5 COST ESTIMATION

Based on the conditions explained above, a summary of the costs for each priority programme is listed below. The total Master Plan cost based on FY2001 cost is estimated at about US$ 21,970,000, of which 68 percent or US$ 15,040,000 will be invested in facilities and equipment and the remaining US$ 6,930,000 will be used to cover the cost of experts, consultants, hired labour, training and operation.

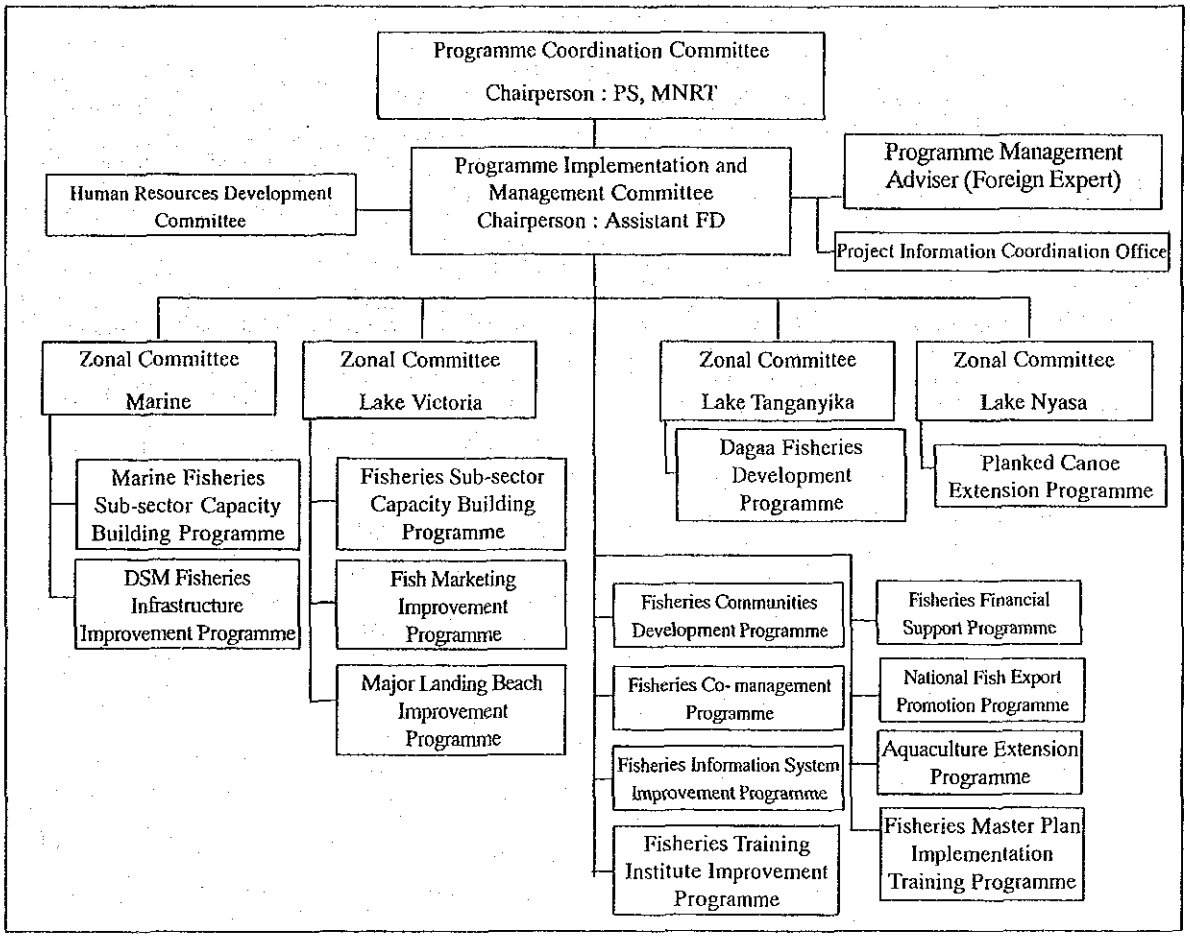
Estimated Cost for Priority Programmes

Priority Programmes	Cost (Tsh.)	Cost (US$)
Marine Fisheries Sub-sector Capacity Building Programme	2,602,099,308	2,970,433
Dar es Salaam Fisheries Infrastructure Improvement Programme	3,184,199,556	3,634,931
Lake Victoria Fisheries Sub-sector Capacity Building Programme	221,415,132	252,757
LakeVictoria Fish Marketing Improvement Programme	5,105,518,092	5,828,217
Lake Tanganyika Dagaa Fisheries Development Programme	116,437,044	132,919
Lake Nyasa Planked Canue Extension Programme	123,177,864	140,614
Aquaculture Extension Programme	548,025,600	625,600
Fisheries Finacial Support Programme	1,073,100,000	1,225,000
Fisheries Co-management Programme	730,058,400	833,400
National Fish Export Promotion Programme	516,840,000	590,000
Lake Victoria Major Landing Beach Improvement Programme	1,620,187,404	1,849,529
Fisheries Communities Development Programme	509,019,948	581,073
Fisheries Information System Improvement Programme	449,819,868	513,493
Fisheries Training Institute Improvement Programme	2,315,034,108	2,642,733
Fisheries Master Plan Implementation Training Programme	126,408,552	144,302
Grand Total	19,241,340,876	21,965,001

6. IMPLEMENTATION PLAN

6.1 Implementation Structure

The implementing agency of the Master Plan is the Ministry of Natural Resources and Tourism, and the Fisheries Division will be the focal centre that will be responsible for the implementation and the budget of the projects. To efficiently implement the Master Plan, a Programme Coordination Committee will be installed as an executive body and it will be responsible for supervising the implementation of the projects. In addition, a Programme Implementation and Management Committee will be formed, responsible for establishing the priority standing of all the programmes and specific management policies. Under this committee, zonal committees at major water bodies will be set up that will be responsible for coordinating the priority projects with other regional development plans at the regional/district level.



Organizational Chart of the Priority Programme Implementing Bodies

6.3 Implementation Schedule

6.3.1 Criteria for Programme Implementation Priority

Due to the diverse development needs of the vast land area of Tanzania, the priority programmes will serve as trial development models. Therefore, implementing the programmes in phases will enable the

programme to be reviewed to obtain feedback on each programme's impact and the lessons that were learned. Practically implementing the programme according to the regional characteristics will be efficiently economical both in terms of time and funds. The following four criteria were used to determine the priority standing of the 15 programmes that will be implemented under the Master Plan.

(a) Efficiency
Number of beneficiaries, degree of the participation of the fishers, apply of appropriate technology, effective coordination with other project

(b) Programme Impact
Social and economic benefit, the ripple effect

(c) Management and Operations Capabilities
Sustainability, support from Government, donors, NGO, etc.

(d) Impartial Fishery Development Input

6.3.2 Implementation Schedule

[Short-term Programmes: 2002 to 2004]

The implementation period of the Master Plan will be for ten years starting in 2002/2003. In the initial year 2002, the Programme Coordination Committee and Programme Implementation and Management Committee will be created and preparations to implement the programmes will begin. The short-term programmes will begin in 2002 and end in 2004. A detailed implementation plan and required budgetary measures will be made for each programme. Technical assistance will be provided at this time for programme implementation, schedule coordination, and negotiations with donors and a foreign technical advisor will be dispatched. At the field level, the district fisheries officers will organize the basic data on fishers, fishing boat registrations, and organizations that will be needed to implement the programmes. A workshop for fishers and private companies will be implemented in each region to promote understanding about the Master Plan.

[Medium to Long-term Programmes: 2005 to 2010]

An interim evaluation will be made on the impact and conditions pertaining to the programme's implementation for short-term programmes. Based on the lessons that were learned, the implementation period for the remaining programmes will be re-reviewed.

Implementation Schedule of Priority Programmes

		Short Term			Med Term			Long Term			
		2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12
	Establishment of Programme Coordination and Programme Implementation & Management Committee										
Mid Term Evaluation											
Monitoring											
1	Marine Fisheries Sub-sector Capacity Building Programme		Phase I		Evaluation	Phase II					
2	DSM Fisheries Infrastructure Improvement Programme	Pre-survey and planning for the new FD's office									
3	Lake Victoria Fisheries Sub-sector Capacity Building Programme										
4	Lake Victoria Fish Marketing Improvement Programme										
5	Lake Tanganyika Dagaa Fisheries Development Programme		Phase I		Evaluation	Phase II					
6	Lake Nyasa Planked Canoe Extension Programme										
7	Aquaculture Extension Programme										
8	Fisheries Financial Support Programme					Phase I			Phase II		
9	Fisheries Co- management Programme										
10	National Fish Export Promotion Programme										
11	Lake Victoria Major Landing Beach Improvement Programme										
12	Fishing Communities Development Programme										
13	Fisheries Information System Improvement Programme					Continuous update of data collection system					
14	Fisheries Training Institute Improvement Programme										
15	Fisheries Master Plan Implementation Training Programme										

Construction Component

7 EVALUATION

7.1 Socio-economic Benefit

It is considered that the lower awareness or self-reliant nature of the fishers and dysfunctional institutional system which supports fishers, particularly cooperatives, are part of the reasons for reduced efficiency and effectiveness of the previous fisheries development projects in Tanzania. The benefits that will be derived from this Master Plan, which focuses on the capacity building of the fisheries sector, are mainly socio-economic, and it will not necessarily produce quantitative economic impact. The overall benefits that will be achieved by the Master Plan are explained below.

(1) Increased Fisher Income and Mobilisation of the Fishers Community Economy

Developing cooperative activities by organizing the marketing activities of fisheries production will improve production efficiency, expand the distribution market, and increase fisher income (Priority Programmes 1 and 11). In addition, improvements in post harvest processing technology will increase the value added of fishery products, which will in turn, raise the income of processors (Priority Programmes 4, 5, 10). Increased fisher income will improve the purchasing power of the fishers and mobilize the economic activities of the fisher communities.

(2) Effective Use of Resources and Increased Food Supply

Due to inadequate scientific data on resources in Tanzania, fisheries exploitation effort must be carefully monitored. In view of the anticipated increase in fish demand in the next decade, the fishing pressure on fishing grounds is expected to increase. Under this Master Plan, the aim is to achieve the profitability of fishers using appropriate fisheries technology, while increasing fisheries production by distributing fishing pressure through diversification of the fishing grounds and other measures. In particular, organizing the fishers will not only achieve efficient production, but will enable the task of resource management and control to be implemented by the fishers in future.

To prevent the risk of overexploiting fishery resources through improved fishing technology, a plan to reduce post harvest losses (Priority Programme 5) and effectively utilize the fish remnants of processing factories will be developed (Priority Programme 4). The goal is to increase the food supply without increasing the burden on fishery resources. The programme on environmental education (Priority Programme 12) will raise fisher awareness about fisheries management and develop self-reliant fisheries management activities.

(3) Earning of Foreign Exchange and Provision of Employment

An increased supply of the Nile perch, which comprises 90 percent of the country's fisheries exports, is not expected due to limited resources. Therefore, a programme to develop a production base to produce a higher value added processed product using the same raw material will be implemented (Priority Programme 10), and an increase in export value is anticipated. Achieving a stable export industry will also lead to stable income and employment for artisanal fishers, whose existence is interdependent with the export processors (processing companies are legally prohibited from engaging in fishing activities and they are dependent on artisanal fishers for their raw supply). In addition, 15 percent of the financial source for the planned Fisheries Development Fund will stem from Nile perch export royalties. Therefore, a stable export industry will also benefit artisanal fishers through the Fisheries Development Fund.

