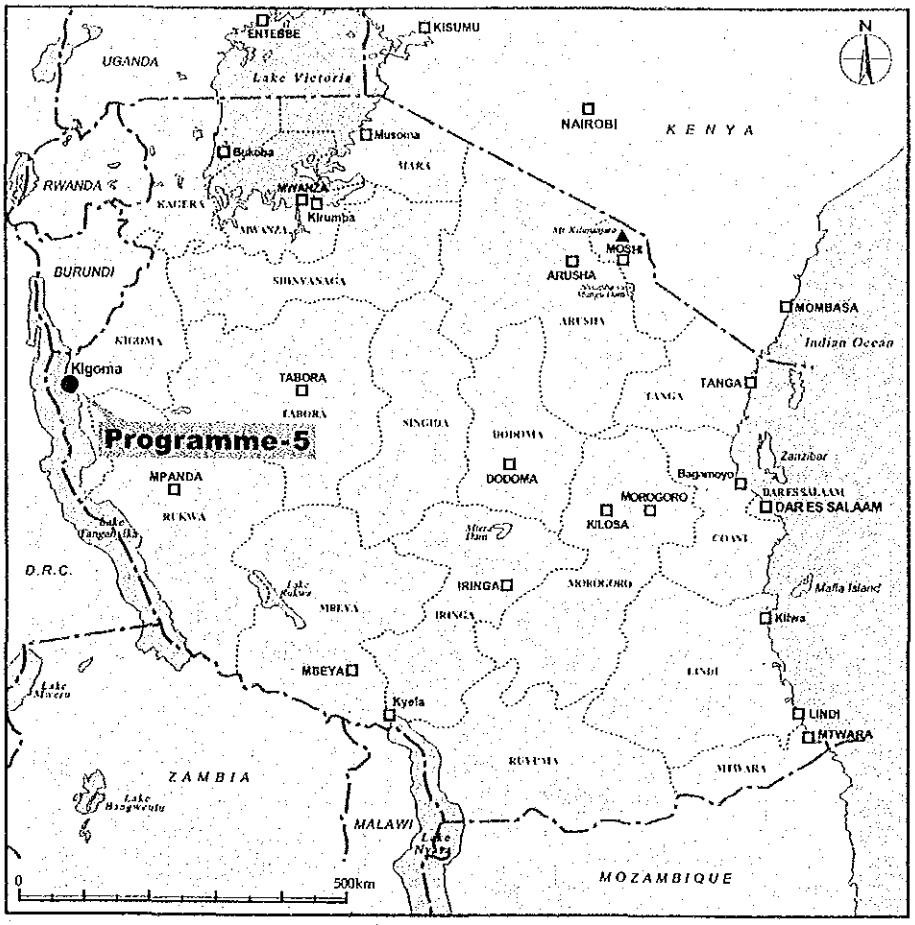
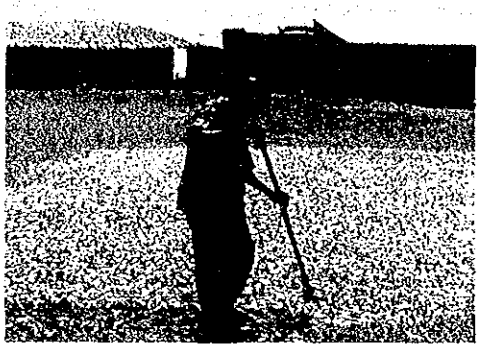
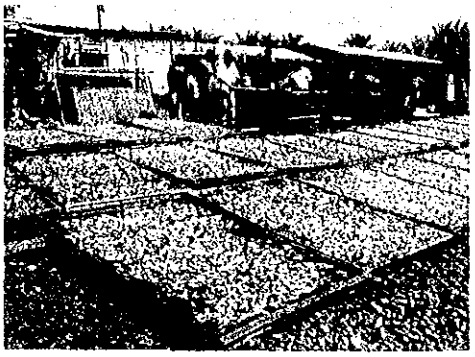
2.5 Lake Tanganyika Dagaa Fisheries Development Programme



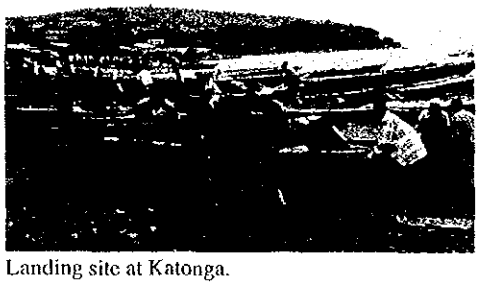
Planning site : Kigoma



Spreading and turning Dagaa to dry in the sun.

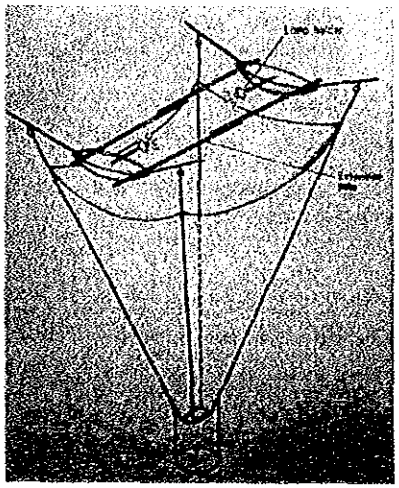


Drying Dagaa on wire mesh trays in Katonga.

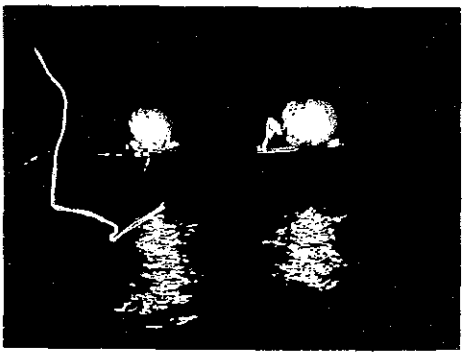


Landing site at Katonga.

Unloading Dagaa from boat at Katonga.



Lift net used for Dagaa fishing.



Night fishing for Dagaa using lamps to attract the fish.

2.5 Lake Tanganyika Dagaa Fisheries Development Programme

(1) Programme Description

A Programme Components

This programme is focused on the promotion of Dagaa production and trading in Lake Tanganyika. Increasing Dagaa production and availability of new Dagaa products for human consumption as table fish are target. This programme is consisted four components as follows;

Improve the fishing aggregate light component; This component is aimed to make high fish aggregating effect with adding the appropriate light reflection plate on the current using pressure lamp. The light reflection plate has a function to concentrate the light into the water than defuse to side direction and it brings highly effect as fish aggregating.

Improve the fishing method experiment component; This experiment component is to introduce the new fishing method like under water lamp, fish finder, soner. During the night, these equipment contribute to find the fish school easily and using the under water lamp induce the fish school to the fish net.

Smoking Dagaa Development component; This component targets that to expand the diversity of Dagaa market as human food by introduce making smoking Dagaa and also expecting to activate the invisible Dagaa market and consumer. This component is not only try to experiment newly processing method but also develop new kind Dagaa products.

Fish processing development component; This component is aimed to stable Dagaa dry processing with hot air drier not to be affected by weather through the year. To dry Dagaa with hot air drier is thought that easy to secure the food safety and contribute the decrease the post harvest loss especially during rainy season. The result brings stable and increase food supply.

B Location

Kigoma Region, Kigoma District, Katonga and Kibirizi

C Duration

Phase 1	24M
Phase 2	24M

(2) Objective and Justification

A Objective

This programme is aimed to reduce the post harvest loss of Dagaa products especially rainy season, to develop Dagaa processing method, facility and to enlightenment to the fishery folk for realize the well utilization of limited fishery resources, and its focus on Dagaa fishing to ensure the fishery products to supply for human food. In the meanwhile, for the fishery folk, to increase their net income in keeping current fishing pressure by introduce the new fishing method and develop the current fishing method.

B Justification

In Tanzania, the high population growth rate has led to a decline in per capita fish consumption. Dagaa from Lake Tanganyika is a potential resources to increase fish supply. Dagaa can mature within one year, which means that it is highly catchable kind of fish, can reproduce very easily and a

promising species. Present Dagaa production estimated at around 50,000 ton from Tanzanian water has not reached its full potential of an estimated 300,000 ton. Fishing technology research will contribute to the promotion of optimal exploitation of resources. However, research needs to pay attention to the problem of the fish stock decline, and also the other species that prey on Dagaa, i.e. Mgebuka, Nonji. There is much fishing pressure without active management system, and weak fisher organization for effective fisheries management. So, the monitoring system of Dagaa resources in the Lake should be installed. Reducing the post harvest loss of processed Dagaa in high catch rainy season is the most effective intervention to increase the supply for human consumption. Post harvest technology shall be the first priority. The pilot processing plant will aim at not only minimizing post harvest loss in rainy season, but also to improve the stable job opportunity for the processors. Enabling processing of Dagaa throughout the year will also contribute to stabilization of fish price and secure the income for the fishers and processors.

(3) Components and Activities

[Phase 1]

Activity 1 Improve the Fishing Aggregate Light Component

Under the current situation, there are two types of fish aggregating lamp, one is called pressured lamp and the other one is Colombus Lamp. Mostly Dagaa fishers use the pressured lamp. This pressurized lamp for agaa fishing is the same type which is common to all Tanzanian as a normal house use lamp and its price is not inexpensive, but easy to procure and also spare parts. On the other hand, the Colombus lamp is designed for on board use lamp in the boat, so its brightness is sufficient for fish aggregation, but it is too expensive for Dagaa fishers to own and maintain. The weak point of pressure lamp is that the light is defused to the side, and much of the light is reflected on the surface of the lake water and not penetrated into the water. This phenomenon is the key to improve the fish aggregating lamp. In this component, the reflective plate will be designed to direct as much light into the water and will result in a high efficiency fish aggregating lamp.

- Procurement of material to improve the aggregating lamp, and install the appropriate equipment, facility to execute the experimentation.
- Research and development on the optimal design, material, shape, duration of reflective plate.
- Production of test piece according to the result of Activity 2.
- On the job experiment to check the aggregating efficiency.
- Feedback the result of Activity 4 to Activity 2 and Activity3 to improve the test piece.

Activity 2 Improve the Fishing Method Experiment Component

Current Dagaa fishing method is to scoop up the school which are aggregated by fishing lamp. Fishing ground is not decided by scientific method but rather by drawing on fishers' past experience and sixth sense. In this component, modern fishing device like an under water lamp, fish finder, sonar will be installed to improve fishing efficiency. The biological behaviour of Dagaa is that it does not gather into school during day time but only after dark. So if fishers use the sonar or fish finder, it would be easy to find Dagaa school during night, and using under water lamp induce the school to the fish net. To discuss and research the possibility of fishing during full moon night which is normally not a fishing night.

- Procurement of material of under water lamp, fish finder and install the appropriate equipment, facility to execute the experimentation.
- On the job experiment to know the efficiency of fish aggregation and running cost.
- On the job experiment to know the possibility of full moon term.
- According to the result of above activities 2 and 3, design the standard equipment for underwater lamp fishing method.

Activity 3 Providing Fishing Boats and Demonstrating Experiment

Facilities for demonstrating experiment have to be obtained. Initially, TAFIRI will conduct experimental fishing using these demonstration fishing boats. After TAFIRI has trained the fishers to use the fish aggregate light and fish detection equipment, they lend the fishers the fishing boats and gear. TAFIRI to provide two fishing boats to fishers for experiment and promote better cooperation with fishers for comparing with previous fishing methods.

Activity 4 Short Term Training for Fishers and Workshop for Dissemination of Technology

New technology to be introduced to fishers through workshop at Katonga and Kibilizi. where the efficiency from fishers side can be inspected. New technology which have positive effect during experiment term will be introduced to fishers through short-term training lasting 1 to 2days.

Activity 5 Smoking Dagaa Development Component

It has the limitation to dry Dagaa during rainy season by the current sun drying method on the ground. In this programme to expand the diversity of Dagaa market as human food by introduce making smoking Dagaa using charcoal or fire wood and also expecting to activate the invisible Dagaa market and consumers. The facility of charcoal oven will be made for during rainy season to produce the smoked Dagaa. The smoked Dagaa will be put into small plastic bag and sealed with cooking recipe shall be attractive to consumer. This component should involve the processor, trader and retail seller of consumer market. The market research in the city will be carried out to study the market demand and catch the popular taste. It is contain that experiment method for smoked Dagaa producing and market research and development.

