are found in the pelagic zone with the small clupeoid fishes representing the main fish caught. The most commercially important of this pelagic fish community consists of the two planktonivorous clupeids, Stolothrissa tanganicae and Limnothrissa miodon, which are locally known as "Ndagala" and the percoid fishes, Lates (Luciolates) Strappersii known locally as "Muokeke" and three other Late Species, Lates mariea and Lates angustifons, known locally as "Sangala".

The most commercially important species in the lake is Stolothrissa tanganicae which grows rapidly but has a short life-cycle averaging only 12 months. Stolothrissa alternates in

abundance with its major predator, Lates (luciolates), whose young ones (under 130 mm), are caught together with the "ndagala". The abundance of the "ndagala" and "mukeke" stocks fluctuates considerably with cycles lasting between 6 and 8 years. A very marked seasonal pattern in the abundance of the stocks is also reported with a minimal biomass in May-July and a maximum between July and December. This variation has been attributed to the hydrobiological regime of the lake.

Unlike Stolothrissa tanganicae, the other important clupeid specie, Limnothrissa miodon, is found more in-shore. This specie has a life - span slightly longer than that of the Stolothrissa tanganice and a maximum length of 75 mm.

The percoid fishes are pelagic and their abundance also varies with the seasons with a peak in December - June. From a length of 130 mm, these percoid fishes become totally piscivorous and feed almost entirely on the Stolothrissa tanganicae. Their life cycle are said to vary from 5 to 10 years and they are known to attain a maximum length of about 450 mm.

Lakes Rweru and Cohoha as well as the other three lakes in the north of the country (Kazigiri, Rwihinda, and Gacamirinda) are part of the Nile Basin.

It has been reported that there are about 18 different species of fish in Lake Rweru out of which 12 have traditionally existed in the lake while six were introduced. Lake Cohoha, on the other hand, is said to contain a total of 14 different fish species of which nine were originally indigenous to the lake. A number of hybrides are also known to have evolved in both lakes.

The most important fishes commercially in the lakes include Clarias gariepinus, Clarias liocephalus, Oreochromis nitolicus, Oreochromis machrochir, as well as various hybrids of these fishes. During the 1960's both lakes also contained sizeable quantities of the tilapia species, Tilapia nilotica, Tilapia varabilis, and Tilapia esculenta. Today, most of the tilapia have virtually disappeared from the lakes. Of the two lakes, lake Rweru is said to be more productive with her shallow waters and connection with the Kagera providing conducive breeding grounds for the Clarias gariepinus. Both lakes appear to have been heavily overfished.

Fisheries Technology

Three types of fishery technologies can be identified in Burundi in describing the fishing methods used in Lake Tanganika: traditional, artisanal, and industrial. Most of the fishing activities is however based on light attraction techniques at night. The most common light source is the kerosine powered pressure lamps.

Traditional Fishery

The traditional method of fishing in Lake Tanganika is carried out with rudimentary dugout canoes with the fishermen using mostly large scoopnets, known locally as lusenga, as well as beach seines, gillnets, and handline. In the early 1960's it was estimated that there were over 700 traditional fishing units operating in the lake. During the mid-sixties and 1970's these units were gradually replaced by catamarans (the preferred method of fishing by the artisanal fishermen which involves the use of two canoes joined together and using a liftnet). By 1982 only 40 traditional fishing units were registered. There is, however, evidence to suggest that the sector is slowly recovering as over ninety units were registered in 1988 with an estimated landing of over 180 tonnes.

The traditional method of fishing used in the other northern lakes involve the use of gillnets, seines, traps and handlines.

Artisanal Fishery

The preferred method of fishing of the artisanal fishermen is with catamarans, made of two wooden boats joined together and manned by a crew of four to six fishermen. This fishing method which was first introduced in Burundi, in the 1950's is usually employed by the artisanal fishermen within five kilometres offshore. The boats are mostly paddled to and from the fishing area although there is now increasing use of outboard motors and larger nets.