(4) Expanding the Economic Activities of Women in Fisheries Communities

Fish processing is an important economic activity for women, and women groups have been given priority in the programmes that will provide supervision in improved processing technology. This will create economic opportunities for women and increase their income. In addition, the participation of

women in fisheries community development projects will strengthen their role and voice in the community (Priority Programmes 5, 9, 12).

(5) Mobilizing Organizations

In the Master Plan, the established fishery cooperatives in Dar es Salaam and Coast region will assist in developing a model cooperative (Priority Programme 1). The success of this pilot project will improve fisher's perception on old-style cooperatives, and mobilize local fisher group activities.

(6) Strengthen Regional Decentralization of the Fisheries Sector

The key to achieving successful regional decentralization is to implement direct measures to strengthen the capabilities of the government fisheries officers and to improve the self-reliance of the district fisheries administration (Priority Programmes 14, 15). The activities of the teams comprised of district fisheries officers, cooperative officers, and agricultural extension personnel are anticipated to promote the rational use of limited human resources and raise the districts' administrative capabilities (Priority Programmes 7, 9, 12).

(7) Achieving Impartial Development

The Master Plan has paid attention to the development of Lake Tanganyika and Lake Nyasa where there has been less investment, in contrast to the marine coast and Lake Victoria. The implementation of the programmes (Priority Programmes 5, 6) will benefit the livelihood of the local fishers where development has been relatively minimal and this will achieve equitable and fair development.

7.2 Environmental Evaluation

Of the above 15 Priority Programmes, only Priority Programmes 2, 4, and 11 have significant construction components. Programme 2 would require mandatory EIA (Environmental Impact Assessment) or an environmental consideration report. Priority Programmes 4 and 11 may or may not require EIA.

Priority Programme 14 which involves rehabilitation of existing Nyegezi Freshwater Fisheries Training Institute may or may not require EIA. As the rehabilitation will be at the same location as existing buildings, significant negative impacts is not expected on the natural environment. Priority Programme 6 is not a boat building project per se but rather a project to introduce Lake Nyasa Planked Canue Extension Programme, this project is not expected to have any significant impact on the environment and thus would not require an EIA.

The other programmes are mainly comprised of "soft" components, are not in the mandatory list, are not located in Environmentally Sensitive Areas, and not expected to impact significantly on the natural environment, therefore EIA would not to be required.

In this Master Plan, IEE was performed on Priority Programmes 2, 4, and 11 to identify possible significant impacts and to propose mitigation measures to lessen or avoid these impacts. Subsequently according to the NEMC (National Environment Management Council)'s screening procedure, if the programme is "Passed", the programme will be submitted for review and implementation. If the programme "Failed", the proponent or implementation body will then need to carry out an EIA and comply with the EIA Procedure.

The final decision on whether a project component will require an EIA or not, or a less stringent assessment report, will depend on NEMC's evaluation of the "Environmental Assessment Registration Forms" for the programme's components.

8 RECOMMENDATIONS

(1) Rapid Implementation of the Priority Programmes and Use of Foreign Experts

The Master Plan is comprised of 15 priority programmes and its diverse activities range from finances, providing technical support to local communities, to requesting financial assistance from international donors. The project covers four major water bodies in the country and its implementation is complex. Therefore, the implementation schedule of its many programmes and activities, and their progress must be accurately grasped. To accomplish this, the Fisheries Division, which is the main government body that will oversee the project, must swiftly establish a Project Implementation and Management Committee, enact appropriate budgetary measures, and officially request the cooperation of assistance institutions, and other measures to enable the programmes to be implemented fast. To facilitate the task of programme implementation and coordination, it is recommended that a foreign expert is dispatched and placed in the committee in view of the need for initial input from assistance institutions and the neutral position of such institutions.

(2) Early Establishment of the Fisheries Development Fund

To implement the Master Plan, it is important to secure a stable financial source; As this financial source, the Fisheries Development Fund that has been pursued under the new fisheries law, should be put into practice as soon as possible. Much of the initial investment that will be made for the priority programmes will be by donor countries and international institutions, but diverse financial sources must be procured to cover the increased operations and maintenance costs that will be incurred domestically. This will stabilize the finances of the programmes.

Presently, the provisions of the draft proposal of the Fisheries Development Fund has focused on developing the BMU and protecting fisheries resources. The financial source of the fund will stem from licensing fees (25%) and royalties (15%), and the scope of the fund is estimated at US$1,000,000. Since the financial source stems from taxes, it is appropriate and fair to allocate a fixed amount of the fund for environmental conservation at Lake Victoria. However, it is necessary to study the flexible and far-ranging use of these funds for artisanal fishers' education, for development of improved processing and marketing technology that effectively uses resources, and for micro projects that are needed to develop the fisheries communities.

(3) Publication of Annual Report on Fisheries to Promote Public Information

Due to structural reforms and regional decentralization measures that have been pursued by the central government to replace the traditional top-down administrative approach, the key to achieving successful public administration is to obtain the cooperation of the private sector and fishers. Therefore, all the programmes and projects pertaining to fisheries management, fisheries community development, and others that will be implemented under the Master Plan will include the participation of fisher organizations and private NGOs. Thus an important task is to cultivate the understanding of the participants and to evaluate and review their roles and activities.

Unfortunately, the information needed to promote the understanding and evaluation of fishery activities is generally managed by and limited to a few individuals, and public information is nonexistent. Presently, the dissemination of the Annual Report of the Fisheries Division is strongly recommended as a means of promoting the widespread understanding of fisheries development policies and their progress. Public information that is available nationwide is essential for the regional fisheries administration, which lacks parallel ties with other government bodies and institutions due to decentralization. In particular, the evaluation of current project policies improves effectiveness and efficiency, and plays an important role in improving administrative services despite limited financial sources. Therefore, it is recommended that a policy evaluation system that will provide public information is created in the Fisheries Division.

Since Tanzania's national policy and the assistance policies of donor countries have focused on

poverty eradication and the trend is for major sectors to converge on it, it is quite necessary to obtain the consent for the investment of the fisheries sector, even small sector. The Fisheries Division must therefore provide public information on the contribution of the sector to the national socio-economy.

(4) Integration of the Nyegezi Freshwater Fisheries Training Institute and the Mbegani Fisheries Development Centre

It is recommended that the Nyegezi Freshwater Fisheries Training Institute and the Mbegani Fisheries Development Centre be rationalized and integrated, in order to raise the impact of the educational and training activities. Since 99 percent of fisheries production in Tanzania is carried out by artisanal fishers, it is essential that the district fisheries officers and fisheries extension personnel, who are in charge of providing guidance for fishers, maintain an adequate level of technical expertise. In view of the number of government fisheries personnel available, it is irrational to maintain two independent training institutions. To raise the operations ratio of educational equipment and facilities that presently overlap, their common usage is recommended, excluding inland and marine fisheries related activities.

Since 80 percent of fishery production and 70 percent of the district fisheries personnel belong to inland districts, it is suitable that the functions of the Nyegezi Freshwater Fisheries Training Institute are upgraded. In particular, if regional cooperation between Kenya and Uganda, which both share the use of Lake Victoria, is expanded, the role of Nyegezi in educating the fishers and government fisheries officers will become important to promoting stable regional cooperation. Measures to strengthen the functions and the facilities and equipment of the Mbegani Fisheries Development Centre to provide services in the technical development of coastal fishers are recommended.

(5) Programme Implementation Based on a Sense of Responsibility and Self-reliance of the Beneficiaries

The fundamental objective of the programmes are to strengthen the capabilities of the district fisheries officers who provide direct guidance to the fishers. The aim is to foster self-reliant fisheries by fishers by effectively utilizing fishery production equipment and materials. However, the general perception of government support of fisheries remains tied to the free government services that were provided during the socialist era. Subsequently, many problems such as the lack of basic fisher understanding about fisheries management, the profitability of fisheries activities, and the lack of technical and basic capabilities exist. Therefore, workshops and other basic training activities will be held to promote the responsibility and role of the beneficiaries and to define their responsibilities prior to the start of the programmes and to acknowledge the importance of selecting fishers with a high sense of responsibility and capabilities.

(6) Suggestion for the Project Implementation from Financial Aspect

This Master Plan proposes programmes which consist of various factors. Though it has high economical benefits, its financial returns are low. Therefore, for the initiation of programmes, the establishment of the Fisheries Development Fund (FDF) from royalties and active commitment by the Fisheries Division in supporting fisheries development are necessary together with securing foreign aid.

Considering individual programmes, programmes which propose the construction of Kirumba market and renovation of Nyegezi Freshwater Fisheries Training Institute require high costs for not only construction but also its maintenance. Appropriate management on construction is necessary for keeping the cost to a minimum.

For fisheries financial support, the establishment of the financial foundation in districts and cooperatives for maximising their income is important. By doing so, reinforcement of cooperatives are to be expected which also reduces their dependency on NGOs and donors.

An appropriate evaluation should be carried out in order to adjust the project implementation for generating real economic benefits during their implementation period.

Main Report

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CHAPTER 3 PRIORITY PROGRAMMES

CHAPTER 4 COST ESTIMATION FOR PROGRAMMES

CHAPTER 5 IMPLEMENTATION PLAN

CHAPTER 6 EVALUATION

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Abbreviation

ALCOM	Aquaculture for Local Community Development Programme
BMU	Beach Management Unit
CIDA	Canadian International Development Agency
CRDB	Credit Rural and Development Bank
DC	District Commissioner
DED	District Executive Director
FD	Fisheries Division
DFO	District Fisheries Officer
DSM	Dar es Salaam
EAC	East African Communities
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EU	European Union
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organisation of the United Nations
FINNIDA	Finnish International Development Agency
FO	Fisheries Officer
FRP Boat	Fibre Reinforcement Plastic Boat
GDP	Gross Domestic Production
GPS	Global Positioning System
HACCP	Hazard Analysis Critical Control Point
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteers
LTR	Lake Tanganyika Research
LVEMP	Lake Victoria Environmental Management Project
LVFO	Lake Victoria Fisheries Organisation
LVFRP	Lake Victoria Fisheries Research Project
MNRT	Ministry of Natural Resources and Tourism
NGO	Non-Governmental Organisation
NIGP	National Income Generation Programme
NORAD	Norwegian Agency for Development Cooperation
OJT	On the Job Training
PRSP	Poverty Reduction Strategy Paper
RAS	Regional Administrative Secretary
RIPS	Regional Integrated Project Support
SACCOS	Savings and Credit Cooperative Societies
SADC	South African Development Community
SIDO	Small Industry Development Organization
TAFICO	Tanzania Fisheries Cooperation
TAFIRI	Tanzania Fisheries Research Institute
TCZCDP	Tanga Coastal Zone Conservation & Development Programme
THA	Tanzania Harbour Authority
TRA	Tanzania Revenue Authority
UNCDF	United Nations Capital Development Funds
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UNFPA	United Nations Population Fund
VETA	Vocational Education and Training Authority
WWF	World Wildlife Fund for Nature

Currency

Annual currency rate

	1995	1996	1997	1998	1999	2000	2001
1US$: Tsh.	574.8	580.0	612.1	664.7	744.8	800.44	876.62
1US$: ¥	94.1	108.8	121.0	130.9	113.9	107.06	118.33
¥1: Tsh.	6.11	5.33	5.06	5.08	6.54	7.48	7.41

Sources: The rates between US$ and Tsh. for 2000 and 2001 are referred from Bank of Tanzania.
The rate between US$ and ¥ is referred from IMF for 2000 and Bank of Japan for 2001.
The rests are referred from World Development Indicators.