- Procurement for material and equipment to make smoke oven, sealer, warehouse to stock the products.
- Selection of participate for this component.
- Study for cost, duration to produce the smoking product.
- Producing and Selling the smoked products.
- Market research in the retail place.

Activity 6 Fish processing Development Component

This component is aimed to stable Dagaa dry processing with hot air drier not to be affected by weather through the year. To dry Dagaa with hot air drier is thought that easy to secure the food safety and contribute to decrease the post harvest loss especially during rainy season. The result brings stable and increase food supply. The current post harvest loss is more than 30% of whole production in rainy season and it is not available for human consumption. The phenomenon of post harvest loss are by decaying of the intestine, parasite infection, bag biting causing by uncompleted drying.

To introduce the fish drying plant for local government, NGO, fish processing corp. are thought in appropriately, but thinking over their capacity the operation ability is not reliable. One of the best way is to establish the fish processing public corporation by processor and give the education to build up their capacity, then introduce the processing plant. It is very important to make the consensus about the way of operation, how to provide the profit, how to share the cost etc among the stakeholders. The technology transfer for machine operation, maintenance, overhaul are also key point to sustain this plant.

- Build the fish drying plant house, procure the equipment and the material for the plant.
- Selection of participate for this component.
- Study for cost, duration to dry the fish.
- Market research in the retail place.

Activity 7 Training of Processing Groups

Workshop related to processing technique of Dagaa to be held at Katonga and Kibiliji with the aim of analysing the problem of drying process, possibility for further improvement, management ability, and organizing ability. At the workshop, talented group with high technique and motivation to be identified and plans for usage of facility and for training groups considering commission management of experimental processing facilities to be worked out.

[Phase 2]

Small finance for artisanal fishers and processors.

Activity 8 Micro-credit for Artisanal Fishers and Processors

Funding assistance is implemented to spread the technique which is introduced at phase 1 to fishers. Since micro-credit service has been under implementation by NGOs, Programme Office to give guarantee of micro credit service to fishers who belong to processing groups and project scheme.

(4) Facility and Equipment Plan

A Summary of Facility and Equipment

a) Basic policy of the design

The Kigoma area is one of the largest production ground of Dagaa in Lake Tanganyika, but the processing of Dagaa is done outdoors and in the rainy season, the quality drops and there is high post harvest losses. The unstable supply of Dagaa in the market during the rainy season leads to high fluctuation of price.

To overcome the above issues, drying facilities and storage warehouse is planned in order to provide stable volume and high quality even during the wet season.

b) General site condition

Kigoma is the largest city at the coast of Lake Tanganyika, and has good city infrastructure even compared to Dar es Salaam. The main facilities which are to be located at Katonga and Kibirizi are located in the suburbs of Kigoma, with a bus service from the town, and good road connection. Both locations are on flat ground, project site has enough area, and there is no problem with site security either. Electricity main supply is available from the access road in front of the project sites.

c) Outline of facilities plan

There will be two facilities, a warehouse for stocking and a drying plant to dry Dagaa. These facilities will be arranged on both sides of the work area to facilitate easy packing and distribution. In addition, access will be planned to allow transportation trucks easy access in and out of the site. Dagaa will be dipped into salt water contained in a concrete soak pit before drying in the drying plant. Waste water from the drying plant will be drained into a septic tank before discharge. Heating unit will deliver dry air to dry Dagaa for three or four hours.

Facilities Components

	Facility	Structure	Area (square meters)	Reference
A	Drying room	CB, metal roof, one-storied	75	
B	Warehouse	CB, metal roof, one-storied	120	
C	Soak pit	RC	2m(W)x1.5m(H)x1m(D)	
D	Septic tank	RC	2m(W)x3m(H)x2m(D)	

B Facility Design

Facility and Equipment	Amount	Description
1.1 Pressure lamp	30	Standard model in Tanzania
1.2 Material for reflector	---	Stainless, tool etc
1.3 Work table	1	For process reflector
1.4 Tool for process	1	For process reflector
1.5Lightmeasure instrument	1	
1.6 Planked boat	4	Total length 10m
1.7 Outboard engine	2	45hp
1.8 Lift net	2	15x15x10m
1.9 Fish box	20	40
2.1 Fish finder	2	
2.2Under water lamp and peripherals	2	Including onboard power generator
2.3 FRP boat	4	15
2.4 Out board engine	2	45hp
2.5 Lift net	2	15x15x10m
2.6 Pressure lamp	8	Standard model in Tanzania
2.7 Fish box	20	40kg
3.1 Smoking oven	2	$10m^2$
3.2 Warehouse	2	$10m^3$
3.3 Material for smoking		charcoal
3.4 Drying rack	40	1.5x2m
3.5 Packing Material		Polyethylene roll
3.6 Sealing device	2	Hot sealer
4.1 Hot air dryer	1	
4.2 Drying plant	1	$10m^2$
4.3 Warehouse for products	1	100m
4.4 Fuel tank	1	
4.5 Ware house for material	1	$20m^3$
4.6 Office		$20m^2$
4.7 Drying rack	40	1.5x2m

(5) Operation and Management Plan

A Management Plan

Regarding the improvement of the fishing aggregate light component, related material and equipment will be installed at TAFIRI KIGOMA. TAFIRI will manage these components. TAFIRI and Kigoma District fisheries office will do the joint marine examination. After the experiment and with good result, the enlightenment activity to the fishers will be carried out by Kigoma District Fisheries Office.

For Dagaa processing development component, the installed fish drying plant and equipment will *belong to Kigoma District Fisheries Office and selection of the users of this facility will be decided* by the local fisheries staff after discussion with local fishers. Users will be required to form an organization to manage and operate the facilities. The technical support / maintenance management for the drying equipment are not complicated, and a local engineer should be able to provide these support.

B *Plan of Workers Required*

Charge	Man	Month	Belongs
Programme coordinator	1	48	Kigoma District Fisheries High Ranking Officer
Staff	3	48	Kigoma District Fisheries Officer
Fishery expert	1	24	TAFIRI KIGOMA
Process expert	1	24	Foreign expert

***Working with NGO groups about popularization of processing technology*

C Training Plan

The training of Fishing equipment improvement can be carried out with one day lecture of experiment utility and improvement method by lending equipment for development to fishers own

The technique of processing training will be practiced regularly in the way of practical training method at new experiment processing factory. The facilities will be entrust to processing factory groups and on the job training will be implemented. Outside groups will have the possibility to participate in the training.

D NGO

NGOs such as TACARE, Pride Tanzania provide Micro-finance service in Kigoma. These NGOs offer instructions for fishers and train district fisheries division officers and officers at organization department. NGOs' active involvement as a project coordinator is expected in this plan.

(6) Work Plan

Activity	Resp.	Schedule	Output
[Improve the fishing aggregate light component]			
Procurement of material	TAFIRI		Install the material for experiment
Recondition of current facility and equipment	TAFIRI		Preparation Completed
Design reflection plate	TAFIRI		Completed test piece
On the water experiment	FD		Finalize the reflection plate
[Improve the fishing method experiment component]			
Procurement of material of under water lamp	TAFIRI		Install the material for experiment
On the water experiment	TAFIRI & FD		Compile the experimented data
Design standard type under water lamp	TAFIRI & FD		Establish the under water lamp fishing method
[Smoking Dagaa Development Component]			
Construct the smoke oven	TAFIRI		Completed the smoke oven
Select the participate	FD		Participate selected
Study for processing term and cost	TAFIRI		Estimate the profit
Sell the product	FD		Communicate the *smoking technique*
Market research	FD		Grasp the market needs and flavour
[Fish processing development component]			
Install the fish dry plant	TAFIRI		Fish dry plant stand by
Select the participant	FD		Participation selected
Study and timing for operation	TAFIRI		Reinforce the personal *capacity*
Market research	FD		Grasp the market needs and flavour

(7) Cost Estimate

Project section cost		Cost of construction (Tsh.)	(US$)	Reference
1. Cost of facility	A	11,250,000	9,411	Drying room
	B	13,200,000	15,058	Warehouse
	C	800,000	913	Soak pit
	D	2,000,000	2,281	Septic tank
	(subtotal)	(27,250,000)	(27,663)	
2. Deep well		3,000,000	3,422	
2) Fuel tank	equipment	1,000,000	1,141	
3) Heat unit		14,820,000	16,906	
Total project cost		46,070,000	52,554	
2. Material fee		37,050,237	42,265	ANNEX 2.6-1
Total		83,120,237	94,819	

Human cost

		Month	Unit cost ($)	Cost	
Programme coordinator	1	48	0	0	Kigoma District Fisheries High Ranking Officer
Staff	3	48	0	0	Kigoma District Fisheries Officer
Fishery expert	1	24	0	0	TAFIRI KIGOMA
Process expert	1	24	15,000	360,000	Foreign expert
Subtotal			15,000	360,000	

Training cost

	Man		Unit cost ($)	Cost	
Small scale fisher	60	Man Day	5	300	4times/yearx1dayx15manx1year
Small scale processor	360	Man Day	5	1,800	4times/yearx2dayx15manx3year
Subtotal				2,100	

(8) Cost Analysis

The processing plant will require an initial investment of about US$ 30,000, but it is estimated that with a profit of US$ 5,500 (after the depreciation payment) per month, recovery of the investment is possible in about 2 years.

For the administration costs, capital equal to or more than US$ 800 / time is necessary for materials costs in order to process the greatest volume. Connection with organization / small scale finance for the processors is necessary for a fund supply.

(9) Monitoring

The monitoring for the each component are done by donor agency basically, in the case if it is possible to find out the appropriate third party like a NGO, NPO, to hire such kind of organization shall be fine.

At the same time, a consideration should be made to assessment and monitoring of the fisheries resources and aquatic environment on the project activities. This will provide research to generate scientific information which will be the basis for management decision. For that purpose, fisheries groups are utilised for the data collection under the supervision of TAFIRI and district fisheries officers. The fishery officers follow up the fishing activities of each groups and give them necessary

guidance and instructions. Fishing log books are prepared and the groups are ordered to keep the log books recording every fishing operation including the following items. These data will be summed up periodically to observe their transition in long term.

- Fishing ground
- Fishing method, size of fishing gears
- Times of fishing operations
- Quantity of catch
- Main species

(10) Environmental Impact

The experimental fishing technologies research component of the project will have insignificant impact on the fisheries resources of the lake. As such, EIA would not to be required. However, the technologies developed from this research could have a significant impact during implementation and dissemination of these technologies. As a precautionary measure, awareness and importance of sustainable exploitation of the resources should be an integral part of the dissemination process to avoid over exploitation of the targeted fisheries resources.

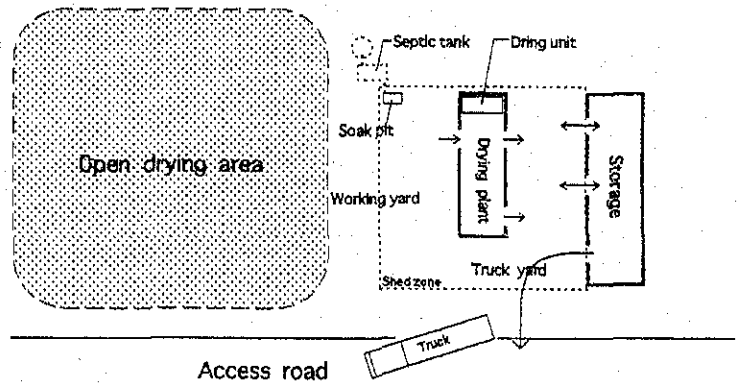
(11) Linkage

A Inter Sectorial Linkage

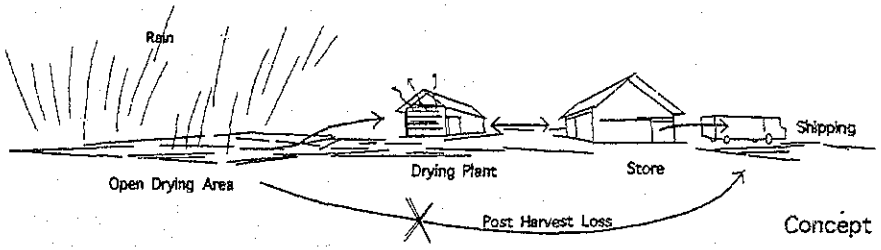
There is some possibility to be converted or adapted the developed fisheries technology by this programme in another water bodies. Fisheries Division and TAFIRI are expected to take an important role as Information coordination Hub to transmit and exchange the fisheries technology among the Tanzania and also international countries especially Lake Tanganyika countries.