It has been estimated that in 1989 there were about 700 catamarans being operated in the artisanal sector and the number of fishing units involved in artisanal fisheries is said to be growing at an average annual rate of about 5 per cent although there has been a reduction in fish catch and, hence, revenue per unit. The average catch of these units is said to be in the neighbourhood of 15 to 20 tonnes per year.

Industrial Fishing

Industrial fishing was introduced in Lake Tanganika by Greek group of fishermen in the 1950's and the ex-patriate Greeks in Burundi still dominate the industry today. In 1989 industrial fishing in the Burundi part of the lake consisted of 17 units. Each unit comprise a vessel 12 to 15 metre long powered by an inboard diesel motor, a non-powered skiff to assist in setting and hauling the net, and three to six small light-attraction boats carrying kerosene lamps.

These boats which are supposed to operate at least 5 km offshore by regulation have been experiencing a steady decline in their fish catch. The average catch per vessel is said to have

decreased from 400 tonnes in the mid 1920's to 200 tonnes in 1981. Today, the average annual catch is estimated by the Greek proprietors of the vessels to be about 80 tonnes per vessel, although some officials in Bujumbura consider this figure to be an under-estimation of the true situation.

There is however no doubt that the importance of the industrial sector in the fishing industry of Burundi has been declining steadily over the years in contrast to the development of artisanal fishing. There are many reasons for this decline. Firstly, in the face of limited stocks of fish in the lake, more fish capture by the artisanal fishermen has meant less capture by the industrial fishing units. Secondly, because the fixed and operating costs of fishing of artisanal fishery are much less than those of industrial fishery, the artisanal fishermen have been able to produce and sell their fish at a much cheaper rate. Not being able to increase their prices of fish sufficiently enough to cover their higher cost, more and more industrial fishermen have been going out of business. The situation has not been made any better for these group of fishermen by the scarcity of foreign exchange in the country and the explicit imposition of taxation on their fishing revenues.

The Potential of Artisanal Fisheries

There is no doubt that Lake Tanganika fisheries makes an important contribution to the economy of Burundi not only as a source of much needed animal protein but also as a provider of much needed employment. The other northern lakes in the country, although small by comparison, also compliment the role of the big lake in this regard.

Over the years artisanal fishery has contributed significantly to the two important national objectives of improving the animal protein intake of the population and increasing employment and the incomes of the country's peasants. The contribution of artisanal fishery to these two national objectives has increased significantly during the last decade and is likely to increase even more dramatically in the future as the role and importance of industrial fishing in the country's economy continue their downward trend.

Most artisanal fishermen in the country are peasant farmers who allocate a portion of their time to fishing activities. A total of about 6000 artisanal fishermen operate out of Lake Tanganika on this basis. The total number of artisanal fishermen operating out of the other two important northern lakes are estimated at 500 and 200 respectively for Lake Cohoha and Rweru respectively.

These artisanal fishermen engage in peak fishing during the most favourable fishing period of the year. During the low fishing period, most of them occupy themselves in other agricultural activities. Because of the relatively low investment levels required in the sector and the relatively high revenues accruable from fishing, artisanal fishing continues to be attractive to increasing numbers of peasant farmers. These artisanal fishermen are said to be among the highest income earners in the rural areas of the country.

III. CONSTRAINTS IN THE ARTISANAL FISHERIES SECTOR

As the importance and the role of the industrial fishing sector in the fishing industry in Burundi has waned over the last few years, so has the importance of the artisanal fisheries sector increased. It is therefore obvious that artisanal fisheries is going to play an increasingly important role in the food economy of the country not only because of its potential contribution to the animal protein needs of the country but also because of its potential employment impact in terms of fishermen, processors and traders. It, however, seems unlikely that artisanal fisheries, given the constraints currently facing the sector, can increase its landings dramatically enough to meet the needs of the countries unless efforts are made to remove these constraint that presently restrict the growth of artisanal fisheries and would most likely inhibit any sustainable development of the sector in the future.

These constraints include the following:

- (1) Limitations in the fishing gear and technology used by the artisanal fishermen;
- (2) Inadequate marketing and processing facilities;
- (3) Ineffective fisheries extension services; and
- (4) Socio-economic constraints resulting from the perception of the people of the role of fishing in their society.