General Socio-economic Information of the United Republic of Tanzania

General Information		
Area	945,087km^2 (land: 886,037 km^2, sea: 59,050 km^2)	The World Factbook 2000
Capital City	Dar es Salaam (Capital is now being shifted to Dodoma, yet it is still recognised as Dar es Salaam internationally)	The World Factbook 2000
Population	33.95 million (2000)	UNFPA
Pop. Growth Rate	2.4% (1999)	WDI database, April 2001
Life Expectancy	45 years old (1999)	WDI database, April 2001
Religion	Christianity 45%, Islam 35%, Traditional Religion 20%	The World Factbook 2000
Language	Swahili (mother language), English (official language)	MoFA HP
Illiteracy rate	Male : 16.0%, Female : 34.3% (1999)	WDI database, April 2001
Independence	1961 : the Republic of Tanganyika (Main Land) 1963 : the Republic of Zanzibar 1964 : *the United Republic of Tanzania*	MoFA HP
Political Information		
Gov. system	Republic	The World Factbook 2000
Head of State	President Benjamin William Mkapa, Re-elected in Dec. 2000	The World Factbook 2000
Parliament	Single-chamber System (5 year term), Parliament member : 295	MoFA HP
Government	1) Prime Minister: Frederick Tluway Sumaye 2) Foreign Minister : Jakaya Mrisho Kikwete	MoFA HP
Economic Information		
GDP	US$ 9.0 billion (2000)	WDI database, April 2001
Major Industry (GDP%)	Agriculture 45.1%, Manufacturing Industry 15.8%, Service 39.1% (2000)	WDI database, April 2001
GDP Growth Rate	5.2% (2000)	WDI database, April 2001
Inflation Rate	6.0% (2000)	WDI database, April 2001
GNP per Head	220 (1998)	World Bank
Currency	Tanzania Shillings (Tsh.)	
Economic Cooperation		
Major Donor Countries	UK 20.6%, Germany 14.2%, Japan 10.7%, the Netherlands 10.3%, Denmark 9.0% (1997)	MoFA HP
Aid from Japan	1) Loan assistance (until 1999, EN) 40.3 billion Yen 2) Grant aid (until 1999, EN) 107.9 billion Yen 3) Technical cooperation (until 1999, JICA) 43.2 billion Yen	MoFA HP

INTRODUCTION

INTRODUCTION

About Draft Final Report

In 1997, the Tanzanian Government established the 'National Fisheries Sector Policy and Strategy Statement 1997' as a basic policy for Fisheries Development. There, 18 policy statements and development issues are given. It is a national issue to promote sustainable development in fisheries, improve livelihood in fisheries villages, and secure stable food supply in future. On the other hand, through enforcement of HIPC (Heavily Indebted Poor Countries; HIPC)[i] initiative in Tanzania since the year 2000, the national target has been focused on poverty alleviation. With poverty alleviation as a common development goal, cross-sectoral strategies have been introduced. Additionally, decentralisation promotes fisheries resource development and fisheries management by regional government. It means fisheries administration from fishers' point of view is strongly required today. This Master Plan Study on Fisheries Development, considering these situations, prepared the Master Plan to consolidate and implement the national framework and policy statements for fisheries development.

This document was prepared as a draft final report through analysing data/ information obtained through document collection, interview surveys, and workshops between January and December 2001. The report presents development strategies and 15 priority programmes of the Master Plan.

The Master Plan Study on Fisheries Development in the United Republic of Tanzania was launched in January 2001 for an 18-month period (Jan. 2001-June 2002). The Study was executed by System Science Consultants Inc. (SSC) and Overseas Agro-Fisheries Consultants Co. Ltd. (OAFIC), with Fisheries Division of the Ministry of Natural Resources and Tourism as the national counterpart. It was funded by Japan International Cooperation Agency (JICA). The Study aimed to prepare the Fisheries Master Plan that will provide guidance on priority areas for sector development.

This draft final report will be completed as a final report after the discussion and mutual agreement among all stakeholders in the National Seminar to be held in April, 2002.

Overall Objectives for the Master Plan Study on Fisheries Development

This Master Plan aims at operationalising the National Fisheries Sector Policy and Strategy Statement (1998) and the overall objectives of the Master Plan are to develop a feasible integrated development strategy that will stimulate sustainable economic growth of the sector and shared benefits in order to enhance the welfare and well-being of the fisheries communities.

Term for Master Plan

This Master Plan aims to provide plans for 10 years starting from the year 2002.

Survey Areas

This national Master Plan targets the whole area of the United Republic of Tanzania except Zanzibar and the EEZ. Programmes are planned for each five water bodies categorised in the report. They are (1) Marine, (2) Lake Victoria, (3) Lake Tanganyika, (4) Lake Nyasa and (5) other small water bodies.

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[i] HIPC are countries that has GNP per capita below US$ 659, and total financial dept exceeding 2.2 times of annual export or 80% of GNP. HIPC initiative is a plan against HIPC for dept relief that has been agreed among official creditors. HIPC are obligated to form PRSP, and through this procedure, ODA for 100%, non-ODA for 90% are to be reduced. Tanzania has completed PRSP by 2001.

Survey Methods

Survey for this project was implemented in two phases. Phase 1 survey was carried out from 8th January to 11th September 2001. Analysis on present conditions and basic development concepts are summarised as the main output in the interim report. Phase 2 survey has been implemented from 15th October 2001 to 12th June 2002 (expected) and main focus is on the planning of priority programmes based on basic development concepts and the survey for programme implementation.

For the field survey, 12 experts from this Master Plan Study visited major fisheries production sites (refer to the Project Site Map in front). They extracted technical and political issues through observation on fishing activities and discussion with stakeholders in fisheries sector. For socio-economic condition of stakeholders in fisheries sector, the Economic Research Bureau, University of Dar es Salaam, as sub-contractor to the Study, carried out household survey with 1,118 households and market/ consumption survey with 1,090 questionnaires over 19 districts. When the survey was implemented, the format of questionnaire from the Household Budget Survey 92 was applied in order to enable data comparison with national average, farming villages and fishing villages.

Data and information at village and district levels were collected through PRA (Participatory Rapid Appraisal). In PRA, some tools were also applied for institutional analysis. Gender assessment, management evaluation, and poverty analysis were included for assessing changes in fisheries sector. Also, Study Team members visited landing sites in order to understand the overall situation. Interviews and discussion were carried out with key persons and target groups. There, topics to be focused in this Master Plan were carefully surveyed. In the interviews, special attention was paid to encourage participants' frank opinion. Counterparts from Tanzanian Government also participated in those interviews and discussion at the sites for understanding and clarifying issues.

The Project implemented the National Workshop at Morogoro between 29th October and 1st November 2001, aiming at the mutual agreement on the basic development concepts. For the National Workshop, fishers and District Fisheries Officers from water bodies across the nation participated, and discussed the development concepts and approaches in each area. What was discussed in the workshop was reflected in the experts' detailed survey and plans for priority programmes. Priority programmes and their implementation plan will be discussed and agreed at the National Seminar to be held in April 2002.

Composition of the Master Plan

This Fisheries Master Plan consists of (1) Analysis on Present Conditions of the Sector, (2) Basic Development Concept and Strategy, (3) Priority Programmes, (4) Cost Estimation for Programmes, (5) Implementation Plan, (6) Evaluation, and (7) Recommendations.

I. PRESENT CONDITIONS OF THE SECTOR

CHAPTER 1. PRESENT CONDITIONS OF THE SECTOR

1 OVERVIEW OF THE NATION

1.1 Characteristics of the Country and Main Water Bodies

Tanzania is situated in latitude 1 to 11 degrees South and 30 to 40 degrees East. Her land area is 886,037km^2 which gradually increases altitude up to 500 to 1,000m as it goes towards the inland.

The land is well endowed with water resources which consist of coastline of some 800km long and inland water bodies of 60,000km^2 (Attachment Figure 2). The three African Great Lakes, these are Lake Victoria, Lake Tanganyika and Lake Nyasa, are all shared by Tanzania and providing food, transportation and employment for 10 million people who live in those lakes basin. Exclusive Economic Zone (EEZ) established in the Indian Ocean has a water body of 223,000km^2 which provides 18 percent of Tanzanian fisheries production. While the continental shelf which does not exceed water depth of 200m is narrow. It makes up to 18,508km^2 consists of 2,183km^2 of coral reefs, 820km^2 of mangrove forests, and 15,505km^2 of the rest.

Lake Victoria is the second largest lake in the world with a surface area of 68,800km^2 and shared between Kenya (6%), Uganda (43%) and Tanzania (51%). The fisheries production from the lake was 363,000 tons in 1994 among above mentioned three countries, 29 percent of Kenya, 27 percent of Uganda and 44 percent of Tanzania. The population living in the lake catchment is estimated at 27 million and utilises the lake for not only fisheries but also agriculture, industry and domestic usage. The population pressures have resulted in hot spots of heavy localized degradation of lake water quality and measures are to be taken under the co-management of EAC (East African Communities).

Lake Tanganyika, known as the second deepest lake in the world, is shared by the four countries of Burundi, the Democratic Republic of the Congo, Tanzania and Zambia. The lake covers an area of 32,945km^2 of which 13,510km^2 is in Tanzania. 31 percent of total fisheries production is produced in Tanzania. Co-management of Lake Tanganyika among shared countries has still long way to go because of the presence of politically unstable countries, Burundi and the Democratic Republic of the Congo where as an integrated environmental management and cooperative lake development are observed in Lake Victoria under EAC. Kigoma District is now dealing with approximately 50,000 refugees from Burundi.

Lake Nyasa is one of the Great Lakes of East Africa and is the southernmost of the Western Rift Valley lakes of Africa. It has a surface area of about 28,000km^2 and is shared between Malawi, Tanzania and Mozambique. On the Tanzanian side, the nature of the depth profile of the lake falls rapidly to 200 to 300m. This feature limits the artisanal fishers to fishing in the near shores due to the limitation of their fishing gears and equipment.

Other than above noted three major lakes, there are Lake Rukwa (2,850km^2), artificial man-made lakes or reservoir, Mtera Dam (580km^2), Nyumba ya Mungu Dam (100 to 180km^2) and many other small water bodies in Tanzania. However many of them do not have good access to the markets and their economic impacts are limited within their surrounding areas.

1.2 Climate

Climate in Tanzania is divided into coastal, central highland, lake and southern and northern highland areas. Climate in the coastal area is a typical tropical one with high temperature and humidity. Precipitation is 1,000 to 1,500mm. The average annual temperature in Dar es Salaam is 25.8 C, the maximum and minimum average monthly temperatures are 19 and 30 C respectively. Main rainy season is between March and May, whereas short rainy season is in November and December. Average velocity of the wind is 5m/s from northeast between December to April in the coastal area. Whereas the average velocity goes up to 8m/s and the wind starts blowing from southwest from June

to October, limiting artisanal fishers' activities who mainly ship on the sailed boats by creating high waves.