B Project Linkage

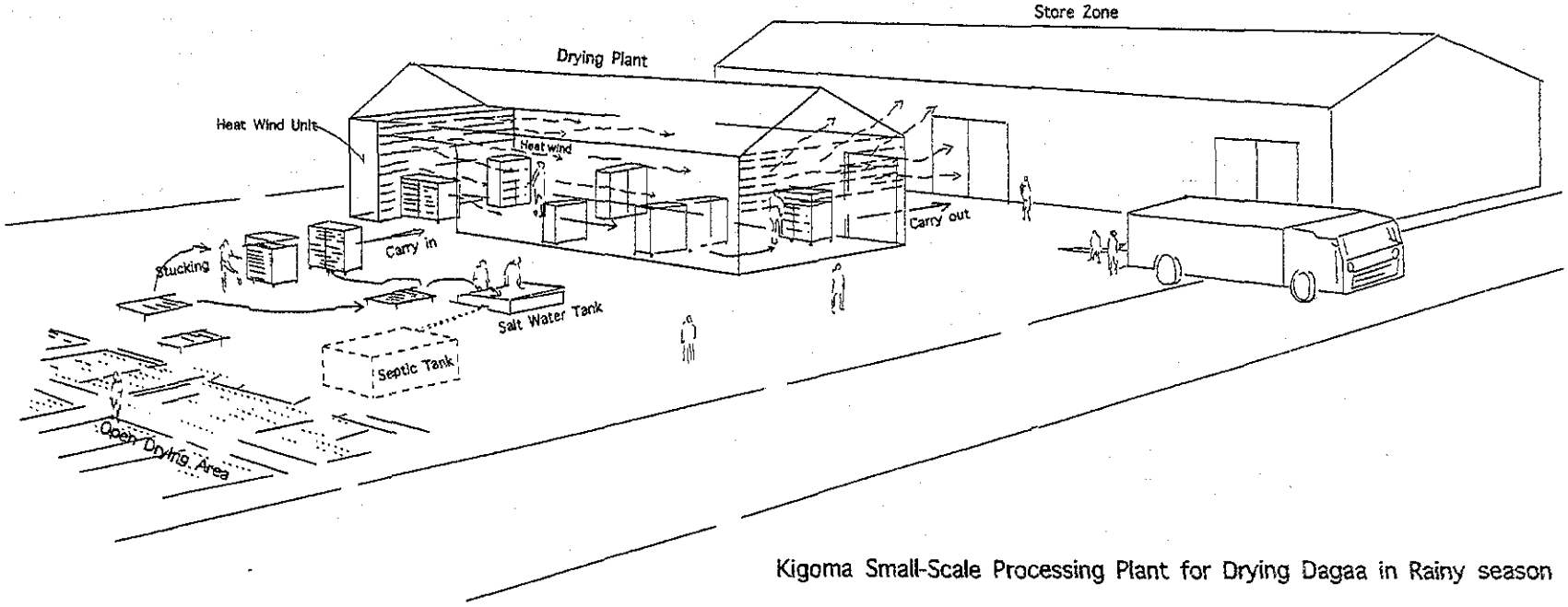
The aggregate light component is aimed as to put the light reflection plate attach on the current used pressure lamp and it is quite low cost to increase the fish aggregating effect. The purpose is to realize the decreasing the fishing cost and easy to install even low income artisanal fishers. While Improve the fishing aggregate light component is quite low cost implementation plan, the Improve the fishing method experiment component is needed budget to install the fish finder, under water lamp, so when the result of this component to local fishery folk, it is required the reinforce their economic condition such as by financial support system.



Concept Site Plan 0 10 m



Concept



Kigoma Small-Scale Processing Plant for Drying Dagaa in Rainy season

ANNEX 2.5-1

Facility and Equipment	No.	Unit cost (Yen)	Cost (Yen)	Cost (Tsh)
[Improve the Fishing Aggregate Light Component]				
1.1 Pressure lamp	30	2,000	60,000	444,514
1.2 Material for reflector	---	300,000	300,000	2,222,570
1.3 Work table	1	200,000	200,000	1,481,713
1.4 Tool for process	1	500,000	500,000	3,704,283
1.5Lightmeasure instrument	1	300,000	300,000	2,222,570
1.6 Planked boat	4	100,000	400,000	2,963,426
1.7 Outboard engine	2	500,000	1,000,000	7,408,566
1.8 Lift net	2	400,000	800,000	5,926,853
1.9 Fish box	20	1,000	20,000	148,171
[Improve the Fishing Method Experiment Component]				
2.1 Fish finder	2	200,000	400,000	2,963,426
2.2Under water lamp and peripherals	2	300,000	600,000	4,445,139
2.3 Pressure lamp	8	2,000	16,000	118,537
2.4 Fish box	20	1,000	20,000	148,171
[Smoking Dagaa Development Component]				
3.1 Material for smoking	10	2,000	20,000	148,171
3.2 Drying rack	40	2,000	80,000	592,685
3.3 Packing Material		5,000	5,000	37,043
3.4 Sealing device	2	100,000	200,000	1,481,713
[Fish Processing Development Component]				
4.1 Drying rack	40	2,000	80,000	592,685
Sub total			5,001,000	37,050,237

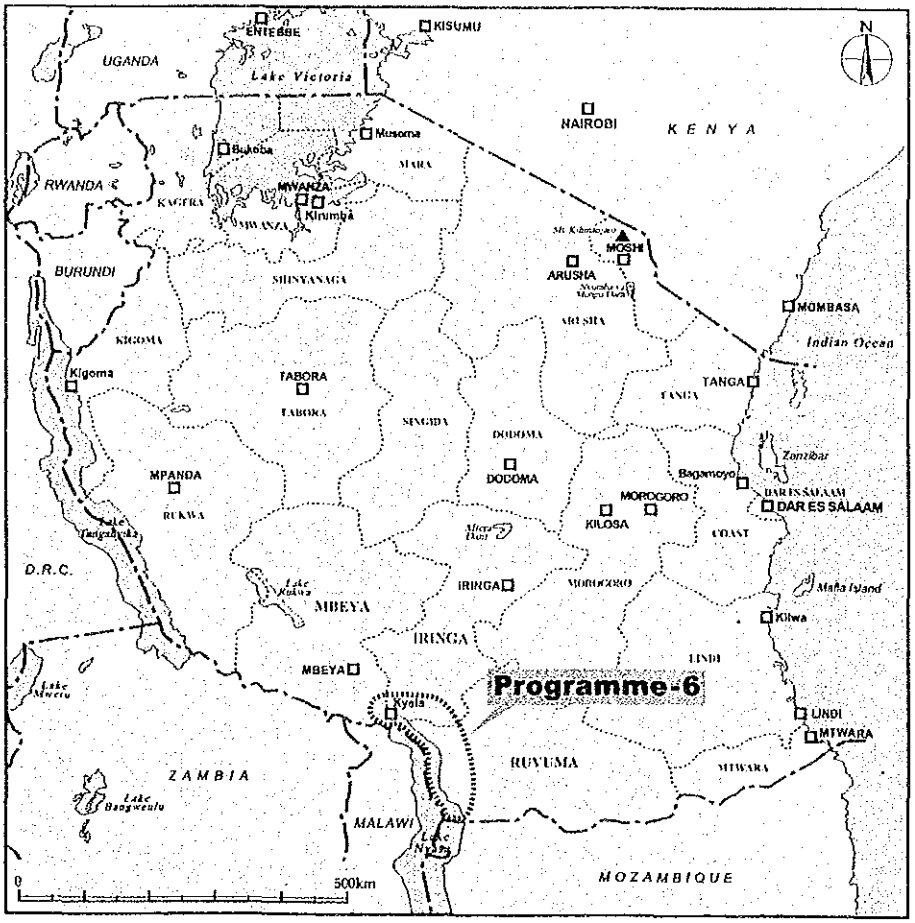
*1USD=876.62TSH=118.33YEN

ANNEX 2.5-2

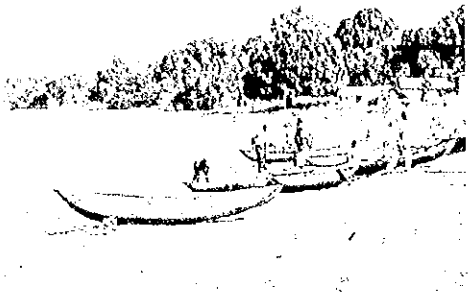
Comparative Advantage of Different Dagaa Dry Processing Methods

	Unit	Traditional	Drying rack	Drying plant	Reference
I. Gross Benefit					
Production (per processing)	(kg)	630	630	630	25% of fresh material, drying takes 2days for sun drying, 1day for plant
No. of processing /month	cycle	10	10	20	Drying takes 2days for sun drying, 1day for plant
Price of dried Dagaa (Tsh/kg)	($/kg)	1.2	1.5	2.0	Tsh.200×0.3+Tsh.1,500×0.7=1,110=$1.23 Tsh.200×0.3+Tsh.1,800×0.7=1,320=$1.47
Gross value of production (/processing)	($)	756	926	1,260	
II. Operation Cost					
Fresh Dagaa price	($)	0.4	0.4	0.4	Tsh.333=US0.37$/kg
Fish material cost	($)	832	832	832	*42 Boxes x60kg=2,520kg*
Packing material, other material	($)				
Labour 1	($)	23	23	23	Carrying fish from beach to processing area, Tsh.500=US$0.54/box×42 boxes
Rent for land	($)	23	23	23	Tsh.500=US$0.54/box×42 boxes
Fuel	($)			49	5L/h (kelosine)×Tsh.600/L×15h
Electricity	($)			5	
Maintenance	($)	0.0	1.3	8.0	10% of invest. Cost /120 processing for sun drying, 10% of invest. Cost/240 processing for plant
Sub-total	($)	877	879	939	
Gross profit (per month)	($)	(1,214)	474	6,413	
II. Investment cost					
Processing plant	Building($)			9,411	45㎡×US$200/㎡
	Facilities($)			18,047	Kerosene burner, Fan, Fuel storage
	Drying rack($)			1,720	Trey 400 piece (0.8×1.0m)=Tsh.4,000=US$4.3/trey
	($)			400	20Cart (1.0×1.2m)=US$20/cart
Drying rack	($)		1,650		Trey 300 piece (1.0×1.2m)=Tsh.5,000=US$5.5/trey
Sub-total	($)	0	1,650	29,578	
IV Depreciation (month)	($)		34	880	2 years life for facility & equipment, 20years for building
Monthly net profit after depreciation	($)	(1,214)	440	5,533	
V. Monthly profit per member	($)	(121)	44	553	Profit will be shared by 10 members

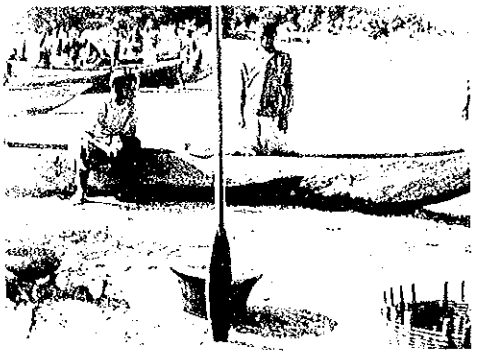
2.6 *Lake Nyasa Planked Canoe Extension Programme*



Planning area : Mbeya Region, Iringa Region, Ruvuma Region



Traditional dugout canoes used on Lake Nyasa.



Traditional dugout canoes used on Lake Nyasa.

Typical fisher's house on the shore of Lake Nyasa.

Mbasa from Lake Nyasa seen at Kyela Fish Market.

2.6 Lake Nyasa Planked Canoe Extension Programme

(1) Programme Description

A Programme Components

This is the programme that establish the Lake Nyasa Fishery Technology Expansion Centre in Kyela to develop the fishery technology in the harmony with biodiversity concept and sustainable fishery resources. This centre involves two kinds components, one is "Diffusion of planked boats component" and the other one is "Introduce the sail technology". Diffusion of planked boats component is bring up the local boat builder to convert the dug out canoes to planked boat. The sail technology component is to introduce the use of sail to the local fishery folk to encourage their fishing activity.