These constraints are discussed in detail in the rest of this section.

Artisanal Fisheries Technology

At present, artisanal fishermen concentrate their efforts mostly in exploiting the "ndagala" resources of the lake whose stock fluctuates significantly resulting in large variation in their prices and in the incomes received by the fishermen. The lack of variety in the method used to catch the "ndagala" and the limited efficiency of the nets used have prevented the optimum

exploitation of predator stocks in the lakes such as the Luciolates and the non-exploitation of some other important fish species.

There will therefore be need not only to increase the number and types of boats used in the lake in order to meet the enlarged requirements of an increased fleet of artisanal fishermen but also to improve and diversify the fishing techniques used in the sector. In this regard, improved and better designed boats would be needed to permit the artisanal fishermen to have easier access to more abundant and more varied fish stocks off-shore. There will also be need for the introduction of suitable low cost fishing gear which the artisanal fishermen can adopt on a permanent and long term basis. In summary, concerted efforts must be made to identify improved fishing technologies that exploit local resources while at the same time improving the operational efficiency of the artisanal fleet.

Fish Marketing and Processing

Bujumbura is the focal point for the marketing of fish in Burundi. By law, the industrial units operating in Lake Tanganika have to sell their entire catch in the capital city's central market. Because of its size and the higher purchasing power in the city, a large proportion of the catch of the artisanal fishermen are also sold in the Bujumbura market. The fish catch of the artisanal fishermen is usually sold to fish mongers directly at the landing sites who, in turn, transport the fresh fish by bicycles or pick-up trucks to the nearby village markets or to the central market in Bujumbura.

Fish consumption is also relatively high in a few other towns in the interior of the country such as Gitega, Ngozi, Cibitoke, Bubanza and Kayanza where the purchasing power of the inhabitants is high due to their engagement in the production of cash crops such as coffee and cotton.

While there does not appear to be any prejudice against the eating of fish in any part of the country, poor communication linkages with the higher regions in the interior of the country, which are densely populated but whose inhabitants are scattered around the hill-sides, and whose purchasing power is relatively low, have prevented these regions from having access to fish in both its fresh and preserved form.

The fish processing facilities are quite rudimentary. A number of the landing sites were installed with facilities for sun-drying, smoking, salting, and packaging but many of these facilities are now in a state of disrepair while others are not being fully utilized because of their poor condition.

Presently, most of the catch of the artisanal fleet is sun-dried, generally on the ground. This form of treatment permits one to three months of preservation. A number of innovations in sun-drying the "Ndagala" have been tried including the use raised metal and cement platforms. The high costs involved in the construction of these platforms together with their limited availability, have prevented their widespread use, leaving sun-drying in the sand as the preferred means of drying of the catch of the artisanal fleet. Consequently, there is still significant wastage and losses particularly during the raining season, when production is at its peak. There is, therefore no doubt that an improved system of conservation and treatment of the species of fish involved here would not only permit increased availability of the fish and reduction of loss, it would also permit the expansion of the distribution zone of the fish.

Another method of preserving certain species of fish caught in Burundi is by smoking. The most commonly smoked species is the Lates (Luciolates) stappersii. Various smoking methods are used depending on the species, the condition of the fish, and the location of the smoking system. The efficiency of most of the smoking systems is quite low as a result of inefficient use of scarce firewood and poor heat and smoke distribution. Furthermore, spoilage of smoked fish after the fish has been packed for storage is quite common. There is, therefore, need for more efficient oven designs.

Fisheries Extension services

The fisheries extension services are poorly organized. In addition to inadequacies in the number of extension staff available, their roles and functions are not properly defined. The few extension officials found in the landing sites appear to concern themselves solely with the collection and transfer of fisheries data to the fisheries department in Bujumbura. Furthermore, these extension officers have little or no equipment and themselves lack adequate training to function as useful extension agents. There is therefore need for the improvement of the existing extension services in terms of staff and equipment as a key to steady improvements in artisanal fisheries in the country.