Climate in the central highland area with 600 to 1,200m altitude is the tropical savannah with less annual precipitation of 600 to 800 mm. There, the dry and rainy seasons are distinct. The lake area is located between the altitude of 900 to 1,200m and has relatively high rain fall. The annual precipitation is 1,100mm in Mwanza at Lake Victoria whereas 1,200mm in Kigoma at Lake Tanganyika. Both have distinctive dry season between June and October with almost zero mm of rainfall (Attached Figures 7, 8, 9 and 10).

1.3 Population

Based on the population census in 1988, the estimated population in 2000 is 33.95 million and the population growth rate is 2.7 percent. The urban population in 1988 was 11.5 percent, one of the lowest in Africa. However, in 1999, the number jumped up to 32 percent that shows the rapid urbanisation. Populations in major cities are 1.36 million in Dar es Salaam, 223 thousand in Mwanza, 187 thousand in Tanga and 152 in Mbeya (Population Census 1988). 75 to 80 percent of population involved in economic activities are engaged in traditional agriculture producing small amount of cash crops for self-sufficiency. Employment for the formal sector shares only 5 percent of population involved in economic activities, and half are public servants.

Expected population in 2012, the target year for this Master Plan, is 46.7 million (UNFPA) which is 38 percent increase from the year 2000 (Attached Table 3).

1.4 Socio-economic Conditions

After Tanzania got independent from the United Kingdom in 1961, it had gone through Ujamaa Socialism period and has now entered the free economy period under the Structural Adjustment programme. The Tanzanian Government faced with the economic crisis in 80's, decided to accept the Economy Revival Plan by World Bank. It began to promote policies including retrenchment of public servants, privatisation of public corporations, abolishment of uniform pricing system, and liberalisation of agricultural marketing. Within the implementation of above mentioned policies, fisheries sector was not an exception. The Government-ran fish processing factories and ship building workshops such as TAFICO (Tanzania Fisheries Cooperation) were closed or sold and fisheries officers were retrenched. As a result, GDP showed some recovery trend and once reached US$ 100 per individual in 1990. The average growth rate of GDP between 1996 and 2000 was 4.2 percent (4.7 percent for 1999, 4.9 percent for 2000) which exceeded the population growth rate. At the same time, the inflation rate had decreased to 5 percent in 2001. However, trade and financial debts are constantly present and its economy is highly dependent on foreign aids. In 2000, the export of mineral resources (gold) increased 181 percent from the previous year, resulting in 22 percent decrease in trade debt. Yet, US$ 1,536.33 million of import still overwhelmingly exceeds US$ 662.70 million of export. About the financial structure, the annual income in 1999/2000 was Tanzanian Shilling (Tsh.)1,057,951 million, whereas the annual expenditure is Tsh.1,168,779 million. The procurement of the debt of Tsh.110,827 million depends on national banks and foreign aids. Especially the dependence on latter exceeds 10 percent of the total annual expenditure. This result is the high unpaid foreign debt which is 91.3 percent of GNP in 1999, and DSR (Debt Service Ratio) is 18.8 percent. Tanzania committed to the HIPC initiative in 2000, and now working on the national management focusing on the poverty alleviation and the national economic development targeting 8 to 9 percent of GDP growth rate by 2025.

Despite the improvement of macro-economy, the weakness of Tanzanian economy is noted as it highly depends on agriculture, forestry and fisheries which are easily effected by the climate. These sectors share 46 percent of GDP and provide 3/4 of employment opportunities. The re-pricing and the reformation of marketing systems in agricultural products under the Structural Adjustment Programme influenced positively on agricultural production in the first half of 1990's. However, the agricultural GDP growth remains 3 percent between 1995 to 1999. The reasons behind this low growth rate are the

small scale operation (94 percent of farmers has less than 1ha) and the difficulty of obtaining the production equipment; similar issues fishers are facing.

The primary school enrolment rate in Tanzania of 68 percent in 1980, went down to 48 percent in 1997 as the economy deteriorated. In the Poverty Reduction Strategy Paper, the government proposes to raise the primary school enrolment rate up to 85 percent in 2003. On the other hand, the education level of fishers is low. The result of the sub-contract survey showed that 20 to 40 percent of fishers either did not go or dropped out from the primary school. This low education of fishers is an obstacle to implementing cooperative management and trainings.

In health and sanitation sector, HIV/ AIDS is considered as a big issue and being tackled as in other African countries. 1.3 million people or 8.1 percent of the population between the age of 15 to 49, are infected with HIV/ AIDS, and 140 thousands are dying annually. Since fishers have high cash income and mobility, they are most likely to be categorised as a high-risk group, yet proper survey is not carried out. The knowledge on HIV/AIDS among fishers is low; therefore, HIV/ AIDS education is an issue for fisheries community development and fisheries extension.

1.5 Administrative Institution

The country is divided into 25 regions (20 in main land and 5 in Zanzibar). There are districts in regions and villages in districts (Attached Figure 11). In each region, there are a Regional Commissioner (RC) and a Regional Administrative Secretary (RAS) underneath. Districts (125 in main land) are recognised as autonomous administrative organisations and have a District Commissioner (DC) and a District Executive Director (DED). Both regions and districts are under the control of the Ministry of Regional Administration and Local Government. Decentralisation enforced since 1996 promoted the transition of roles from the central to local governments and empowers the local autonomy. As a result, the districts are now working on a new system enabling them to employ, introduce taxes, and manage natural resources by themselves. There, three committees of (1) Finance, (2) Economy and Environment, and (3) Education/ Health/ Water are experimentally established in the District Government for the smooth implementation of the governance at the district level. The fisheries sector come under the Committee of Economy and Environment together with agriculture and cooperative sectors (Attached Figure 12). However, in the midst of the decentralisation transition, there are some confusion among district officers causing fragmented services. The district annual revenue also highly depends on the subsidies from the central government. In the workshop for fisheries officers in this Project, there were issues such as DED being unable to give proper advice about fisheries related matters because of lack of knowledge in fisheries sector.

2 THE FISHERIES AND THE NATIONAL SOCIO-ECONOMY

2.1 Contribution of the Fisheries Sector to the National Economy

In 1996, 30,171 fishing boats and 102,527 fishers were involved in fishing activities in Tanzania. 80 percent of these boats and fishers were engaged in inland fisheries, reflected in the fact that 80 percent of Tanzanian fisheries production came from the inland fisheries. A structural characteristic of Tanzanian fisheries is that 99.6 percent of its production is generated from artisanal fisheries. Out of 328,813 tons of total fisheries production in 1996, only 1,341 tons was produced by 23 industrial prawn trawlers in Indian Ocean (Fig. 1-1). In Tanzania, for the protection of the artisanal fisheries, direct involvement of industries in fisheries is forbidden in lakes. Artisanal fishers mainly own canoes without engines resulting in low average national motorisation rate that is 10 percent. In fish processing, on the other hand, enterprises take a bigger share than the artisanal processors. The 12 registered processing enterprises in Tanzania all engaged in exports of Nile perch fillet or frozen prawns. Artisanal processors are involved in drying or smoking of excess fish for mainly preservation purpose.

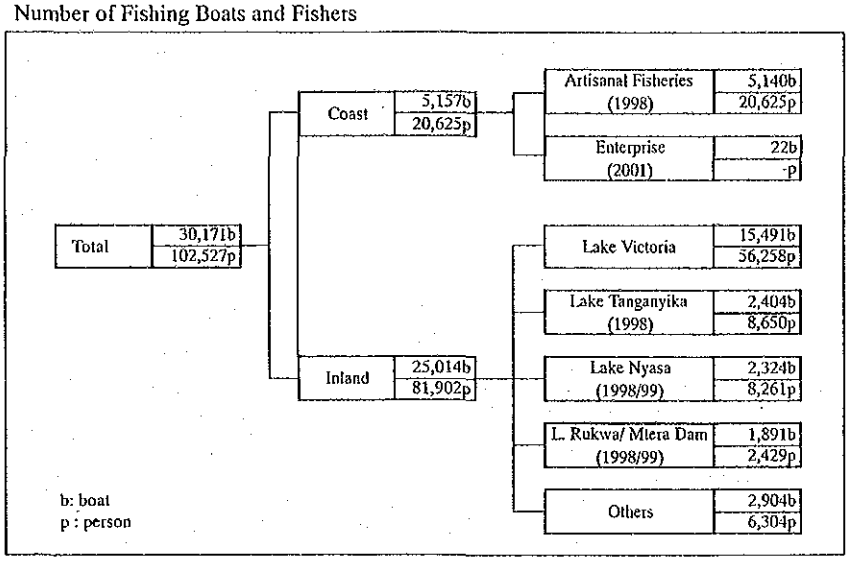
The real growth rate of the Gross Domestic Product (GDP) in 1999 was 4.8 percent, an increase over the 1998 GDP of 4.0 percent. In contrast to these figures, the real growth rate of the fisheries sector in

1999 was 3.2 percent, lower than the 1998 real growth rate of 3.5 percent (Attached Figure 13). The contribution of the fisheries sector to the GDP in 1999 was 2.9 percent (the Economic Survey, 1999). This decrease in percentage was triggered by the ban of Nile perch export to EU in 1998. The condition is recovering after the removal of the ban.

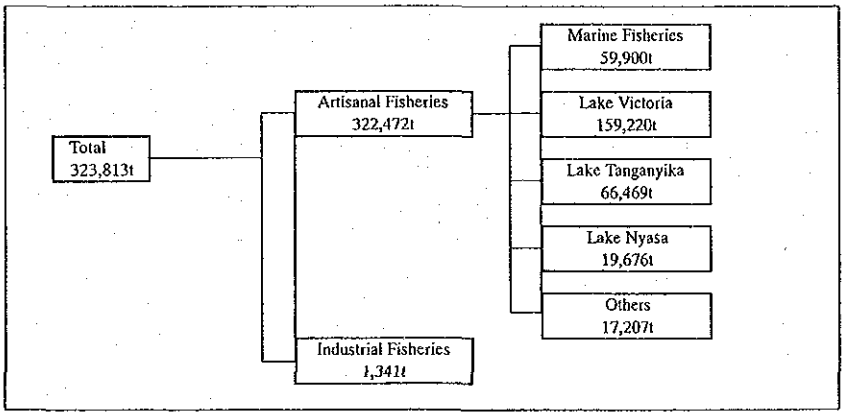
In the area of employment, approximately 800,000 people were directly employed in the fisheries industry from 1999 to the present. This figure represents a record growth rate of 4 percent for the three-year period from 1995 to 1998/1999, which surpassed the population growth rate of 2.6 percent (Fisheries Frame Survey Results 1995 to 2000). Accurate statistics on the number of personnel employed in fish processing and fish marketing are unavailable since the Fisheries Frame Survey was not conducted in past years. However, this number is estimated to be five times bigger than the number of fishers. Based on this estimation, the number of people employed by the fisheries and related industries is estimated to be about 2.5 percent of the total labour force of 16 million in Tanzania in 1999. According to the fishery census of 1995 to 1998, there were 951 fish landing sites scattered throughout the country, which signified that a fishing village was located about every 4km along the coastline of major water bodies. Many of these villages were located in areas where the existence of other industries were limited or on isolated islands. Hence fisheries is a valuable source of employment and maintains an equilibrium within the country.