B Location

Mbeya Region, Iringa Region, Ruvuma Region

C Duration

Phase one : 36 month

(2) Objectives and Justification

In this programme, focus on developing fishing technology especially boat operation technique and boat building material compare to the another water body, and it is contribute to the safety and eco-friendly fishing, also preserve the forest resources. The aim is mainly defuse the appropriate fishery technology to the Lake Nyasa area keeping good harmony with nature.

Currently, all fishing boat in Lake Nyasa are dug out canoe for fishing. The material of dug out canoe is taken from threes of 40 to 80 yeas in age and if the ratio of different types of material wood and its duration is between one and five years. The calculation shows that 1,080 large trees are cut every year for constructing canoes. Adding the place for make dug out canoe is deep inside of forest so, usually the tip from the dugging are used for fire wood, but the place is too far so those tips are not used completely only to be disposed. Therefore, also from the viewpoint of preservation of forest resources, it is necessary to promote the replacement of dugout canoes with planked boats. And the fishery folk use the paddles for moving to the fishing ground, so it is very limited area where they can go. From the point of view for increase their income and increase the products, to install the out board engine according to convert to planked boat from dug out canoe is one option, although this option is need high investment for the fishery folk and it is not easy for then secure they financial condition , also it is difficult to say cover the running cost by increased fish products. Under this consideration, introduce the sail to operate the planked boat is good for them cause its low cost and almost no running cost but needs sail operation technique.

(3) Components and Activities

A Diffusion of Planked Boats Component

In this component, to establish the fishery technology expansion centre to encourage small boat builder and teach them how to make planked boat. And for the fishery folk make them educate to recognize how important keeping forest resources and introduce them to convert their canoe to planked boat.

Activity 1: Procure the material for making planked boat and boat building equipment and facility

Activity 2: Study for designing the planked boat which achieve high stability with out rigger and appropriate shape for the sail.

Activity 3: According to the result of above activity 2, invite the boat building technician from private companies in Kigoma to the centre.

Activity 4: Execute the training and lecture to the participant as local canoe builder and its cadet from fishing village.

Activity 5: Give education and enlightenment for the fishery folk on conversion to planked boat.

B Introduce the Sail Technology Component

In this component, teach to the fishery folk how to operate the sail using the planked boat which is built by the above component 3.1. This kind of technique is not applied in the Lake Nyasa area, so even aged fishery folk and young one stand on the same start line to learn the sail operation. It is thinking that to support young fishery folk who are eager to learn new knowledge and new skill but has no strong economical base. To encourage such kind of fishery folk is very important and give them good education about the fisheries are good investment for the future fishery.

Activity 1: Procure the small scale model boat for class room, and real sail boat for On the water training.

Activity 2: Selection of participants

Activity 3: Invite the lecturer who execute the study in the class and on the water

Activity 4: Class work using the model boat to learn basic knowledge

Activity 5: On the water training to operate the sail.

(4) Facility and Equipment Plan

Facility and Equipment	No.	Specification
1.1 Boat building tool	2	Tanzania Standard for wooden boat
1.2 Wood material for boat building	——	Hard wood
1.3 Other equipment	——	Nail, cotton etc,
1.4 Black board	1	3 x 1.5m
1.5 Table and Chair	10	
2.1 Planked boat	3	Total length 5m, with out rigger
2.2 Gill net	3	4 inch
2.3 Boat yard (Boat building work shop)	1	200m^2
2.4 Class room	1	50 m^2
2.5 Warehouse	1	50 m^2
2.6 Other facility (bathroom)		

(5) Operation and Management Plan

A Management Organization

This programme will be taken the responsibility by Ministry of Natural Resources and Tourism for overall, and TAFIRI Kyela will implement the project in collaboration with other relevant institution and authority. The programme activities at the field level mostly are carried out by District Fisheries Officer (or District Natural Resource Officer) and her/his staff. Basically District Fisheries Officer as a head of District officer will have responsibility for programme execution. This centre will be settled

and managed by TAFIRI Kyela. The technology transfer to the fishery folk and enlightenment to them by TAFIRI Kyela and Kyela Natural Resources Office under corroboration. The expert for small boat building will be dispatched or Technician from Kigoma will be needed as a boat build instructor. And required volunteers for enlightenment on environmental issue or village development will be dispatched.

B Personnel Plan

Charge	People	Belongs	Period
The head of Lake Nyasa Fishery technology expansion Center	1	Chief of a fishery section of Kyela	36 months
Staff	1	Fishery section officer of Kyela	36 months
Staff	2	Fishery section officer of Kyela	36 months
Boat build instructor	1	Invite a master carpenter in Kigoma Choosing a person from Recommended by Fishery section of Kigoma	18 months
planked boat operate instructor	2	Invite fishers in Kigoma Choosing a person from Recommended by Fishery section of Kigoma	2 months

(6) Work Plan

Activity	Resp.	Schedule	Output
Diffusion of planked boats component			
Procurement of material	TAFIRI		Install the material for boat building
Recondition of current facility and equipment	TAFIRI		Preparation Completed
Design the planked boat	TAFIRI		Completed test piece
Recruit of trainer	FD		Get the trainer
Training for participants	FD		Execute training
Enlightenment for Fishery folk	FD		Decrease the number of dug out canoe
Introduce the sail technology component			
Procurement of planked sail boat model	TAFIRI		Get the teaching material
Selection of participate	FD		Selected trainee
Recruit the trainer	TAFIRI		Get the trainer
Class work	FD		Learn the sail operation theory
OJT	FD		Learn the operation technique on the water

(7) Cost Estimate

Project section cost		Cost of construction (Tsh)	(US$)	Reference
(1) Cost of facility	A	26,000,000	29,659	boat building work shop
	B	5,500,000	6,274	
	C	5,500,000	6,274	
	(Subtotal)	(37,000,000)	(42,207)	
Equipment		2,000,000	2,281	
Total project cost		39,000,000	44,489	
(2). Material fee		22,814,459	26,025	ANNEX 2.-1
Total		61,814,459	70,514	

Human Cost

	Unit cost	Month	(Tsh.)	(US$)
boat build instructor	US$850/week	18 months	53,649,144	61,200
the planked boat operate instructor	US$850/week	2 months	6,641,016	6,800
Total			59,610,160	68,000

Training Cost

		Week, Man	(Tsh.)	(US$)
Trainee Plan (for popularization of planked boat)	US$5/day	2 weeks, 20 men	1,227,268	1,400
Trainee Plan (for introduction of operation and sailing technique)	US$5/day	1 week, 20 men	613,634	700
Total			1,840,902	2,100

(8) Monitoring

The monitoring for the each component are done by donor agency basically, in the case if it is possible to find out the appropriate third party like a NGO, NPO, to hire such kind of organization shall be fine.

At the same time, a consideration should be made to assessment and monitoring of the fisheries resources and aquatic environment on the project activities. This will provide research to generate scientific information which will be the basis for management decision. For that purpose, fisheries groups are utilised for the data collection under the supervision of TAFIRI and district fisheries officers. The fishery officers follow up the fishing activities of each groups and give them necessary guidance and instructions. Fishing log books are prepared and the groups are ordered to keep the log books recording every fishing operation including the following items. These data will be summed up periodically to observe their transition in long term.

- Fishing ground
- Fishing method, size of fishing gears
- Times of fishing operations
- Quantity of catch
- Main species

(9) Environmental Impact

This programme is not expected to impact significantly on the natural environment, therefore EIA would not to be required.

The impact of the promotion of planked boats will likely be an indirect benefit in the reduction of deforestation pressure. The availability of planked boats will reduce the need to fall big trees to make dugout canoes and give the fisher community the possibility of having bigger boats to fish more effectively. The dissemination of planked boat building knowledge to the needy fishing communities in Lake Nyasa will afford them a wider choice to improve their welfare through better fishing equipment.

(10) Linkage

A Inter Sectorial Linkage

This kind of technique has been used in another water bodies, so Fisheries Division and TAFIRI are expected to take an important role as Information coordination Hub to transmit and exchange the fisheries technology among the Tanzania and also international countries especially Lake Nyasa countries.

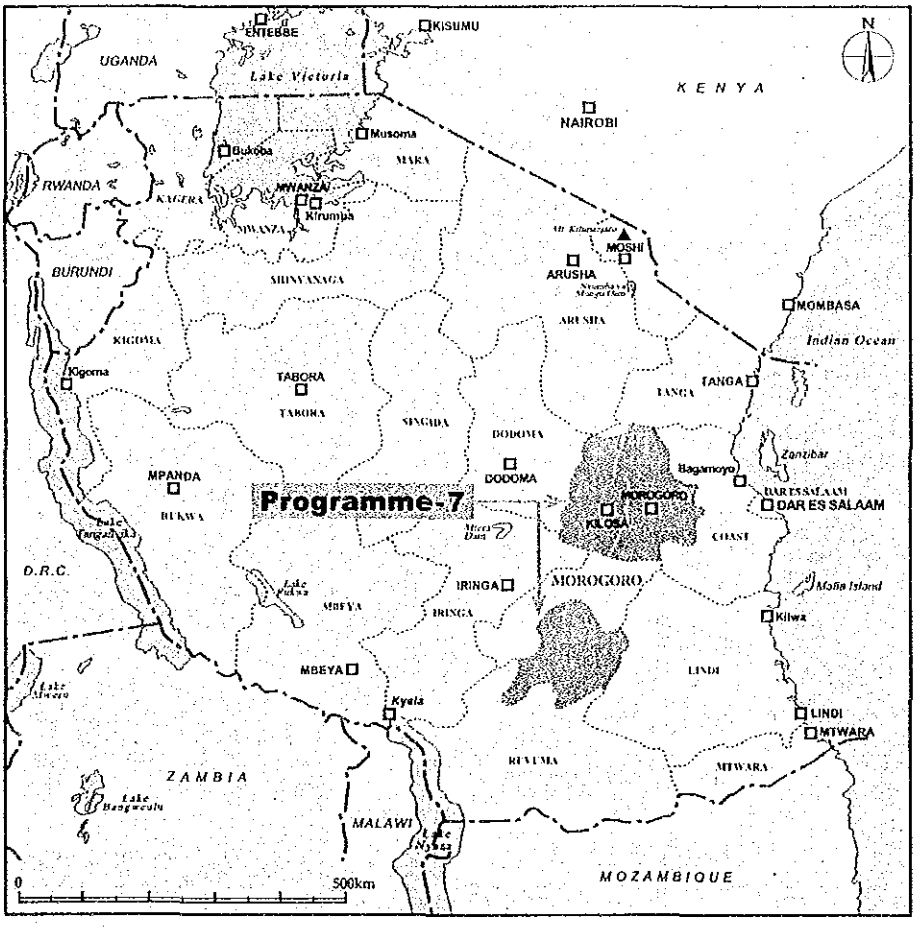
B Component Linkage

This component has very important issue as an environment factor, although it is something hard for the fishery folk to know the importance to them, cause it does not make a profit for fishing activity. So to introduce the sail technique which make them available bring to far fishing ground, and give them more opportunity to fish. Adding introduce the out-rigger give them more stability of the boat on the rough Lake condition, contributing to safety on the water.

Annex 2.6-1

Component	Quantity	Cost(Tsh.)	Cost(US$)
1.1tool for boat building	2	7,408,265	8,451
1.2wood material for boat building	20	2,963,306	3,380
1.3other material	---	100,000	114
1.4Black board	1	2,222,480	2,535
1.5Table, Chair	10	370,413	423
1.6Planked boat	3	749,998	856
1.7Gill net	3	8,999,997	10,267
Total		22,814,459	26,025

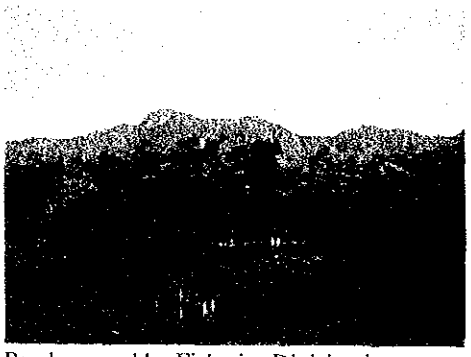
2.7 *Aquaculture Extension Programme*



Planning area : Morogoro Region

Fish tanks at Kinguluwira National Aqua-culture Center at Morogoro.