The Socio-economic System

The socio-economic system in which the artisanal fishermen operate could also pose a serious constraint to the steady and sustainable development of the sector unless the system is understood and accommodated in all efforts at developing the sector.

Artisanal fishing is a relatively new economic activity in the socio-economic environment of Burundi. In the past most of the fishing in the Lake was carried out by foreigners, mostly fishermen from Zaire. Some socio-economic considerations of relevance to the development of artisanal fisheries in Burundi include the following:

- (1) The fact that as a result of their historical background, the fishermen may place fishing at a lower status level vis-a-vis other agricultural and rural activities as a means of promoting the welfare of their families or that of their communities.
- (2) The fact that artisanal fisheries production has been irregular depending on the agricultural calendar with the artisanal fishermen allocating time to fishing when it is most feasible to do so.
- (3) The fact that fisheries revenues are only partly reinvested in the fisheries sector with most of the revenues being used in other sectors and activities.

These consideration notwithstanding, the fact that fishing in Burundi is relatively highly profitable means that the Government is likely to see more and more transformation of Burundi farmers into artisanal fishermen. However, for this transformation to take place in an effective and sustainable manner, any artisanal fisheries development programme must address the socio-economic issues raised above.

IV. ARTISANAL FISHERIES DEVELOPMENT IN BURUNDI

The basic strategy for the development of fisheries in Burundi was put into place in the 1960's immediately after the country's independence. The primary focus of this strategy was to exploit, in an organized manner, the resources of the lakes in the country with particular emphasis, as would be expected on the resources of Lake Tanganika. In this regard, the stated policy was to promote and develop the artisanal fisheries industry. The country's fisheries development strategy and policies were supported, starting in the early 1970's, by several forms of external assistance of which the most important are a World Campaign Against Hunger project initiated in 1970 and a traditional fisheries development project funded by the UNDP but implemented by the FAO in 1972.

After that, government interventions aimed at developing artisanal fisheries intensified culminating in the most all encompassing artisanal fisheries development project in the country. This was a World Bank supported fisheries development project funded by both the World Bank and funds from Abu Dhabi as a follow up to the earlier FAO artisanal fisheries development project. The project resulted in the creation of a parastatal organization, Société d'usines de poissons du Burundi (SUPOBU) with the aim of improving artisanal fisheries production and marketing in the country by:

- (1) constructing fish development stations and centres along the lake;
- (2) providing credit for the purchase of fishing gear and equipment; and
- (3) providing training and extension to artisanal fishermen.

To achieve these objectives SUPOBU supplied fishing gear and credit facilities and helped with boat-building and the construction of fish-processing facilities on the main landing sites along the lake. Within a few years it became clear that SUPOBU could not support itself and its activities. It operated at a deficit for several years, lost World Bank support in 1983 and was dissolved in 1987. The fish stations and centres are now mostly in a state of disrepair although, some of the property and assets of SUPOBU which were transferred to the Service des Pêches, are now rented out to private fishermen and traders.

The general consensus is that the performance of the project was less than satisfactory. Since the demise of this major artisanal fisheries development project, a number of new fisheries projects have been initiated. A number of others are also being contemplated for the future. But as the Director of the Department of Fisheries and Forestry concluded at a Fisheries Seminar held in Bujumbura in February 1988, what is essential for fisheries development in Burundi is not to have a large number of projects per se, but to follow an effective fisheries development strategy and to implement consistent fisheries development policies.

It is obvious that there were many reasons for the lack of satisfactory performance by the artisanal fisheries development projects which have been implemented in Burundi. In order to avoid the same problems that these projects have encountered in the past and to achieve a sustained and sustainable development of artisanal fisheries in the country, there is an urgent need to carefully examine the performance of past and ongoing fisheries projects in the country within the socio-economic context of the fishermen who

participate in the activities of the projects and in the framework of national development objectives.

In the next section of this report, a number of recommendations on how this exercise could be successfully carried out are provided.