One of the priority economic development issues of the Tanzanian government is the promotion of exports. In 1999 the overall sales of traditional export products such as coffee recorded a decline of 8.1 percent or US$ 521 million from the previous fiscal year. Although the decreased ratio is smaller in comparison to the annual decline of 21.8 percent in 1998, the country is dependent on revenue generated from traditional export products such as coffee and cotton. Structural problems in the country's export industry is believed to be the cause behind the drop in exports. In contrast to these conditions, the export of fishery products has averaged a rapid growth of 10 percent since 1990 and has become an important export product comprising 12.3 percent of the total export value in 1998. The total export value in 2000 was US$ 75.5 million and it has continued to maintain a large growth rate which has established fisheries as a major export item of the country. Royalty of the fish export, one of the financial sources for the Fisheries Division, reached Tsh.4,000 million contributing to its stable financial condition.

Number of Fishing Boats and Fishers



Total and Areal Production of Fisheries in Tanzania for the Year 1996



Major Fish Spieces Landed in Tanzania for the Year 1996

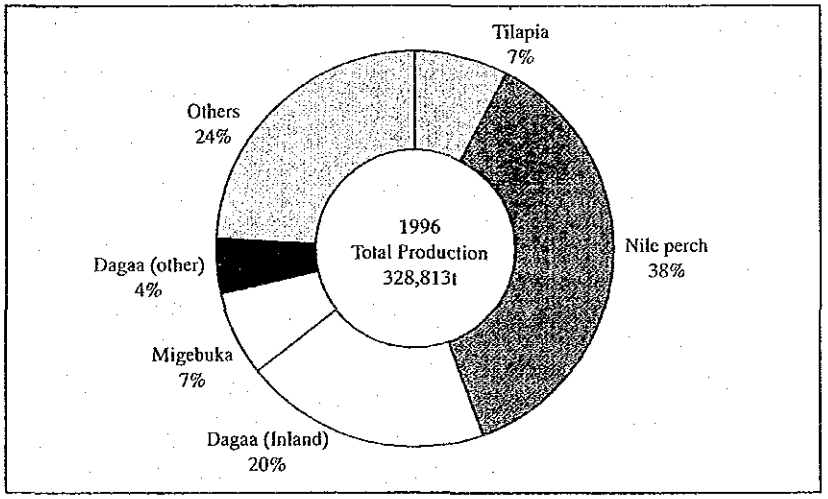


Fig. 1-1 Basic Information on Fisheries in Tanzania

Table 1-1 Macro Economic Index for Fisheries Sector

Item	1996	1997	1998	1999	2000
Fisheries GDP (1,000 US$)*	-	165,232	189,787	211,704	
Fisheries GDP/GDP (%)*	-	3.0	2.9	2.9	
Employment (full-time fishers)	75,621	-	-	78,682	
Fisheries Export (million US$)	61.8	70.1	72.5	61.8	75.6
Fisheries Export/Export (%)			12.3	11.4	11.4

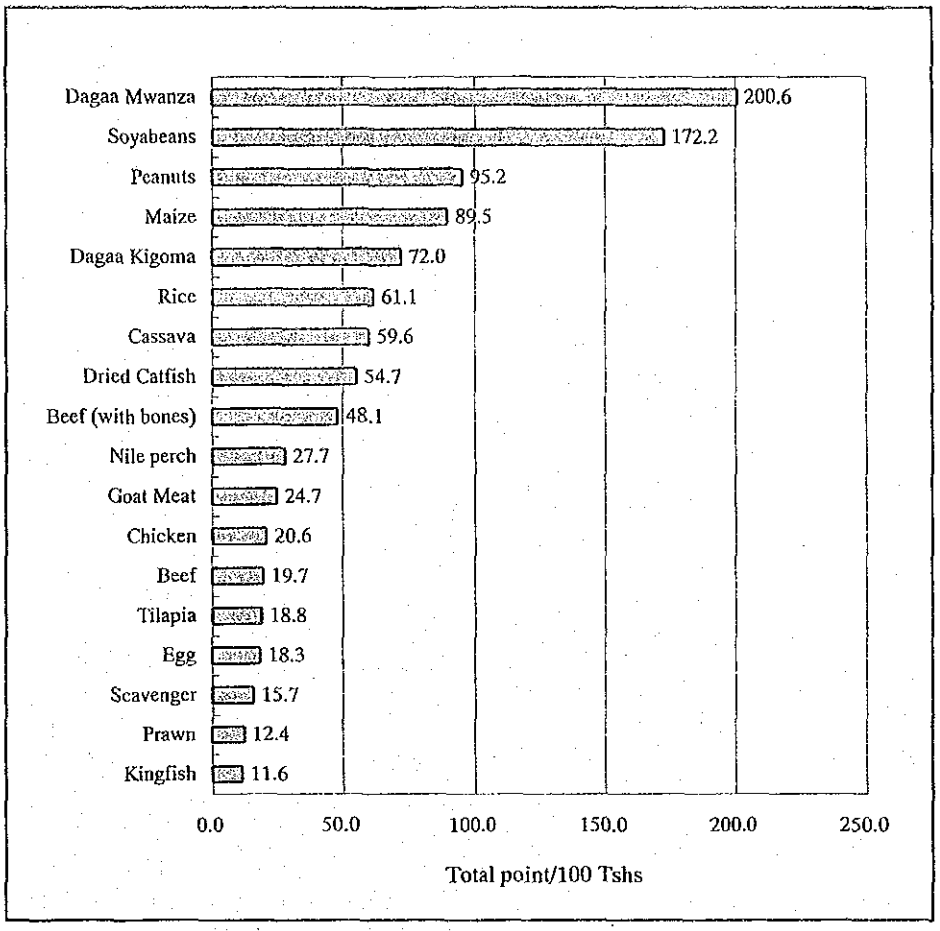
Sources : *The Economic Survey 1999 (at constant 1992 prices); others are referred from Fisheries Frame Survey Results 1995 to 2000

2.2 Contribution to Food Security and National Nutrition

As of 2001 to the present, Tanzania is a net export country and fishery products is one of the potentially self-sufficient food items. The per capita fish consumption volume is estimated at 5.9kg/year and nutritionally, it comprises 32.7 percent of the animal protein consumption of the populace; in contrast to the average value of 16 percent for the entire continent of Africa or 9.4 percent of the animal protein intake of the adjacent country Kenya, this is a high ratio (see Attached Table 5). Due to cultural reasons and the undeveloped distribution system, fish products fulfil a high ratio of the nutritional demand of the urban and particularly, the coastal regions since fish consumption is limited in the inland areas.

According to the Poverty Reduction Strategy Paper, 43 percent of all children under the age of five in Tanzania are under height and stunted of whom 18 percent are severely undernourished. The daily nutritional intake is 1,940kcal in Tanzania (FAO value, 1999), which is greatly below the average value for Africa (2,411kcal). One of the major causes is attributed to the low animal protein intake of the country (average value in Africa 12.3g/day; average value in Tanzania 9.8g). Adequate nutritional intake is the basis for sound health; and the improvement or deterioration of fish culture in Tanzania will have a major economic impact on the nation's health care burdens.

According to the survey on poverty and nutrition implemented in 2000 (Tanzania Food and Nutrition Research Centre, 2000), the nutritional value of fish was analysed according to cost and nutritional value and the economic efficiency was reviewed according to item. The findings showed that Dagaa harvested from Lake Victoria and purchased at Tsh.100 had a total value of 200 points as a potential energy and protein source. This was followed by soy beans (172 points) which showed that Dagaa was an extremely economical food item (see Table below). An important factor in Tanzania's endeavour to eradicate poverty and to improve nutritional intake is to secure an inexpensive, nutritionally rich food item. Consequently, increased consumption of Dagaa, which has been recognized as a very economical food source, will contribute greatly to improving the national nutritional intake. Therefore, the role of the national economy is extremely vital in resolving issues such as developing a distribution system of Dagaa and promoting the consumption of fish in the remote areas.



Source : Tanzania Food & Nutrition Research Centre, 2000

Figure 1-2 Comparison Among Energy and Protein Contained in Each Product Purchased with Tsh. 100

3 SITUATION OF THE FISHERIES SECTOR

3.1 Fisheries Production and Resources

3.1.1 Fisheries Production

(1) Trends in Fisheries Production

The fisheries production for 2000 increased by 3.5 percent from the previous year to 320,900 tons, a 2.0 percent increase in revenue or US$ 97,100 (calculated at US$ 1=Tsh.800). Tanzania's fish production recorded a gradual increase from 150,000 tons to 300,000 tons from the 80s to the 90s. Despite a production volume of 350,000 tons in 1996 and 1997, production has stagnated this last decade declining to 310,000 tons in 1999 and 320,000 tons in 2000 (see Attached Figure 14). This *recent drop in fish production is largely attributed to the stagnant production levels of inland fisheries* which comprises 85 percent of the total fish production volume. However, the statistics on fish landing volume is claimed to be unreliable and the Annual Statistics Report is not published since 1996. The announced total national fisheries production is only an estimation which has to be kept in minds, despite the fact that most people engaged in fisheries do recognise the production stagnancy.

Tanzanian fisheries are characterized with the production that 99 percent of comprised of artisanal fisheries. Presently, fishing activities of the Nile perch processing plants are prohibited at the major fishing ground of the country, Lake Victoria, and only 23 prawn trawlers have been granted licenses to operate in the coastal regions as one means of controlling fishery resources and also for the protection of artisanal fishers. As the international competition in fish export becomes more intense, rationalisation in the fisheries sector will be required. However, most probably, the present high percentage of artisanal fisheries in the fish production will not change because of its high contribution to national employment.

(2) Fish Species and Seasonal Trends

A breakdown of the fish production (1990 to 1996) according to region showed that 48 percent of the production was came from Lake Victoria, followed by 20 percent at Lake Tanganyika, 15 percent by marine fisheries, and 9 percent at Lake Nyasa. There have been no major changes in this composition in recent years. Though there is no drastic change in production trends, some decrease is observed in Lake Nyasa and other small water bodies. The annual productivity per fisher is 4.31 tons in marine, 4.57 tons in Lake Victoria, 5.31 tons in Lake Tanganyika and Lake Nyasa record the lowest of 3.45 tons.

Table 1-2 Changes in Fisheries Production in Each Water Body (1990 to 1996)

(Unit : tons)

	1990	1991	1992	1993	1994	1995	1996	Composition %
Marine	56,779	53,891	43,302	35,449	39,073	50,695	60,849	15.1
Lake Victoria	231,547	146,310	132,171	176,264	118,633	121,891	159,219	48.1
Lake Tanganyika	64,865	63,503	80,525	71,730	54,125	54,651	66,469	20.2
Lake Nyasa	28,741	28,076	44,968	25,762	33,318	17,299	19,675	8.8
Other small water bodies	32,184	34,932	34,535	22,261	23,640	13,676	17,601	7.9
Total	414,116	326,712	335,501	331,466	268,789	258,212	323,813	100.0

Source : Fisheries Statistics

Note : Composition % is the average from 1990 to 1996

The migration of several species including Yellow fin is observed within Tanzanian EEZ. Presently, Japan has signed a fisheries agreement with Tanzania to operate long-line tuna fisheries in the country's EEZ and one tuna/bonito fishing boat in 2000 and five boats in 2001 are permitted to carry out fishing operations in the zone. However, there has been only 1 boat (7.5 tons, 3 million yen) in 1998/99 that has carried out fishing activity in the zone so far. Fisheries development is lagging in the EEZ and offshore areas and collecting information about the conditions of offshore resources, developing and introducing the appropriate technology are important issues that need to be addressed.