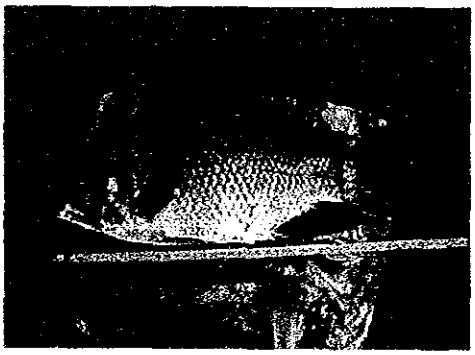
Fish ponds at Kinguluwira National Aqua-culture Center at Morogoro.



Ponds owned by Fisheries Division in Morogoro city.

Fish ponds at Kinguluwira National Aqua-culture Center at Morogoro.

Private fish pond in Mgeta village, Morogoro District.



Tilapia (*O. niloticus*) which is cultivated in Kinguluwira National Aqua-culture Center at Morogoro.

2.7 Aquaculture Extension Programme

(1) Programme Description

A Summary

In Tanzania where the fish supply from natural fisheries is abundant, the relative importance of a cultured fish supply is still in its intermediate stages Under this programme, a survey will be carried out on the potential implementation of two types of culture activities at the National Aquaculture Centre in Morogoro state, i.e., commercial based culture of Tilapia and catfish and self-sustaining fish culture operations. In addition, suitable aquaculture sites in the state, culture methods, and the market will be studied. Morogoro state is located inland and its access to fish supplied by natural fisheries is limited. Therefore, the potential for aquaculture development is high. In addition to the construction of the National Aquaculture Centre, FAO and SADC have implemented aquaculture extension projects in the state. However, due to the inability to secure a water source and the lack of continuous extension services, these projects have not been very successful. Past projects will be reviewed in this programme. A detailed survey will be conducted to designate water resources suitable for aquaculture, to study extension activities that are linked with the agricultural sector, and to assess the marketability of cultured fish.

B Project Region: Morogoro Region

C Duration: Phase 1 (12 months)
Phase 2 (24 months)

(2) Objectives and Justification

A Objectives

a) The volume of cultured fish will be increased, in view of the region's dependence on fish supplied from outside the region to meet the fish demand of the urban and farming communities.

b) The factors that have impeded aquaculture extension activities will be pinpointed and suitable aquaculture sites in Morogoro state will be identified, a culture training model will be developed, and a strategy for culture extension activities will be formulated.

c) Aquaculture data and training activities will be provided for farmers and companies engaged in culture activities. Input in the aquaculture industry will be promoted and new revenue generating opportunities will be created.

B Appropriateness of the Project

In contrast to a yearly increased fish demand due to a 2.4 percent population growth rate in Tanzania, the modernization of the fisheries sector that supplies the fish has lagged and production has stagnated. Simultaneously, the slow development of a marketing infrastructure has made fish difficult to obtain in the inland areas that are removed from the coastal regions or Lake Victoria where a surplus fish production exists. Presently, dried Dagaa is the fish product that is marketed throughout the entire country, and the low diversity in fishery product, and the flavour of Dagaa itself have limited fish consumption. According to the poverty eradication strategy paper, 43 percent of Tanzanian children under the age of five years are short in height and suffer from developmental disorders, of which 18 percent suffer from severe malnutrition. This is especially prominent in the inland farming communities. The daily nutritional intake volume in Tanzania is 1,940kcal (FAO statistic, 1999) which is greatly below the average of the African continent (2,411kcal). A major

cause is surmised to be the low animal protein intake volume (average in Africa 12.3/day: 9.8g in Tanzania). Since a sudden improvement in the marketing infrastructure is not anticipated, the fish supply in the inland urban and rural areas will be greatly dependent on cultured fish production.

From a long-term perspective, Tanzania's fishery resources, especially at some of the fishing grounds that are easily accessible by artisanal fishers, it is surmised that maximum fish production levels have been reached. Hence expanding and increasing aquaculture production nationwide as an alternative to natural fisheries will guarantee a stable food supply.

The price of fresh fish is high at Ths.500-1,500/kg. Aquaculture production carried out by farms as a cash crop activity is an effective means of increasing the cash income of farmers in conjunction with beekeeping and arboretum cultivation. In the case of extensive aquaculture, special equipment and materials are not needed. Therefore, it has a high potential to become a part of composite farming since labour to excavate ponds and feed can be supplied from the village.

Since aquaculture can be a nutritional supply and a source of cash income, aquaculture extension projects were implemented in Morogoro, Lindi, and Mtwara states in the 1980s to 1990s, but they were not successful due to three major impeding factors: 1) selection of an inappropriate culture site, 2) lack of adequate understanding about aquaculture by the farmers and lack of adequate training, and 3) inadequate support system for fish culture farms. The productivity of culture ponds is greatly affected by the amount of water available throughout the year. If there is a dependence on rainfall water, many of the farms often abandon the ponds following a year of minimal rainfall. Thus training to strengthen farmers' knowledge about aquaculture before they begin culture activities is important. In the past, training activities have only consisted of basic lectures and demonstrations at model culture ponds for several days. An educational programme consisting of guidebooks, videos, and observation trips has not been conducted. When problems such as a slow growth rate of fish is encountered, many of the farms give up aquaculture without trying to resolve the problem due to inadequate training. Because work records are not kept, it has made assessments about the profitability of aquaculture in comparison to other activities difficult. In order to disseminate culture activities, the continuous technical support of the district fisheries officers and extension personnel is essential, in addition to improving the farmers' knowledge. Although there are five technical experts at the Morogoro National Aquaculture Centre, their supervisory tours of the villages have stopped since 1997 when the ALCOM Aquaculture Project ended due to the lack of a budget and transport means. This lack of access to technical guidance has greatly reduced farmer input in aquaculture activities. In addition, surveillance activities and controlling the theft of fish, which is one of the major problems in aquaculture, at the village level is essential, but a support system for culture activities by the village council or resident groups is nonexistent.

Despite the recognition of the importance of aquaculture, the three issues explained above must be carefully resolved to implement culture extension activities, in view of past experiences. Since the culture environment differs greatly according to region, the designation of sites suitable for aquaculture, understanding the farmers' training needs, establishing a support system, and reviewing the potential implementation of culture extension activities are exceedingly important. Morogoro state is located 350km inland from Dar es Salaam. The basic function of the National Aquaculture Center in Morogoro state is to provide culture training and seed supplies. With the support of ALCOM and NGOs, there are more than 200 culture ponds that are still in operation. By strengthening the activities of these existing aquaculturalists, the spread of culture activities in the neighbouring areas becomes possible. The Sokoine Agricultural University in Morogoro which is a potential source of extension support is presently receiving Japanese assistance. In addition, the Regional Development Centre possesses rural community development technology and recruiting the cooperation of such institutions will make advanced technical assistance a possibility.

Although the precipitation volume is relatively low at 600mm to 1,200mm, a potential water source exists by using the gravity approach that uses the high and low topography of the 300m to 600m hilly regions of the Uruguru mountains in the state. In terms of market viability, the capital city of Morogoro has a population 200,000 at present (population growth rate of 4.6 percent) and a regular

fish market exists. An annual volume of 1,500 tons of fish from the coastal region and the rivers of other states is shipped to the market. In view of these prevailing conditions, the competitive viability of locally cultured fish exists.

(3) Components and Activities

[Phase 1]

The potential of aquaculture extension activities in Morogoro, Kilosa, and Ulanga districts in Morogoro state will be surveyed. Kilonbero district was excluded from this survey since a thriving river fisheries exists due to the Kilonbero River. There are 411 farms in the three districts that are targeted. The survey items and output are as follows.

Water source survey: The district Fisheries Division will conduct an interview survey of the village representatives and using a 1/50,000 map, they will screen rivers that do not dry up and villages possessing ponds. For villages possessing a potential water source, a survey team will be dispatched to prepare a water usage map based on a water and ground quality survey and assessments of resident participation. The existence of potential water usage for aquaculture activities will be evaluated.

Survey on training needs: An interview survey of farms engaged in culture activities and farms that are not involved will be conducted to grasp the degree of farmer understanding about aquaculture. Based on the data obtained, a training programme and training equipment (video, literature) will be developed.

Survey on an Aquaculture Support System: The system of seed supply, technical supervision, and extension activities will be evaluated. A system that will ensure the sustained village tours of the National Aquaculture Centre, district fisheries officers, rural development personnel, and agricultural extension personnel will be created.

Survey on potential small financing for culture activities: A survey on the existing system of small-scale public financial assistance (women's development fund and the youth development fund) and the use of credit by NGOs will be surveyed. The construction costs of small culture ponds (100 to 200m^2) is a low Tsh.100,000 to 200,000. Therefore, the use of the existing micro credit scheme for non specialized culture activities will be studied.

Drafting an aquaculture and training plan: Based on the findings obtained from the surveys listed above, an aquaculture extension and training plan will be drafted.

[Phase 2]

Basic education for the Fisheries Division personnel, agricultural extension personnel and rural community development personnel in Morogoro state will be conducted. Priority will be given to villages with water sources that can be utilized for culture activities that were pinpointed in the water source survey conducted in phase 1.

Training for aquaculturalists: To develop basic understanding of aquaculture activities, workshops will be held in high potential aquaculture areas and farming communities. A short training workshop in culture methods, selecting suitable sites, means of financial access, and others will be provided to farmers who have expressed interest in participating in the workshop. The farmers will be expected to construct their own ponds in this project and the aim is to provide free technical service in order to encourage farmers to engage in culture activities.

Establish village aquaculture cooperatives: As the experiences of RIPS has shown, the major problem in aquaculture is theft. Therefore, the most effective countermeasure is for the ponds to be located adjacent to the homes. Further, by mobilizing the village in promoting aquaculture, surveillance activities and a theft prevention network can be efficiently established. Utilizing the existing agricultural cooperatives to undertake aquaculture as a group activity will also be greatly beneficial in

facilitating the spread of shared technology. Therefore, discussions with the village and cooperative leaders will be held to promote a village level extension strategy, agricultural cooperative extension, and to organize aquaculture farms. Since it is also important to establish a system of communications between the villages and the project, linkage with the regional government's agriculture, cooperatives, and rural community sections will be established.

(4) Facilities and Equipment Plan

New input will not be made in this programme. However, the following equipment and materials will be needed to conduct the survey.

	Quantity	Unit	Note
Car 4WD	1	No.	for research
Motor cycle	5	No.	for research
Copy machine	1	No.	for working on report
Personal computer	1	set	for working on report
Visual and Audio materials	1	set	for training facility

(5) Operation and Management Plan

A. Management System

The Morogoro National Aquaculture Centre will be designated as the programme implementing body and a programme office will be set up at the centre. This programme will be implemented in three districts and a district Assistant Fisheries Officer, who will be placed under the supervision of the Programme Coordinator, will be responsible for overseeing the surveys and extension activities in each district. There are currently seven staff members employed at the National Aquaculture Centre (5 technical supervisors and 2 watchmen), but the director of the centre is also in need of training. Therefore, the guidance of a foreign expert will be needed during the duration of the programme. A team of experts created by the Fisheries Division will implement the surveys that will be implemented with the participation of district officers and the village residents. The experts will be recruited from TAFIRI, the Nyegezi Freshwater Fisheries Training Institute, and the Mbegani Fisheries Development Centre.

B. Staff

	Period	Source
Programme coordinator	24months	Foreign expert
National Programme coordinator	24months	Morogoro national aquaculture Institution
The team of investigating potentiality of aquaculture	12months	
Utilization		Morogoro Agricultural Uni.
Aquaculture Diffusion Institution		Headquarters of Fisheries Division
Rural Development (Participatory)		Morogoro Agricultural Uni.