V. CONCLUSIONS AND RECOMMENDATION

There is no doubt that the fisheries sector is of considerable importance to the food economy of Burundi. The number of fishermen, processors and traders involved in the sector and the value of national income generated also demonstrates the importance of the sector to the financial economy of the country.

The animal protein intake by the population is now relatively low compared to recommended levels. With rising population levels, increasing pressures on land and a limited amount of exploitable resources, the fisheries resources of Burundi would become indispensable for the maintenance of the present relatively low level of animal protein consumption in the country in the future. The role and importance of the sector becomes even more obvious if one considers the fish requirements of the country if recommended levels of animal protein consumption were to be met. For example, it has been estimated the country would need to produce about 44,000 tonnes of fish per year to meet the animal protein requirements of the country by the year 2000. This figure takes into consideration the contribution that the livestock sector is expected to make to the animal protein availability.

What this scenario suggests is that fisheries activities would have to be significantly increased during the coming years if the current and anticipated animal protein availability gap is to be bridged. The resource estimate of the lakes in the country generally suggested by the biologists are 20,000 tonnes per year from Lake Tanganyika and about 2000 tonnes a year from the other northern lakes including aquaculture. To fully exploit these resources would require an ambitious fisheries development effort in which artisanal fisheries would play a pivotal role. In fact, there has been a resurgence in artisanal fishing activities in the country during the last decade and the sector is estimated to be growing at an average annual rate of about five percent.

Although government policies and interventions have resulted in the design and implementation of several fisheries projects in the country during the last decade, very few of these projects have produced satisfactory results. The government is now quite concerned about the inability of most of these projects to address their stated objectives and is desirous of a more effective fisheries development strategy for the country.

In this concluding section of the report a number of recommendations are provided that should guide the design and implementation of artisanal fisheries development in the future in order to achieve sustained and sustainable fisheries development in the country. The recommendations presented below are, therefore, made for this purpose.

(1) The Need for Clear Artisanal Fisheries Development Objectives

One of the important reasons for the unsatisfactory performance of fisheries development projects in Burundi is the very vague way in which the many goals of the fisheries development effort were specified and the absence of any indication of the priorities attached to each goal. Most of the projects were preoccupied with the techniques of increasing fish production and distribution at the expense of the wider and more important socio-cultural aspects of fisheries development in the country.

The two basic questions concerning artisanal fisheries development in the country are whether the thrust of the development effort should be directed mainly at assisting the artisanal fishermen and their communities or at managing the resources of the lakes. No doubt both objectives are valid and desirable. There is, however, no guarantee that the attainment of both would be initially complementary. If government concern is to help the artisanal fisheries community improve upon their economic condition, then the project objectives would emphasize the welfare of the artisanal fishing community, increasing employment in the community, reforming the behaviour of the community and ensuring that the majority of the members of the community participated fully in the activities of the project. On the other hand, if the goal of the government is to optimally manage the resources of the lakes of the country, then the objectives of the projects should emphasize goals such as the optimum production of fish, and the conservation of the resources of the lakes.

There would also be need to prioritize the goals of the projects so that consistent decisions can be taken by the project managers in the event of incompatibility among the various goals. In any case, whatever goals are formulated should be desirable to the beneficiaries of the project and, more importantly, should be realistic and achievable.

There is therefore need for the government to articulate or reformulate its artisanal fisheries development policy objectives to guide the formulation and implementation of future artisanal fisheries development projects in the country.

The Need for Appropriate Improved Artisanal Fisheries Technology

There is no doubt that the fish production technology currently used by artisanal fishermen in Burundi would need to be improved if they are to be able to increase their fish catch significantly to meet the country's increased animal protein requirements from fish source. The numbers and types of boats used by the fishermen would need to be increased and their design improved.

The large number of abandoned machinery and equipment associated with previous artisanal fisheries development projects in the country suggests that improved artisanal fisheries technology cannot be introduced successfully in a vacuum. Whenever this has been done the intended beneficiaries have either been unable or unwilling to adopt it on a sustainable basis.