(3) Fish Production in Major Fish Species and Seasonal Fluctuations

A. Fish Production in Major Fish Species

According to the fish production data between 1990 to 1996 (Annual Statistics Report), 50 percent of its production comprised 2 major species in Tanzania, i.e. Nile perch and Dagaa Kigoma[1] from Lake Tanganyika. Major 5 species occupy 75 percent of its production showing the simple structure of Tanzanian fisheries.

[1] Dagaa is a general term for small pelagic fish represented by sardine. Processed dagaa differ in names and prices according to their production sites; Dagaa Mwanza from Lake Victoria, Dagaa Kigoma from Lake Tanganyika and Dagaa Pwani from marine fisheries. Out of these, Dagaa Kigoma, consists of two species of *Stolothrissa tanganicae* and *Limnothrissa miodon*, records the highest dagaa production. Second highest dagaa production is Dagaa Mwanza consists of *Rastrinebola argentea*, a *cyprinidae* species.

Table 1-3 Changes in Fisheries Production in Each Fish Species (1990 to 1996)

(Unit : tons)

	1990	1991	1992	1993	1994	1995	1996	Composition %
Nile perch	175,269	96,307	74,973	155,758	99,624	103,481	120,327	36.6
Dagaa Mwanza	29,014	29,419	37,699	7,619	14,952	3,145	19,392	6.3
Dagaa Kigoma	42,052	36,518	54,021	36,962	29,241	40,763	40,179	12.4
Tilapia	10,885	11,393	8,657	4,487	1,349	1,263	360	1.7
Others	156,896	153,075	160,151	126,640	123,623	109,560	143,555	43.1
Total	414,116	326,712	335,501	331,466	268,789	258,212	323,813	100.0

Source : Fisheries Statistics

Note : Composition % is the average from 1990 to 1996

a) Nile perch (*Lates niloticus*)

Nile perch, introduced to Lake Victoria in 1950's, first appeared in Tanzanian fisheries statistics (FAO) in 1980. Since then, its production rapidly increased showing 14 percent of total production in 1985, and rocketed up to 40 percent in 1990's. Keeping the biggest share, its production now has stabilised to around 10 to 15,000 million tons/ year.

b) Dagaa Kigoma (*Stolothrissa tanganicae, Limnothrissa miodon*)

80 percent of fish production from Lake Tanganyika comprises 2 Dagaa species and Migebuka (*Luciolates stappersii*). It is known that Dagaa is found in the northern part While Migebuka is found more in the southern part of the lake and it accounts for 40 percent of the production in Rukwa Region. The annual Dagaa production in Lake Tanganyika is stabilised to around 40,000 tons since 1990.

c) Dagaa Mwanza (*Rastrinebola argentea*)

The annual production volume of Dagaa Mwanza between 1990 to 1996 largely fluctuates from 3,145 to 29,014 tons. However, people engaged in Dagaa production in Lake Victoria does not recognise these changes, and therefore, the reliability in its statistics is questioned. The annual handling volume of Dagaa in Kirumba Market, one of the biggest Dagaa market in Lake Victoria, is around 10,000 tons (processed fish weight). From this figure, the total production of Dagaa Mwanza is estimated approximately 3 to 40,000 tons/year. Dagaa Mwanza belongs to the *Cyprinidae* family, and has slightly bitter taste, different from Dagaa Kigoma, which is People therefore, tend to dislike Dagaa Mwanza and 60 to 80 percent of its production is consumed as chicken feed.

B. Seasonal Fluctuations

Seasonal fluctuations in fisheries production are minimal in Tanzania. In 1996 the annual average index was 100; the disparity between the maximum index in January, which was 116, and the lowest index in October, which was 88, was less than 30 percent (see Attached Figure 17). This disparity does not differ according to water body—about 50 percent for Lake Victoria and 30 percent in the coastal region. Seasonal fluctuations in the production volume according to fishing season is generally characteristic of fisheries and a significant factor that contributes to unstable income. The stability of fish production in Tanzania is an advantageous condition that heightens the reliability of income projections in planning and applying financial assistance programs in fisheries.

3.1.2 Fisheries Technologies

(1) Fishing Boats and Gears

Based on the Frame Survey 1998/99, 77 percent of 22,928 boats in Tanzania is engaged in inland fisheries. Boats used in inland fisheries are mostly canoes of 5 to 8m length. Constructed boats are

often found in Lake Victoria and Tanganyika, whereas dugout canoes are popularly used in Lake Nyasa. In marine fisheries, together with canoes, there are more varieties such as bigger fishing boat, the size of 8 to 13m, with an outboard engine and Dau. As for fishing gears, gill nets and line fishing are most popular in Tanzania. Lift net specialised for Dagaa fishing is widely used in Lake Tanganyika, and introduced to Lake Victoria. However, purse seine is used for Dagaa fishing in marine fisheries instead of Lift net. Annual catch per boat is 15.8, 20.2, 19.0 and 8.4 tons for marine fisheries, Lake Victoria, Lake Tanganyika and Lake Nyasa respectively. This low catch in Lake Nyasa in comparison to other areas, shows the low productivity of fishing boats and gears used in Lake Nyasa.

Table 1-4 Main Fishing Gears in Tanzania (1998/1999)

	Marine Fisheries	Inland Fisheries	Total
Fishers (man)	20,625	58,047	78,672
Boats (number)	5,157	17,141	22,298
Engines (number)	518	2,042	2,560
Gill net	12,588	230,752	239,877
Beach seine	319	1,944	2,263
Lift net	0	1,523	1,523
Ring net	128	0	128

Source : Frame survey, 1998/99

(2) Motorization Rate

The motorization ratio of fishing boats according to the Fisheries Frame Survey conducted from 1995 to 2000 shows that the national average is an extremely low 10 percent. In a review of the motorization ratio according to region, the ratio of motorized fishing boats operating in Lake Victoria is under 20 percent. This reflects a pronounced delay in modernization in contrast to the neighbouring countries of Kenya and Uganda, where the ratio is about 50 to 60 percent. The lagging investments in modernization is surmised to be a controlling factor in the production costs of the Nile perch in Tanzania. Although this is comparatively advantageous in terms of exportation, it is also the probable cause behind the stagnating incomes of the fishers. In recent years, the rise in distantly located fishing grounds has increased the need for outboard engines; and the motorization ratio of fishing boats operating in Lake Victoria is anticipated to reach levels that are on par with those of neighbouring countries.

Presently, a fishing net manufacturer is based in Dar es Salaam only, who is supplying nets to artisanal fishers. Yamaha has established a branch store in Mwanza for outboard engines that can be purchased in Mwanza and Dar es Salaam. Generally, fishers often point out the high price of fishing gear and outboard engines, but a comparison of the price of outboard engines in three East African countries shows that the price is the cheapest in Tanzania where the import tax and VAT are exempted (see Attached Figure 7). There is a 60 percent price disparity for 25HP outboard engines sold in Kenya and Tanzania. Therefore, the strategy to disseminate fishing gear should not be dependent on tax exemptions or lowered prices, but should be based on the capital of fishers and the means of purchase. Stores do not provide credit for fishing gear purchases and the data obtained in this study (survey to determine the socio-economic conditions of fisheries communities) has also shown that 90 to 97 percent of the fishers purchase their fishing gear using cash. Relatives are a source of funding for about 20 percent of the purchases, but 50 to 60 percent are independent funds. This signifies that funding sources are limited. However, some fishers in Uganda have established a reserve fund for outboard engine purchases and savings accounts with the cooperation of the retail store. Utilizing savings funds as a means of purchasing fishing gear is one way of resolving the problem of funding.

The introduction of modern fishing gears is noticeably delayed in Tanzania and there are hardly any compass nor fish finder found in even experimental stages. Outboard engines and fishing gears are often privately imported or individually bought in Oman.

Table 1-5 Modern Fishing Technology Introduced to Artisanal Fishers in Tanzania

Field	Technology	Comment
Fishing	Magnetic Compass Fish finder GPS	Not yet introduced
	Diesel engine	Fishers bought second hand engines from Oman by themselves. Not able to buy new engines. Used for purse seiners in Indian Ocean.
	Mobilisation of purse seine	It is necessary for increasing the size of the net, yet on research has been done so far.
	FRP boat	Found only in leisure boats. In lake Victoria, few are introduced for patrol boats and carrier boats. Not even experimental construction has been done for fishing purposes.
Processing	Drying rack for Dagaa	• Some extension can be seen in Kigoma bought by individual groups together with brine and sun dry processing. • Non can be observed in Mwanza even after the experimental trials.
	Processed products (SURIMI)	Japanese Volunteer (JOCV) is now carrying out experimental processing at Nyegezi. Fresh water Fisheries Training Institute.

Source : Survey carried out by team members

3.1.3 Aquaculture

(1) Inland Aquaculture

The development of aquaculture, which was introduced in Tanzania in the 1960s, has been slow due to the abundant natural fishery resources of the country; and its present production volume is negligible. Though there are no official statistic data, 1,000 to 1,500 aquaculture ponds are thought to be present in Ruvuma, Lindi, Mtwara and Morogoro regions where aquaculture development projects took places in the past. The major aquaculture species is Tilapia (*O. niloticus*) yet, Clarias (*C. gariepiniss*) is also cultivated in some areas. Tanzanian aquaculture is characterised with hand made small sized earth ponds (100 to 200m^2). Most of fish farmers are not full-time engaged in fish cultivation. There is no particular harvest period, and no feed is given. The aquaculture that depends on the fish natural reproduction cycle shows that it is still in the stage of development.

However, in view of the present standstill in fish production levels, it is anticipated that the importance of aquaculture will increase in future as a fish supply source that will fulfil the demand created by the 2.6 percent population growth rate. Additionally, it is also a fish supply source for remote areas where the fish distribution system is undeveloped. It also contributes to integrated farming and it supports the poverty eradication strategy to diversify agriculture. Hence aquaculture has *high development potential.*

In 1981 the National Aquaculture Centre was built in the Morogoro District with the assistance of the UNDP and FAO. However, the 800 fish ponds, which existed in the 1960s, declined to less than 100 in the 1980s due to the lack of extension services (the operations of the National Aquaculture Centre also stopped in 1982 to 1988). Presently, in addition to these ponds, the spread of aquaculture were largely carried out by ALCOM (Aquaculture for Local Community Development Programme) in 1994 to 1997. ALCOM provided seed fish and technical guidance to a total of five communities in the Morogoro and Kilosa districts. Many of the culture ponds constructed under this project are still in operation, but government services and monitoring activities have not been carried out. The partial functions of the National Aquaculture Centre, particularly the lack of information and statistical data, the lost data and activities of ALCOM and others are some of the major constraints in the development and extension of fish culture.

In 1951, the first trial on the establishment of Tilapia culture was carried out by Mahiwa Agricultural University in Lindi and Mtwara regions. This was taken over and continued by British ODA (Official Development Assistance) in 1980's. RIPS (Regional Integrated Project Support), funded by the Finnish Government, has been engaged in fishers' education and the integrated fish culture project

providing loans for pond construction (Tsh.25 million in 1995 to 1996). 366 ponds in 106 villages were constructed under RIPS project, yet the set goals, an increase in animal protein consumption and cash income, were not fully achieved. Even though many farmers were interested (76 percent of farmers interviewed), 3/4 of those who started fish culture do not feel they have benefited from their activities because of water and theft problems. From these experiences, fish culture extension should consider suggestions listed below.