(6) Work Plan

Phase1	Implementing organization									
Investigating potentiality of aquaculture										
hearing survey, pre-survey	District Fisheries Division Office	—								
Utilization										
training			—	—						
Aquaculture Diffusion Institution										
planning					—					
Phase2										
Training of Officer						—	—			
Training of Farmer						—	—	—	—	
Training of Society							—	—	—	

(7) Cost Estimate

	Period	Unit	Unit price ($)		
Programme coordinator	24		20,000	480,000	Foreign expert
National PC	1			0	Officer at NADC
Officer at NADC	5				Officer at NADC
The team of investigating potentiality of aquaculture					
Utilization	90	days	170	15,300	Sokoine agricultural uni.
Aquaculture diffusion	90	days	0	0	Fisheries Division
Rural Development	90	days	170	15,300	Sokoine agricultural uni.
Sub-total				510,600	

Operating Costs

	Unit price ($)	Unit	Period		
Survey Trip cost	160	trip	100	16,000	40 villages x 2 years, 4 times/year
Training cost (farmer)	2,000	people.day	5	10,000	400 people x 5 days
Training Cost (officer)	450	people.day	40	18,000	3 districts x 5 people x 30days
The development of teaching materials cost	1,000	set	10	10,000	
sub-total				54,000	

Equipment

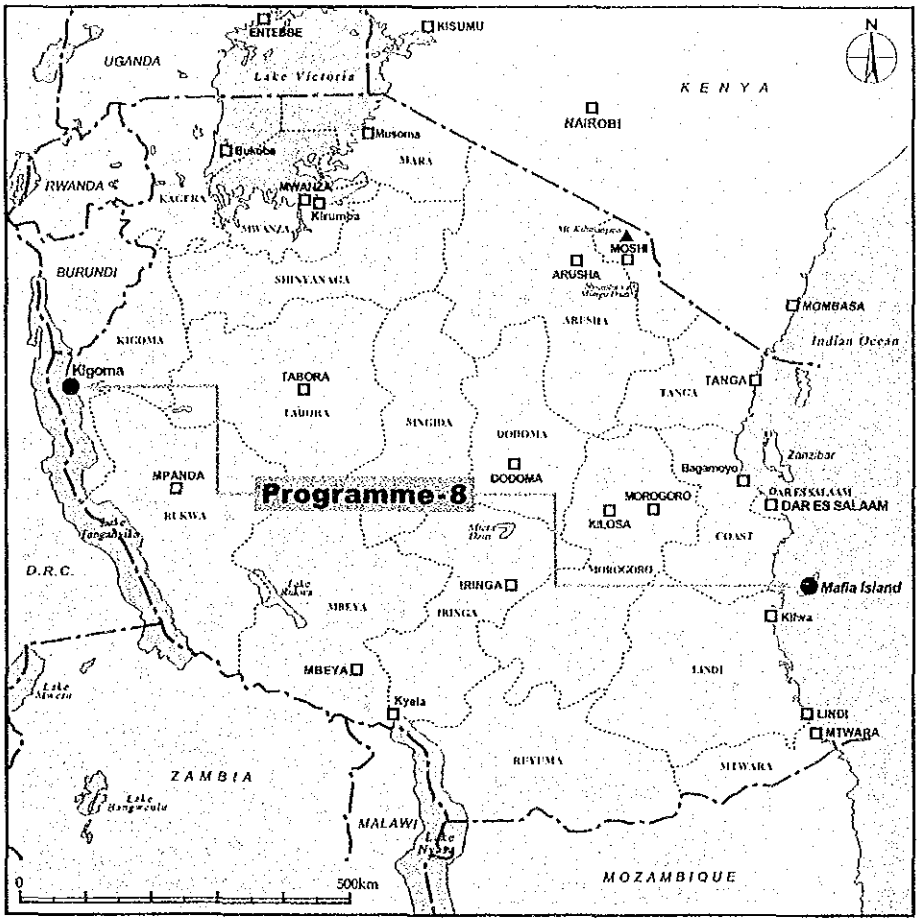
	Quantity	unit	unit price ($)	
Car 4WD	1	ë‰	30,000	30,000
Motor cycle	5	ë‰	3,000	15,000
Copy machine	1	ë‰	3,000	3,000
Personal computer	1	set	3,000	3,000
Visual and Audio materials	1	set	10,000	10,000
sub-total				61,000

(8) *Environmental Impact*

This programme does not involve extensive construction components and as such does have significant negatively impact on the natural environment. As such, EIA would not be necessary.

The potential impact for the successful proliferation of aquaculture activities will be to reduce fishing pressure on the natural fisheries resources. Care should be taken to ensure that the aquaculture activities do not cause undue pollution load to the water body.

2.8 *Fisheries Financial Support Programme*



Planning site : Kigoma, Mafia Island

2.8 Fisheries Financial Support Programme

(1) Programme Description

A Summary

The object of this programme is to establish the credit system with low interest rate for small-scale fishers to make them to purchase capital goods such as fishing boats, outboard engines and fishing gears. In order to accomplish this object, revolving funds will be established directly between fisher' groups and district authorities. But considering the fragile situation of local finance especially in districts, it is necessary for Fisheries Division to assist the districts, which attend to promote fisheries in their district using Fisheries Development Fund (FDF) practically as a revolving fund.

B Target Area: Phase 1: Mafia district
Phase 2: Kigoma district

C Term: Phase 1: 24 months
Phase 2:24 months

(2) Objectives and Justification

A. Objectives

There are many fishers who are lack of financial resources to purchase out-board engine and/or fishing gears, therefore it is needed to establish credit system for small-scale fishing with low interest rate. But the credit scheme from foreign donations, such as Kigoma and/or Kagera Fisheries Development Programmes, were misunderstood to be a grant, and showed low repayment ratio. As a result, these credit schemes could not continue after the foreign aids stopped. In this programme, the sustainable credit scheme combining foreign fund as a seed and "District Fisheries Development Fund" (based on fish levy) are proposed.

In order to keep high repayment ratio, it needs to use the know-how of NGOs practically. The interest rate should be set at the minimum lending rate as 5% of Central Bank of Tanzania.

B. Justifications

Micro-credit schemes managed by NGOs show high repayment ratio in Tanzania such as Pride Tanzania. But the interest rates were very high, therefore it was very difficult for fishers to access such credit schemes to purchase capital goods. They asked several results of repayment to make possible to get enough money to buy these capital goods.

On the other hand, there appeared fishers' groups that had purchased capital goods as Tsh. several million, and continued repayment by their efforts and financial supports by districts.

This programme aims to establish a suitable credit scheme for fishers' groups in the process of assisting "Marine Fisheries Sub-sector Capacity Building Programme" and "Dagga Fisheries Development Programme in Lake Tanganyika".

(3) Components and Activities

In this programme, two steps of revolving fund are presumed.

One is the revolving fund circulating between Fisheries Development Fund (FDF) managed by Fisheries Division and District Fisheries Development Fund (DFDF) managed by districts authorities.

The other one is the revolving fund circulating between District Fisheries Development Fund (DFDF) and fishers' groups.

These days, the financial fundamental of districts are weak, and it is difficult to develop fisheries in their district by their own fund. Then the Fisheries Division assists these districts that has a willingness to establish DFDF to give loans for fishers with low interest rate.

In the meantime, districts will establish their DFDF through saving some parts of fish levy, and establish credit scheme. The scheme may make it possible for fishers' groups to purchase capital goods such as fishing equipment and/or gears, taking in foreign funds as a seed.

In the management of credit recovery, districts will make best use of NGOs experiences. Districts will contract out the management services of recovery to NGOs in the conditions of pre-education and group response to repay. In the same time, district fisheries officers assist the management of recovery indirectly. For that purpose, it is necessary to ask district fisheries officers to participate the Loan Committee that certificate the borrowers.

[Component 1]

Revolving-funding the equipment granted in " Marine Fisheries Sub-sector Capacity Building Programme" and establishing the model of credit scheme for fishers (Strengthen fishers' group in Mafia district and establishment of SACCOS)

In a part of the strengthening the fisher's unions in coast area, joint shipment system for a big market such as Dar es Salaam will be established, based on the co-ownership of transportation by several fisher's group and fishers' union.

For such base, Mafia district authority rents fishing boats for fishers who have not had fishing boats, using foreign credit funds as a seed of sustainable development.

The rental fee paid from fishers will be saved to District Fisheries Development Fund (DFDF), and the part of profits gained from joint shipment system will be also saved to DFDF.

The contract-out expense for a NGO to manage collection of rental fee and/or that of repayment will be covered from the revenue of fish levy.

[Component 2]

Capacity-building fishers cooperative unions and NGOs and expanding the model case to other areas with increase the foreign funds

Component 2 will assist " Dagga Fisheries Development Programme in Lake Tanganyika" advancing the experience of Component 1.

[Component 3]

Establishing "Integrated Local Fisheries Promoting Fund" under a union of cooperatives and fishers' groups

(4) Facility and Equipment Plan

[Phase 1]

Facilities/Equipment	Number	Reference
Motorcycle	2	
PC	1 unit	For management of repayment
Micro-credit Fund		
Personnel cost	24 months	

[Phase 2]

The plan in Phase 2 will be as same as Phase 1.

(5) Operation and Management Plan

A Operation and management system

[Phase 1]

Under the control of Mafia district authority and with the assist of Pride Tanzania, Mafia fisher' union will manage the rent of capital goods, collection of rental fee and/or repayment of credit fund, saving money to SACCOS and effective financing.

B Required Personnel

Specialist	Number	Term	Reference
Micro-finance	1	24 months	

[Phase 2]

Under the control of Kigoma district authority, organizing young fishers group and examination of adequate credit model for Dagga development will be done through capacity building of district fisheries officers, advancing the experience of Component 1

(6) Work Plan

Activity	Management Agency	Schedule	Output
Education/ Instruction	Specialist		1 fishermen's union, 5 fishermen's groups, 1 NGO
Securing Fund	Specialist		
Selection of Loanees	District authority		Fishermen's groups
Strengthening fishermen's union			Adequate accounting
Management of repayment	Union, NGO		More than 90% repayment ratio

(7) Cost Estimate

A Phase 1

Facilities/ Equipment	No.	Unit Price	Total Cost	Reference
Motorcycle	2	5,000	10,000	Supporting NGO activities
PC	1 unit	2,500	2,500	Management of repayment
Micro-credit Fund		200,000	200,000	
Subsidy for Interest			10,000	5 %
Contract-out to NGO			70,000	35 %
Personnel cost	24 month	15,000	360,000	
Total			652,500	

B Phase 2

Facilities/ Equipment	No.	Unit Price	Total Cost	Reference
Motorcycle	2	5,000	10,000	Supporting district fisheries officers
PC	1 unit	2,500	2,500	Management of repayment
Micro-credit Fund		200,000	200,000	
Personnel cost	24 month	15,000	360,000	
Total			572,500	

C Profitability

It is difficult to cover the subsidy for interest and contract-out expense to NGO from the surplus of the fishers'union (UWAWADA) assumed in "Marine Fisheries Sub-sector Capacity Building Programme" and 1 percent of own revenue of Ilala municipality. It is necessary to change the consciousness of fishers and to strengthen the union and establishing the financial foundation. It is also important to increase revenue and reduce the expenses, caused by especially dependence on contract-out to NGO especially.

If the revenue will increase by three times and expenses will decrease by a quarter, the balance will become plus.

(8) Monitoring

It is necessary to monitor the progress of improvement of management with the loan repayment.

It is also necessary to monitor whether fishers' union and district fisheries officers provide the adequate marketing information and management arts to fishers.