The technologies and techniques that are currently preferred by the fishermen have evolved over time. Any new innovations must therefore, be appropriate and their use must be coordinated with the conditions necessary for their success. Most importantly, however, is the fact that, for the innovation to be successful, the fishing community must feel responsible for it. Obviously the choice of any new technology or technique must be based on how well it fits with the resources of the lakes in the country.

Need for Improved Support Services

It will serve little purpose if artisanal fishing methods are improved without providing the support services to enable the fishermen to fully exploit the benefits of these improved methods. To have access to the improved methods, they must also have easy access to funds. If the funds that they require for this purpose are to be readily available, there would be need for an efficient and sustainable credit system capable of handling loan applications, loan disbursements, and repayments. Most of the artisanal fisheries development projects floundered in the past because of the lack of an appropriate and effective organizational arrangement to handle the credit needs of the fishermen. There is therefore need to evolve an effective credit system as a precondition for the implementation of any new artisanal fisheries development project. Such a system should not only be economically sound but should be based on the socio-economic realities of the fishing community.

There will also be need for improved marketing and processing arrangements so as to provide abundant fish at reasonable prices to the consumers and maximum income to the artisanal fishermen. An important issue here is the role and functions of the

middlemen/fish traders vis-a-vis the fishermen. It should be understood that the potential role of the middlemen/fish trader in artisanal fisheries development projects could range from a beneficial to a disadvantageous one for the fishermen with many variations inbetween. In the past, when these middlemen have been by-passed by project activities, the projects have ran into serious difficulties. The hostile attitude held by many government officials and fisheries authority towards these people should be reconsidered. There is need to investigate the fish marketing chains and channels in the country to identify the margins of profits which characterize the various links where services are provided and to identify excessive earnings, if any, so that proposed project activities can be tailored accordingly.

With regards extension services, any new artisanal fisheries development project must improve upon the existing fisheries extension services in the country both in terms of staff and equipment. Without an improved extension service which can effectively disseminate information to artisanal fishermen on improved methods of fish production, handling, marketing, processing and distribution, project objectives wether aimed at the amelioration of the incomes and conditions of the fishermen or on the exploitation and conservation of the resources, would fail to achieve their intended objectives. Such an extension system must also contain built-in feed back mechanisms so that the views and reactions of the fishermen can be relayed back to project officials for their further action.

The Need for New Projects to Pay More Attention to the Socio-cultural Context of the Development Effort

Earlier in this report the importance of socio-cultural considerations in the performance of fisheries development projects in Burundi were highlighted. For example, the part time nature of artisanal fishing in Burundi is well recognized, yet almost all the past artisanal fisheries development projects appeared to have been designed principally to help full-time fishermen. This preoccupation with full-time fishermen is understandable in view of the need for regular loan repayments of project credit through steady fish production. Yet the engagement in non-fishing activities by fishermen often reflects an ability to maximize security and income in the face of the risks and uncertainties inherent in the industry.

The relation between the new technologies and techniques being introduced and the social organization of the artisanal fishermen in the country should provide the essential context for the conceptualization of new artisanal fisheries project ideas and the design and implementation of project activities. A good knowledge of the complex relationship between the fish and the people who

catch it for a living is required in order to sensitize project designers and officials to the implications and effects of changing fishing technologies and institutions on existing socio-cultural interactions.

Concluding Remarks

A comprehensive approach to artisanal fisheries development is needed in Burundi. A number of artisanal fisheries development projects have been initiated in the country in the last decade and a few more are being contemplated in the future. The fact is that past projects have not produced very satisfactory results. What the country needs is not more but better artisanal fisheries development projects in the future.

The recommendations made above are intended to serve as the first step towards more effective artisanal fisheries development project design and implementation. This report is intended basically to sensitize fisheries officials in Burundi to the need for better conceived and operationally sound artisanal fisheries development projects. The report is, therefore, intended to highlight the critical issues which must be considered in the design of artisanal fisheries development projects in the future.

A more detailed exercise would, however, be needed to formulate the plans and programmes that would be required to solve the fisheries problems discussed in this report and to operationalize the recommendations made. A project proposal for a more in-depth analysis resulting which will result in the formulation of a programme and plan for artisanal fisheries development in Burundi is attached to this report as an appendix.