- The development of training programmes for farmers is necessary. Most farmers' households do not keep records of their income and expenditure and therefore are not able to calculate their exact profit. Together with fish culture technology development, training for the marketing should be taken into consideration.
- To counter theft, the importance of fish culture should be recognised by villagers and patrols should be introduced at the village level.
- Information on the suitability of land for ponds should be provided to farmers who are reluctant to obtain land as they worry about its continuous water supply.

(2) Seaweed Culture

According to FAO statistics, 7,000 tons of *Eucheuma* (a certain species of seaweed) was produced in Tanzania (including Zanzibar) in 1999. This figure comprised 27.9 percent of the world's total production volume and it is the third in production volume to Kiribati and the Philippines (see Attached Table 8). *Eucheuma* culture was developed in the 1980s in Zanzibar with a continual series of trial and error, it got established in the 1990s and recorded a high growth rate averaging 20 percent thereafter. Though the biggest production area in Tanzania is still Zanzibar, it is promoted as one of the economic activities for community development along the coastline of the main land supported by NGO and the Government. Yet, women's groups that are engaged in *Eucheuma* culture in Lindi and Mtwara regions, supported by RIPS are not quite able to develop themselves because of marketing problems. Problems include the low price of their products and infrequent visit of middlemen. TCZCDP (Tanga Coastal Zone Conservation & Development Programme) says that the income from seaweed cultivation is low, Tsh.15,000/ month, considering the high workload required (The lowest salary in Tanzania is Tsh.30,000 per month).

The world production volume has stabilized at 20 to 25 thousand tons in recent years and the international market price, which peaked at US$ 0.36/kg in 1996, dropped to US$ 0.29/kg in 1999 and it has continued to decline. In addition to these international market conditions, there are only two domestic companies marketing *Eucheuma* and this monopoly had driven down the producers' selling price to US$ 0.1/kg. Subsequently, the loss of production initiative on the part of producers has become problematic. Major growth in the international market for *Eucheuma* is not anticipated and the future of *Eucheuma* culture is dependent on an increase in value added during the primary processing stage by fishers.

3.1.4 Fisheries Resources and its Management

(1) Development Potential of Fisheries Resources

The extremely limited scientific data on the development potential of fishery resources has greatly impeded the implementation of fisheries regulations in Tanzania. Under the national policy to promote fisheries in 1997, the national development potential of fishery resources was estimated at 730,000 tons. Since the production levels in recent years have been about 300,000 to 400,000 tons, the possibility of increased development has been recognized.

For each major water body, FAO estimated the development potential for marine fisheries resources as 65,000 to 80,000 tons. Considering the total production from marine fisheries of 59,000 tons in 1996, there are approximately 6,000 to 21,000 tons of further development resources. In Lake Victoria, the Lake Victoria Fisheries Research Project (LVFRP) has carried out stock assessment on Nile perch. If

correct, the figure LVFRP announced, which was 650,000 tons of existing Nile perch stock, and the total annual catch of 500,000 tons given by the Fisheries Statistics, would suggest over-fishing. For Dagaa Mwanza, since its reproduction cycle is 1 year, it is thought that the increase in present catch will not cause over fishing though there is no reliable scientific data on Dagaa stock in Lake Victoria. In Lake Tanganyika, Lake Tanganyika Research (LTR) estimates potential production per hectare as 100kg, and for Tanzanian territorial waters as 122,000 to 189,000 tons. LTR points out the risk for over-fishing in Burundi and Zambia where their catch volumes are 95kg/ha and 69kg/ha respectively, whereas, LTR recognises the low catch volume of 34kg/ha in Tanzanian territorial waters. Major data on fishery resources are shown in Table 1-6.

Although the fishery resource volume has been estimated in the existing projects, the data is fragmented and many scientists point out risk for carrying out fisheries management based on these data. Together with continuous scientific survey study, the monitoring for fishing activities is required

Table 1-6 Data Available on Fishery Resources by Water Bodies in Tanzania

Water Bodies	Production Volume in 1996 (mt)	Potential Development Volume (mt)	Source
Marine	61,241	20,000	Pelagic fish in Marine, FAO/swop
		65,000-80,000	NANSEN Survey
Lake Victoria	159,219	200,000	National Fisheries Sector Policy and Strategy Statement 1997
Lake Tanganyika	66,469	300,000	National Fisheries Sector Policy and Strategy Statement 1997
		121,500-189,000	LTR (based on productivity of 90kg-140kg/ha/year)
Lake Nyasa	19,675	100,000	National Fisheries Sector Policy and Strategy Statement 1997

There is no survey on fishing grounds carried out in Tanzania, and information on good fishing grounds where fishers gather is kept only as their knowledge. For pelagic fish in marine waters, there are popular fishing grounds in continental shelf along Mafia and Zanzibar islands (see Attached Figure 18). Boats used are mainly purse seiners with engines. They carry ices in fish hold and one trip lasts for 2 to 4 days. Offshore fishery resources within EEZ in Indian Ocean is hardly utilised. Migration of Yellow fin is observed in Tanzanian EEZ. However, because its migration is limited in particular season, foreign boats are not enthusiastic for fishing in Tanzanian EEZ.

In Lake Victoria and Tanganyika, most boats fish at fishing grounds with 2 to 3 hour travel distance, which are areas within 30km from the shore. Yet, because of the decline in the productivity of near shore area, fishers are now looking for fishing grounds with further distance together with the introduction of outboard engines.

(2) Management of Fisheries Resources

Presently, the methods adopted by the Tanzanian government to manage the fisheries industry is to regulate the fishing period, fishing operations in special areas, and fishing methods through fishing laws. A system of fishing boat registration and licensing has been enforced, but regulations pertaining to fishing restrictions are nonexistent.

Direct control of the fish landing volume based on potential fish catch volume and a fish catch allocation system "Quota" has been adopted in Nile perch fisheries in Uganda (allocated production ratio of export processing plant), but it is difficult to set appropriate standards on fish catch volume that are based on scientific data. Such standards are problematic in Tanzania due to inadequate survey functions. In contrast, restricting the number of fishing licenses to regulate the number of new fishers can be easily implemented in Tanzania. There is the advantage that due to the large number of professional fishers, economic interests can be adjusted among them. One means of restricting the CPUE is to establish an appropriate fish catch system that will maintain appropriate fish catch volume.

Reef fishing is regulated in the Tanga Region and in a segment of the coastal area of Mafia Island, where prohibited fishing areas are decided based on agreements set by the fishers themselves and certain fishing methods are restricted. This is an effective system that is being promoted nationwide to supplement a public system of fisheries management that suffers from a shortage of human resources and capital.

(3) Resource Management by Fishers

It is difficult for the administrative side to implement fishing regulations at sea. In Tanzania, since water bodies are scattered in the vast nation and the local government bodies are still at the development stage, the fishery management should be implemented in collaboration with fishers. Lake Victoria Environmental Management Project (LVEMP) started in 1997, for the purpose of management of landing sites and data collection on catch volumes by fishers. Beach Management Unit (BMU) was organised in each fishing village in Lake Victoria. Yet, many of 600 BMUs that have been established are not functioning. This is because of lack of basic knowledge in fishery management and incentives as they cannot see increase in income from implementation of fishery management.

Awareness survey on resource management among fishers in Lake Tanganyika in 1998 showed that 80 to 90 percent of fishers are aware of the decrease in volume of fish they catch. Yet, 30 to 50 percent of fishers do not know the reason or they believe what has happened was due to God's decision. 20 to 40 percent think the low fishing technology is the cause for the decrease. Only 1/4 reasons the over-fishing as a cause which connotes low awareness towards over-fishing among fishers. For the method of fishery management, 80 to 90 percent object against drawing limitation to the open access. This shows that the basic environment for the introduction of fishery regulations is still under development. Considering above mentioned conditions, awareness building towards resource management among fishers is important for future implementation of fishery management.

3.2 Marketing, Processing and Consumption of Fisheries Products

3.2.1 Marketing System for Fisheries Products

The fish marketing structure, i.e., production to consumption markets, remains undeveloped. In the small, rural fisheries communities, fish transactions are carried out by a small number of retailers and consumers at the fishing landing sites. Fish marketing area limited is generally in the village itself or in neighbouring communities. Wholesale markets with a certain level of shipping and price formation functions are located in extremely limited areas such as Dar es Salaam, Mwanza. Of these wholesale markets, the Dar es Salaam fish market (Banda Beach Market) handles over 10,000 tons of a diverse variety of fishery products and the transactions are conducted through auctions. It also functions as a centre of fair price formation under the good competitions. However, there are many issues such as undeveloped wholesale system, limited shipping functions due to the lack of regulation to control buyers, limited information on prices due to the lack of activities to collect price information. Additionally, due to the lagging development of a fish marketing system, shipping and distribution activities from the production market to other consumer markets remain undeveloped.

A diverse range of fish sellers, peddlers (fried fish processors) fish retailers, restaurant owner conduct their transactions at the fish landing sites. Due to the lack of recorded data, the number of small-scale fish traders are unknown (estimated at about 50,000) and the majority are unlicensed. The transaction volume of many of the fish peddlers is about 20kg. Their daily sales is estimated at Tsh.2,000 to 4,000/day and the margin of trader may be about 10 percent of the fish price.

In observing the fish production sites, the majority of the fish catch are consumed locally and with the exception of a segment of fish species, the distribution of fish is on a very small-scale. The Nile perch and Dagaa, marketed over a wide area including exportation, are distributed from the production site to Dar es Salaam and other inland cities. (see Attached Figures 20 and 21).

3.2.2 Consumption of Fisheries Product

According to the data obtained from the socio-economic survey of fisheries communities, the per capita fish consumption ratio of major urban areas was 38.4kg/person/year in Kigoma, 73.7kg in Lake Victoria, 81.7kg in Dar es Salaam, and 68.8kg in Mbeya. These statistics match the findings of the FAO survey implemented in 1984 on the coastal region. This shows the high fish consumption in coast area and major cities compared to other areas.

In addition, the survey findings on the food preferences of eight items showed that among the 690 people surveyed, 286 people (41%) responded that their first preference was beef, followed by 176 people whose first preference was fish (26 %). Moreover, 60 percent of the respondents indicated fresh fish as their first to third choice. A breakdown of the food items according to points showed that the top three food items, beef, fresh fish, and chicken collected 1,311 points, 1,160 points, and 785 points, respectively. Salted/dried fish and pork each collected 117 and 195 points, respectively. Although these findings were obtained from a survey that was conducted in the urban areas near the production sites, they indicate that the preference for fresh fish remains strong.