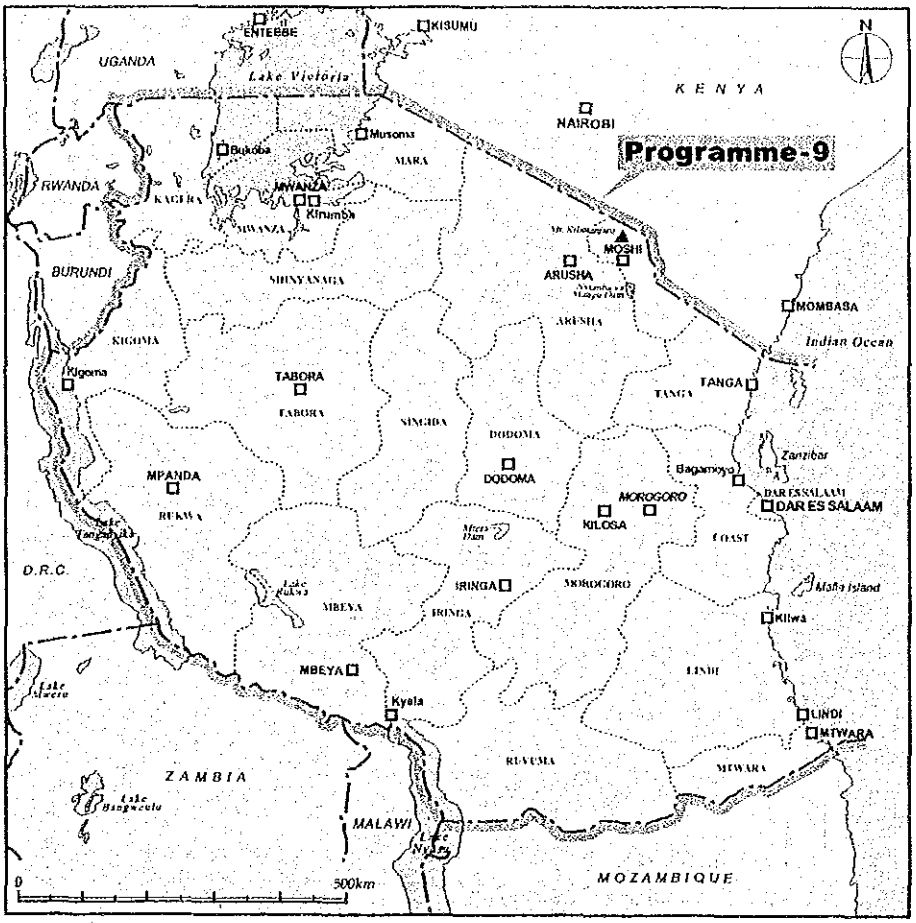
(9) Environmental Impact

This programme consists of "soft" components and has no impact or affect the exterior environment. Therefore, EIA is not necessary. This programme will have a positive impact on the welfare of the fisher community and their ability to improve their financial independence from businessmen and traders. With greater financial security, there will be less compulsion or need to carry out cheap destructive fishing techniques. Training component should not only cover financial management but also responsible fishing practices for continued long term benefits.

(10) Linkage

It is important to tie-up with the new credit scheme proposed by FAO and African Development Bank in Lake Tanganyika and establish appropriate credit scheme for fishers to purchase capital goods.

2.9 *Fisheries Co-management Programme*

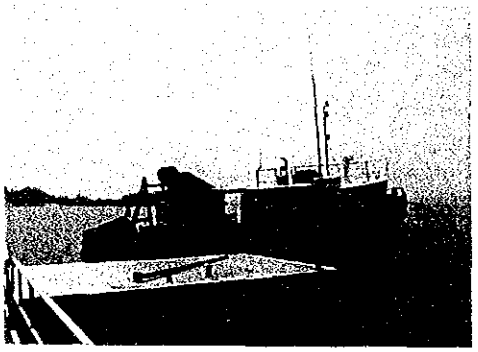


Planning area : National level

Beach Management Unit (BMU) at Kigangama village, Lake Victoria.

Weighing Nile perch on landing barge in Kayanze. BMU is recording fish catch data.

Weighing Nile perch on landing barge in Kayanze.



TAFIRI's research boat.

2.9 Fisheries Co-management Programme

(1) Programme Description

A Summary

The objectives of this programme are to establish co-management system on fisheries resources at Model communities, through strengthening resource management education for fishery cooperatives and assisting the fisheries community's environmental project that will be implemented by the fishery cooperatives or community organization. Due to the shortage of fisheries officers, it is difficult to administer fishery resource management activities. In addition, it has been difficult to compile national fishery statistics since reports from a segment of the fish landing sites on landing conditions are nonexistent. All of these factors have combined to impede the formulation of basic resource management policies. To resolve these conditions, the LVEMP at Lake Victoria established more than 600 BMU, cooperatives that are in charge of managing the fish landing sites and collecting fish landing data, and the sanitary management of the landing beaches. But due to the fishers' lack of understanding about resource management, their lack of consensus, and the lack of a financial assistance system, the majority of the BMU are non-functioning. This programme aims to strengthen the capabilities of fishers cooperatives/groups through learning form these BMU, while helping to reform the fishers and fisher cooperatives' awareness about independently managed fishery resources and expanding their activities. In addition, a project to create a fishery management model of fishing communities at Dar es Salaam and Coast Region will be studied as a means of developing independent management methods that can be applied nationwide.

B Targeted Project Site: 78 fish landing sites in Dar es Salaam and Coast Region (Annex 2.9-1)

C Duration: 36 months

(2) Objectives and Justification

A Objectives

- To instil basic understanding about resource management among the fishers and to foster self-reliant planning and implementation capabilities in fishery management.
- To establish an organizational system that will enable fishers to conduct independent fishery surveillance and data collection activities.

B Justification

Fisheries management is divided largely into two categories. The first category is the systematic management of fisheries based on fisheries laws and the second is independent management by voluntary organizations, namely fisher cooperatives, that engage in fishery resource management activities as a village unit. With many small fishing communities dispersed throughout a wide water area, it is difficult for the government administrative bodies to regulate fishing activities and control illegal fishing activities and it is also inefficient in terms of cost. Presently, the government's administrative leadership has reached its limits in the fisheries sector. Subsequently, to achieve the sustainable fisheries, the fishers themselves must become directly involved in the fishery management. The key to the future success of resource management is to establish fisher consensus about fishery management and to create a co-surveillance system using fishers.

As fishery production is a competitive task, fisheries management must be implemented carefully so as not to create the perception that those who abide by the law tend to lose an economic advantage. Therefore, it is important that fishers who utilize the same resources are organized as a cooperative.

However, in reality, the benefits derived from resource management are slow to appear and in some instances, production may be temporarily restricted. Subsequently, organizing fishers solely for resource management purposes will be a difficult and time-consuming task.

In view of the conditions regarding fishery resources and the task of organizing fishers, the initial priority issues that must be tackled is to cultivate the understanding of the fishers themselves about basis resource management practices and to promote resource management as a preventive measure against overexploitation. The government, fishers, and scientists should reach a common consensus to strengthen a co-surveillance system based on current fishery laws that will be implemented by the fishers. Specific activities by fishers include enforcing restrictions on net mesh size, surveillance of fishing grounds against illegal fishing, and collecting data on fish catch. To foster a sense of independence and self-reliance among the fishers in their implementation of these tasks, the greatest incentive is increased fishery income. Moreover, without an increased income, sustained participation in resource management activities by fishers will become difficult to implement. In principle, increased production stemming managed fisheries produces a rise in fisher income, but when preventive measures are enacted, cultivating the fishers' understanding that such measures eventually lead to increased resources will take time. Thus under this programme, support will be provided for the micro projects that will be implemented by fisher cooperatives to expedite environmental conservation and a system of public financial assistance will be created to support services such as fishery data collection. This approach is considered exceedingly appropriate since it will stimulate fisher incentive and foster an understanding of basic fishery management.

(3) Components and Activities

The programme will be implemented according to the following stages.

Activity	Content	Implementing Party
1. Basic survey study	• Resource development conditions near the fisheries community • Basic data on fisheries community • Developing environmental conservation micro project • Evaluation of village capabilities and potential	Team of experts, Nyegezi Freshwater Fisheries Training Institute, the Mbegani Fisheries Development Centre, TAFIRI *Resident participation criteria
2. Motivation workshop	Educational need for independent, self-reliant community development; correlation between fishery management and increased fisher income	District Community Mobilization Team
3. Training course for residents with interest in fishery management	Training content • Fisheries management system • Fish species ecology • Method of fisheries management • Data collection/analysis for fisheries statistics • Alternative fisheries activities • Fisheries community /cooperative development • Guidance for responsible fisheries	Mbegani Fisheries Development Centre, Fisheries officers, FAO, etc.
4. Create fisher cooperatives or voluntary groups to conduct fishery management		Fisheries community (with assistance from Mobilisation Team)
5. Establish fishery management objectives; prepare annual activity plan		Fisheries community (with assistance from Mobilisation Team)

Activity	Content	Implementing Party
6. Drafting micro projects and project loans	Micro projects • Raise productivity, contribute to economic activities of the village. • Promote use of new resources that will contribute to environmental conservation. • Provide grant aid for micro projects that expedite the active participation of the community.	Fisheries community (with assistance from Mobilisation Team)
7. Training for NGO and financial assistance	Training for NGO Establish financial system for NGO	

A Activity 1 Basic Survey Study

Each district fisheries officer will collect preliminary information on the conditions of the 78 fish landing sites and fishing communities in the two regions targeted in the survey. The team of experts will then visit each of the 78 fishing communities and landing sites to collect basic data. They will be comprised of selected staff members from the Mbegani Fisheries Development Centre, TAFIRI (resource management, fisheries community, and other areas), and the district fisheries officers and local fishers will participate in the survey. The survey will target information about the resource development conditions surrounding the fishing villages (changes in fish size, remote fishing grounds, priority fishing grounds, etc.), basic data about the fishing village (population, fisher income, industries outside of fisheries, etc.), development of environmental conservation micro projects, and an evaluation of village capabilities and potential.

B *Activity 2 Motivation Workshop*

The aim of the workshop is to motivate the fishers on the importance of protecting the environment, while simultaneously teaching them how this will secure and improve fisher income. The workshop will cover the issues related to sustainable use of fishery resources of commonly frequented fishing grounds or fishing grounds near the villages, analysing development potential, and introducing successful cases of fisheries management that will stimulate the fishers' awareness about resource management.

C *Activity 3 Provide Training Course for Fisheries Community Residents* Interested in Fishery Management

An educational training course on specific methods in fisheries management will be implemented for those fishers who are interested in conducting independent resource management after completing the training provided in Activity 2. The training course will be a combined one to two-day training session in the fishing village and a one-week stay at the Mbegani Fisheries Development Centre for fisher and fishing village representatives. The training participants must have at minimum a primary education or higher, and they will be selected according to the number of participants allowed, and the attitude shown during their participation in the workshop. The aim of the training course will be to enable fishers to conduct fishery management activities and not to provide specialized education for fishers. The programme implementation body will be responsible for developing easy-to-understand educational materials and an audiovisual programme that will explain fishery management concepts in simplified terms for the fishers.

Main Subject	Content	Instructor
Fishery management system	Summary of existing fishing methods and regulations. Introduce domestic cases such as Marine Park and TCRDMP's Tanga.	State Fisheries Division officer District fisheries officer
Basic ecology	Basic knowledge about fish ecology and ecosystem of fishing grounds needed to understand fishery management	Instructor from Mbegani Fisheries Development Centre

Fishery management methods	Introduce actual cases of fishery management and review their application to the fishing village	Instructor from Mbegani Fisheries Development Centre
Data collection to prepare fishery statistics	Instil understanding of the importance of preparing fishery statistics and methods on how to utilize the data. Basic technical knowledge on how to collect data in lieu of the regional governments.	Instructor from Mbegani Fisheries Development Centre
Alternative to fishery activities	Review alternative economic activities to reduce excessive fishing effort.	Instructor from Mbegani Fisheries Development Centre
Fishery cooperative/ fisheries community associations	Cooperatives that will mainly implement resource management, the role of the BMU, their functions and operations will be introduced.	Instructor from Mbegani Fisheries Development Centre
Behavioural standards to conduct responsible fisheries	Summary of the ethical behavioural standards need to conduct responsible fisheries as promoted by FAO	Instructor from FAO

D Activity 4 Establish Fisher Cooperatives or Responsible Group for Fisheries Management

Fisher cooperatives or groups that will begin management activities based on an understanding of fishery management as taught through the workshop and training activities will be created. The approach that will be adopted to carry out resource management will differ according to the prevailing social conditions of the fisheries community and resource conditions (for example, the village leadership has a strong influence in artisanal fishing villages). Therefore, diverse types of organizations will serve as the potential body that will implement resources management and not one type of organization.

E Activity 5 Establishing Fisheries Management Goals and Preparing an Annual Activities Plan

Fishery management goals and an activity plan will be drafted based on current fisheries regulations, surveillance task, and others. The plan will be drafted independently by the fishers themselves according to the participation based approach, and the programme will provide the technical support. The plan will include activity target volume and activity content, e.g., (1) fishery management methods/approach, (2) content, (3) summary of management costs, (4) punishment for fishing violators, and (5) methods to assess the impact of fishery management activities.