Appendix I

PROJECT PROPOSAL

Assistance to the Government of Burundi

Title: The Formulation of a Plan and Programme for the
Development of Artisanal Fisheries in Burundi

Government Cooperating Agency Department of Water, Fish, and
Pisciculture, Ministry of
Tourism and the Environment

Project Cost: US\$ 50,000.00

Duration: 3 months

Background and Justification

The current animal protein intake in Burundi is well below recommended levels. With rising population levels, increasing pressures on land and a limited amount of exploitable resources, the fisheries sector in Burundi would have to play an important role in bridging the country's animal protein gap. What this means is that fisheries activities in the country would have to be significantly increased during the coming years. This would require a comprehensive fisheries development effort in the country in which the artisanal fisheries sector would play an important role.

Consequently, new artisanal fisheries development projects would be needed. The fact, however, is that the performance of past artisanal fisheries development projects in the country has been less than satisfactory. Quite often, these projects have preoccupied themselves with innovations involving techniques of fish production at the expense of wider and more important socio-cultural issues. Their activities have tended to centre around the introduction of innovations such as new boats and equipment at the expense of more relevant issues such as how the volume of fish should be best enlarged and how project activities to this effect could be kept sustainable.

Although all the projects were based on detailed feasibility studies, these studies did not address the desirability of the project goals and activities and failed to take into consideration important issues concerning the choice of technology, the sustainability of support services and the socio-cultural context

in which the projects were expected to operate. Hence, the lack of success of these projects and the absence of impact on the fishing community.

The design of future artisanal fisheries projects in Burundi would be better served by desirability studies as opposed to feasibility studies. This project is meant to undertake such a study for Burundi.

Objectives of the Project Development Objectives

The development objectives of the project are as follows:

- (1) To improve the availability of animal protein from fish source in the country.
- (2) To achieve improved levels of incomes of artisanal fishermen and to improve the welfare of the fishing community.
- (3) To attain increased levels of food availability, nutritional status and standard of living for the population of the country.

Immediate Objectives

The immediate objectives of the project are to

- (1) Assist the government in articulating and reformulating their artisanal fisheries development objectives with a view to facilitating the government's ability to screen their broad aims for the artisanal fisheries sector into clear and prioritized objectives.
- (2) Prepare an artisanal fisheries development plan for the country which takes into account the institutional and socio-cultural context of the artisanal fisheries community which will guide the design of future artisanal development projects in the country.

Results Expected

The project will assist in the creation of an operational framework capable of guiding artisanal development project designers on the proper mix of technical and social goals to include in their project design and the needed trade offs between increased technological efficiency and social considerations in

project implementation. The project will permit the formulation of an artisanal fisheries development plan for the country based on the actual circumstances and perceptions of those most directly concerned - artisanal fishermen, middlemen, retailers, consumers, and others who benefit from the fishery and its products. This way, the intended beneficiaries of future artisanal fisheries development projects are likely to feel responsible for making these project succeed; a factor which is indispensable for project success.

Major Activities

The major activities of the project will include the following:

- (1) A three month consultancy by an agricultural economist with a sociological background doing field investigations in the fishing communities in Burundi.
- (2) Review of the operation of both on-going and abandoned artisanal fisheries development projects with particular attention to their impact.
- (3) The conduct of desirability studies on various components of artisanal fisheries development projects.
- (4) The formulation of a comprehensive fisheries development plan.

Estimated cost

- Personnel	US\$
* One consultant for three men-months	14,000.00
* One local Assistant	6,000.00
- Perdiem for consultant	10,000.00
- Perdiem for local Assistant	3,000.00
- Duty Travel	10,000.00
- Analysis and Preparation of report	4,000.00
- Miscellaneous	3,000.00

TOTAL	50,000.00

LIST OF PEOPLE MET

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Charge de Programme
Représentation de la FAO
3. Gorges W. Esentongo
Fishery Biologist
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6. Mr. Sylvestre Bambara
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