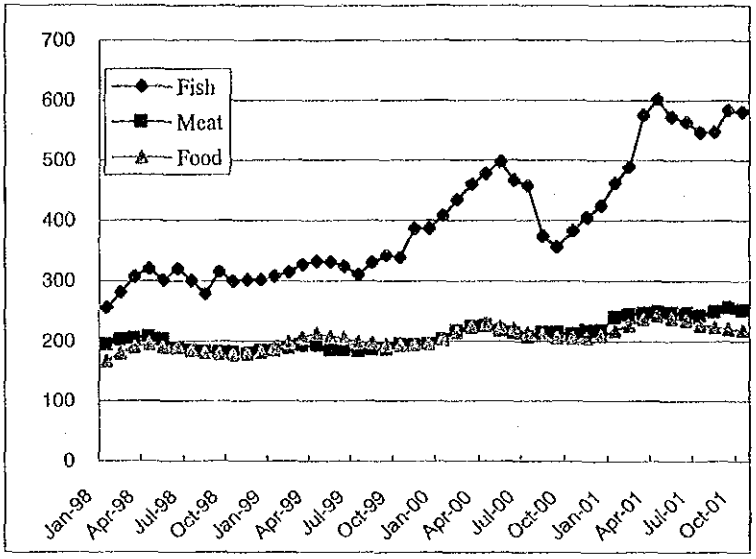
For the Tanzanian government to achieve the important goal of a healthy society, it is vital that the problem of malnourished children, which currently exceeds 43 percent, is resolved. An effective strategy is to increase the consumption of Dagaa which is an inexpensive source of protein. Yet, for the increase, its low preference is an issue (see Attached Table 9). To expand fish consumption in the inland rural communities, the trends in fish use in these regions should be analysed, information about fishery products should be provided, understanding of fishery products should be promoted by agricultural extension workers, and the younger generation should be educated in order to promote fish consumption.

3.2.3 Fish Price

(1) Price Trends

Looking at the changes in consumer food price index, price of fish recorded 256 in January 1998, and 581 in October 2001 when the price unit of 1994 was fixed as 100. This increase in price of fish exceeded the increase in prices of overall food (219 in October 2001) and meat (252 in October 2001) showing the high demand in fisheries products (see Figure 1-3 below).

Looking at the wholesale price index by regions in 1990 to 1996, rabbit fish was 630 in Dar es Salaam and 490 in Lindi region (100 in 1990; calculated from figures in Attached Table 37) showing a bigger increase in urban area. The price difference in urban and rural areas was also big. The price of scavenger and rabbit fish transacted in the Dar es Salaam fish market was Tsh.1,000 to 1,700/kg, whereas the prices of different fishes in rural fishing villages were quite similar. For example, any type of fish was sold at Tsh.300/kg in Mafia Island. On top of this big difference in transaction price, many rural villages are unable to transport fish to cities because of small production volume per fisher, lack of ice supply, and lagged development of joint transportation system.



Source : National Statistic Bureau

Figure 1-3 Changes in Pricing Units of Fish, Meat and Other Food by Consumers (1994=100)

(2) Fresh Fish Price

According to the data of the Tanzania Statistical Bureau, the average fresh fish price in 2000 was Tsh.1,271/kg and although it is cheaper than goat meat, fish is priced higher in comparison to the average price of beef, which was Tsh.998/kg (see Attached Table 11). In view of the fact that 70 percent of all meat consumption in Tanzania is beef, fish products are relatively expensive. However, there is an abundant variety of fish species on the market and the prices are diverse. Price differences range from the high-priced Kingfish (Tsh.2,400/kg), scavenger or Changu in Swahili (Tsh.1,700kg), to the lower end sardines which are sold at Tsh.500/kg. Generally, sardines and carangids and other species of small pelagic fish are cheaper than livestock meat, but the price of large demersal fish such as Kingfish, tuna and other demersal fish is higher than any livestock meat sold in the market. Marine fish is generally preferred in the coastal regions, but Tilapia is sold at the same price as marine fish (Tsh.1,300/kg). In contrast, the Nile perch (Tsh.1,000/kg) is three to four times cheaper than the marine grouper species (the quoted prices are the retail price at Dar es Salaam).

Amidst the overall decline in food consumption, the price of fresh fish is much higher than the rival price of meat; and the simple high price structure is not expected to continue in future. To raise the incomes of fishers within this environment, the production and marketing costs must be curtailed, fish freshness improved, and other value added measures must be implemented. The relatively low-priced Nile perch, which is an inland fish, is a competitively viable fishery product in the domestic urban markets. Its spread in these markets is expected in conjunction with an improved marketing/distribution infrastructure.

(3) Price of Processed Fishery Products

The overwhelming consumer preference for fresh fish in Tanzania has contributed to the relatively low price of processed fishery products. According to data from the Tanzania Statistical Bureau, the price of salted and dried fish is Tsh.1,544/kg and if the volume is converted into raw fish (1:2), the price is Tsh.772/kg which is much cheaper than the price of fresh fish (Tsh.1,271/kg). This indicates that fish processing in Tanzania is largely a means of fish preservation and it does not increase the value added price of fish. Generally, processed fish is marketed in the fresh fish markets of regions where distribution is difficult or when a surplus in fish production has occurred. Processed Dagaa Mwanza is known because of the cheap price (Tsh.400 to 600/kg) and it becomes important food as it provides animal protein to low income people.

3.2.4 Fish Processing

(1) Artisanal Fish Processing

The Fisheries Division has not collected statistical data on processed fish products at present. It appears that small-scale processing activities are conducted mainly in remote fisheries communities and therefore, obtaining data on the overall production volume and costs of processing activities nationwide is difficult.

In areas where production sites are closely located to the consumption sites, fresh fish is widely distributed due to the very strong preference for fresh fish among Tanzanian. However, in remote production sites where fish consumption is limited within the sites, surplus catch is processed for marketing.

Processing methods include drying, salting and smoking. These processing methods differ from area to area. Along the coast, drying with salt and grilling at the beach are common. On the other hand, smoking method is applied for Tilapia, Clarias and Migebuka in inland. Frying method is used for the short period preservation for instance 2 to 3 days, and widely applied in both coast and inland. Nile perch, which does not have a domestic market, is processed and exported by processing industries.

Due to its small size, the freshness levels of Dagaa drops quickly and therefore, nearly 100 percent of the fish catch is sun-dried immediately after fish landing. The harvested volume of Dagaa in 1996 was 19,392 tons and 40,129 tons from Lake Victoria and Lake Tanganyika, respectively, for an estimated total of 18,000 tons (product weight: 30 percent of the raw ingredient). Dagaa is one of the rare products marketed nation-wide and it is sold in small quantity from 50g in most of remote inland villages.

(2) Industrial Fish Processing

Today, fish processed in factories in Tanzania are Nile perch in inland and prawn/ octopus/ squid in coast which all are exported.

Much of the Nile perch catch is processed as fillets for the export market and the volume of processed fillets 38,868 tons was in 2000. About 8,000 tons of other parts were processed and exported. There are 15 fish processing factories and 23 trawlers registered in Tanzania that are engaged in Nile perch processing or prawn trawl fishing and exporting. The Tanzania Fish Processors Association, composed of registered industrial companies, lobbies the Government for the benefit of its members, gives advice for exportation and endeavours to meet international standard of export products. These processing companies engaged in exportation obtain HACCP qualifications and individually carry out sanitary management.

There are 7 factories that process and export Nile perch in Lake Victoria. These factories are forbidden from fishing activities. Therefore they depend on artisanal fishers for the supply of materials. The profit distribution remains unclear since transaction is carried out through middlemen (agents), but there surely exists a strong symbiotic relation between artisanal fishers and processing factories. Therefore changes in export volume and price directly influence livelihoods of artisanal fishers.

(3) Utilisation of By-Product from the Processing Plant and Traders

The remains of processed fish such as the head, tail, and bones comprise about 50 percent of the raw ingredient and are estimated to be about 46,000 tons. About 5,000 tons of this volume are processed into fish meal and also exported by a factory in Mwanza. The remaining 40,000 tons are salted/dried and smoked by small-scale processors and exported to the Democratic Republic of the Congo or shipped to domestic inland markets. Although the export of salted and dried Nile perch amounts to only 56 tons in a published statistic document, the actual production volume of processed fish products using fish scrap generated from the processing plants is estimated to be about 20,000 tons. These 20,000 tons are exported unofficially and shipped to Dodoma and Morogoro. Processing plants for Nile perch wastes are located in mainly three areas, Kirumba, Mkolani and Kanyama in Mwanza.

In those plants, several hundreds of small-scale processors, mainly women, are working with various sorts of Nile perch wastes. Fins and bones are dried under the sun, whereas heads and chips are either smoked, fried or dried with salts. Yet, their environmental condition is bad. There is neither roof nor water supply system. Since there lacks proper drainage system, the condition of the surrounding environment is also poor, causing low sanitary value of processed products.

Based on FAO Survey (1998), the dumping volume of by-products from prawn trawlers on the sea was estimated to 5,000 to 7,500 tons. If these dumped by-products were effectively utilised, it could contribute a lot to the food supply issue. The Survey reported that prawn trawlers unload at the shore only 2,365 tons of by-products annually, out of a total 8,000 to 10,000 tons. These 2,365 tons are transacted by small-scale processors. In Tanzania, permission is required for transferring products from prawn trawlers to other boats on the sea. Yet, many fishers do not possess permissions and therefore it is necessary to organise the effective collection system for by-products.

(4) Post Harvest Loss

In Tanzania, since fishing grounds are located close to the landing sites and fish is often consumed locally, not much fish is wasted. Even when fish has deteriorated, it is used as chicken feed. Therefore post harvest loss mainly means loss in price. This loss in price is observed in small fishing villages. When fish is not sold fresh (e.g. the volume exceeds local consumption amount and there is no means for transporting excess to other areas), it has to be processed. The price of processed fish (if it is dried with salt) is 40 percent less than the same fish sold fresh.

Another case for post harvest loss is observed in Dagaa processing during rainy season. Quality of Dagaa highly depends on weather since it is dried under the sun and there is neither artificial drying equipment nor refrigerator. The post harvest loss of Dagaa Kigoma is especially a big issue because of its high catch volume during rainy season. There is no official data on post harvest loss during rainy season, yet based on interviews from fishers, 50 to 80 percent of products is sold as chicken feed because of its low quality. There is a big difference in prices between chicken feeds (Tsh.200 to 300/kg) and Dagaa for human consumption (Tsh.700 to 1,600). The price of Dagaa is highest in July which is the dry season and this is almost twice compared to the price in rainy season (see Attached Figure 25 and 26). Dagaa Kigoma, one of the important marketed species, make up 15 percent of total national fisheries production and therefore, its post harvest loss is an issue for securing both income generation for Dagaa processors and continuous food supply in the nation.

(5) Sanitation Management

Food inspection was introduced for sanitary control of fisheries products under the Quality Control and Sanitation Standards Department, Fisheries Division. However only Nile perch and prawn for export are inspected; but no other products consumed domestically. Almost all fish retailed are sold in street stalls and rarely handled in shops with adequate preservation equipment. Since street stalls are mobile, introduction of inspection system or sanitary licence together with business licence is difficult. In the case of urban area of Kenya, there are more shops and therefore, construction of shops under the sanitary guidelines and its permission is controlled by the Fisheries Division. Introduction of this kind of sanitary guidelines is a future issue and it is expected to be included in operation and management of the new fish market in Dar es Salaam.

Bacterial test on Nile perch products for export, inspection survey in the factories, and temperature examination on products at airports are implemented by the food inspection laboratory of Fisheries Division in Mwanza. Sanitation control on Nile perch products is required to meet EU standards and it is advised by the survey team from EU. After the ban of Nile perch export caused by the cyanide contamination, periodical survey of residual heavy metal and pesticides in fish/ lake/ water basin is legally obliged. Yet, being short of equipments in Tanzania, samples are sent to the laboratory of South Africa. In the coastal area, prawn products are inspected by Tanzania Standard Bureau (TSB) since there is no inspection laboratory owned by Fisheries Division. All factories for export products in Tanzania apply HACCP system, implementing secure sanitation standard. Yet, factories in Europe and America are requiring ISO9000s and soon Tanzania will be asked to follow.