F Activity 6 Drafting Micro Projects and Loans for the Projects

Consensus must be built up among the fishers who will be conducting independent management of fisheries activities, and it is important to provide an incentive, namely increased fisher income. During the short-term duration of this programme, an alternate incentive to increased fisher income, i.e., financial assistance, will be provided to foster the fishers' basic knowledge in fishery management and to conduct the activities of the mini projects. The following mini project proposals in fishery management are given below.

a) Contributes to environmental conservation, fishery management (shift to larger mesh-sized nets, reforestation, etc.)

b) Promote new types of resources that will lessen fishing pressure.

c) Contributes to environmental education.

G Activity 7 NGO Training and Financial Assistance

Although there are some NGOs for promoting environmental conservation in target areas, many are not functioning as they are expected to be. Under this programme, a workshop and training course for fishers will be implemented to promote basic understanding of fisheries management at these NGOs. Training to strengthen the NGO functions on environmental education for fishers and guidance for monitoring will be conducted at NGOs that are still actively independent. The training activity will be similar to the training provided in Activity 3. The success or failure of NGOs' activities depends on the availability of financial assistance. Thus, to secure finances for the NGO, discussions will be held with the district and village committees and subsidies from the district's finances will be established.

(5) Operation and Management Plan

A Management System

A programme office will be set up at the Mbegani Fisheries Development Centre that will be managed by one programme coordinator. The programme will be under the direct supervision of the Programme Implementing Committee at the Fisheries Division headquarters. In addition, a regional committee to coordinate activities with other fisheries management institutions at Lake Victoria will also be created (Fisheries Division, district government, police, NGO, etc.).

As in the case of Programme 12 (Fisheries Community Development Programme), the establishment of a local network will also benefit this programme. Strengthening the organizational link between NGOs and development institutions will not only help the programme's efficiency, but will help to ensure its sustainability after the programme is completed. The programme office will be responsible for coordinating the implementation of all the mini projects and will be responsible for unifying resource management's information and assets. Therefore, an information system will be created with the following institutions. Discussions with such institutions will help the projects to be efficiently implemented.

- NGO
- FAO
- UNDP
- WWF
- Sokoine Agriculture University
- Moshe Cooperatives College

B Personnel Plan

The coordinator who will be responsible for integrating all the programmes will need the technical cooperation of foreign experts. In addition, instructors from the Fisheries Division and Mbegani Fisheries Development Centre will also be utilized. Supervision of surveillance activities will be conducted by teams comprised of experts from different fields and government officers. The Dar es Salaam and Coast regions will be responsible for creating teams comprised of fisheries officers, cooperative officers, agricultural extension personnel, and farming community development extension personnel to assist the programmes.

Title	People	Period	The resources of person
Programme coordinator	1person	36months	Expert from outside of Tanzania
National Programme coordinator	1person	36months	Mbegani Fisheries Development Centre
A person in charge of Resource management	1person	36months	TAFIRI
A person in charge of Fishing management system	1person	36months	Region or District Fisheries division
A person in charge of Fishing society/community	1person	36months	Mbegani Fisheries Development Centre
Local consultant(Basic survey&Workshop)		12months	University, NGO etc

In addition, training for the experts and district fisheries and cooperative officers who will be implementing the programmes will also be required. The training content and subjects are shown in the table below.

Title	People	Period	Main subject	
Programme coordinator	1person	1month	Resource Management	Outside of country
National Programme coordinator	1person	1month	Programme Management operation Pre-training observation: TCRDMP	Mbegani Fisheries Development Centre
A person in charge of Resource management	1person	1month		
A person in charge of Fishing society/community	1person	1month		
A person in charge of Fishing society/community	1person	1month		
District Officer		*12month*	*Resource Management: Similar to Activity 3*	*Mbegani Fisheries Development Centre*

(6) Work Plan

This programme will be implemented for 36 months. The first six months of the work schedule will be comprised of a fishing village survey and workshop tour of the villages. The micro projects will be implemented in the second half of the schedule.

Activity	Responsible Person. Organization	Process	Output
1.Basic survey	Expert team		Report on Present Condition of Fishing Village
2.Workshop for motivation	Local consultant, NGO		Workshop
3.Fishing Management Training Programme focus on Fishing Villager	Mbegani Fisheries Development Centre		*Implementation of* Training
4.Establishing Fisheries community or organization for the purpose of Fishing Management	Mbegani Fisheries Development Centre		Establishing Fishing Management Organization
5.Setting goal of Fishing Management Annual activity plan	Mbegani Fisheries Development Centre		Report on Fishing Management
6.Planning of Micro-Project and Project Loan	*Programme* office (coordinator)		*Implementation of* Micro-Project
7.Training of NGO and Financial assistance	Fisheries District Office		*Presentation of* Fishing Data and Report

(7) Cost Estimate

The estimated project costs are comprised of the surveillance activity supervision, training equipment and costs, and personnel costs of foreign experts. Personnel costs for the instructors from the Fisheries Division and the Mbegani Fisheries Development Centre under the national coordinator have not been included.

Item	Quantity	Unit Price	Price (US$)
Patrol Car 4WD	1	$30,000	30,000
Patrol motor cycle	5	$1,600	8,000
Visual and Audio materials	1 set	$10,000	10,000
Generator	1	$2,000	2,000
Personal Computer	1 set	$3,000	$3,000
Copy machine	1	$3,000	$3,000
Equipment			56,000
Micro-project fund	10 times	$30,000	
Fishing villager Training cost	350 people/a day	$5	1,750
Flight, fuel expense	72 times	$100	7,200
Management cost sub-total			38,250
basic survey of fishing village Local consultant	60 people/a day	$170/day	10,200
Foreign Expert	36 months	20,000/months	720,000
Important person cost sub-total			777,400
Total			833,400

(8) Monitoring

It is important that the fishing villages are kept informed about the benefits that are derived from resource management, in addition to the increase in income and social benefits that are produced. The constant feedback of the monitoring/evaluation activities to the fishers will ensure that the programme is sustained. The data obtained from the monitoring activities of resources by researchers must be highly accurate scientific data. Therefore, a system of cooperation with researchers such as experts from TAFIRI will be created to conduct the focal resource activity of the programme, the basic survey study. In addition to the scientific data, the Programme Office will develop a resource evaluation model based on resident participation that will help the fishers understand the condition of the fishery resources. This model should be utilized in the monitoring activities.

(9) Environmental Impact

The impact of a successful implementation of co-management programme on the natural resources will be positive and significant.

The success of the co-management programme will depend on a large extent on the active participation of the local fisher communities. In order to encourage their proactive role in the programme, they have to be empowered to carry out their activities. They must have an awareness that the resources belong to them and it is in their best interest to manage it for their long term benefit and sustainable use.

(10) Linkage

There is TCZCDP engaged in the establishment of fisheries management system as well as the empowerment of fisheries communities in Tanga region, direction towards north from the programme's target area. Whereas in Mafia Island, Coast region, the Marine Park Project is establishing the conservation area and strengthening of fishers' capacity in fisheries surveillance Thus, the coordination and communication among these projects and this programme is important in order to avoid duplicating content and to prevent problems from occurring between projects. Also, through

sharing the same approach and collaboration especially in data collection on fish landing volumes, environmental education and monitoring methods, will certainly improve the efficiency as whole.

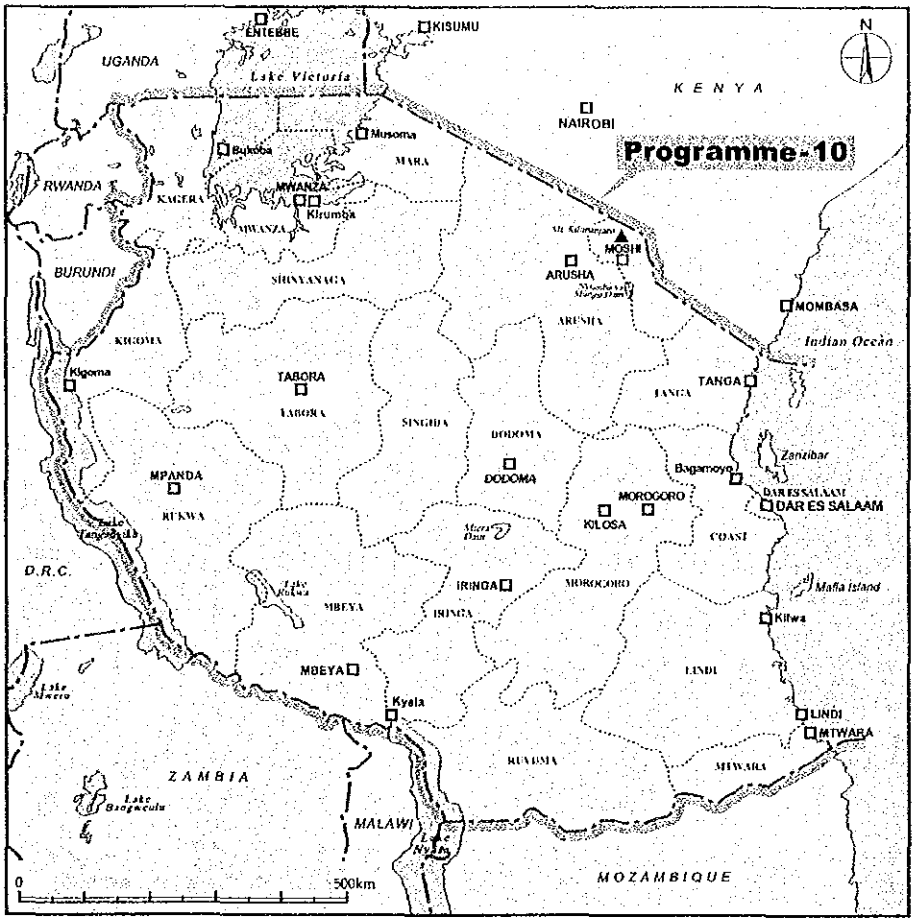
Annex 2.9-1

Outline of Fishing Village Site

		No. of Fish Landing Sites	No. of Fishers	No. of Boats
Coast region	Bagamoyo	13	1,493	265
	Mafia	34	2,597	728
	Mkuranga	10	624	200
	Rufiji	15	441	219
Dar es Salaam region	Ilala	1	1,219	127
	Kinondoni	5	2,357	451
	Temeke	1	1,430	151
Total		79	10,161	2,141

Source: Frame Survey Results for Marine Waters, May 2001, FD MNRT

2.10 National Fish Export Promotion Programme



Planning area : National level

2.10 National Fish Export Promotion Programme

(1) Programme Description

A Summary

The programme to promote fishery exports is comprised of two components-a marketing survey and the construction of a quality control inspection centre. The marketing survey will investigate means to improve the competitive viability of Tanzania's major fishery export products, Nile perch, Dagaa, seaweed, and aquarium fish in the international market, new markets, value added export products, and other factors, and a production and sales strategy will be formulated. As an expanded production volume of Nile perch, which comprises 90 percent of fishery exports, can not be expected, a shift from fillet processing to a new and higher value added processed product will be developed; and market demands must be clearly understood. The fundamental component that supports the competitive viability of exported products in the international market is stable product quality. Presently, due to inadequate equipment, domestic quality control inspections are limited to bacterial tests, and heavy metal and agricultural pesticide residue tests are consigned to a testing centre in South Africa. An inspection laboratory will be built and the aim is to establish a self-reliant testing centre in the country, capable of expanding testing activities to achieve stable, quality processed export fishery products.

B Project Area

The marketing survey will be conducted nationwide since it targets exported fishery products. The survey on product quality will be conducted at Dar es Salaam, the marketing base of the country.

C Duration: 3 years

(2) Objectives and Justification

A. Objectives

a) To survey the exporters, the evaluation and purchasing preferences of general consumers in major advanced countries where Tanzania's products are exported; and study the product standards, quality, grading, type of processing, inspection system that are demanded of Tanzania's exported products.

b) To clarify the marketing routes for smoked, dried and traditionally processed products in Africa, the trends of the black market, pricing mechanism, etc. and draft a policy to on exported fishery products to the African interior.

c) To construct a new quality inspection laboratory to conduct quality control inspections of fishery products in the country, raise the stability of quality inspections, and promote the export of safe fishery products.

B. Justification

After the 1990s, fishery exports recorded a sudden average growth rate of 10 percent and in 1998, it comprised 12.3 percent of the total export value. The total export value in 2000 was US$ 7,550,000 and it continues to maintain a large growth rate, which has established the export industry as one of the nation's major industries. Promotion of exports is one means of achieving a stable macro economy and it is also one of the major issues targeted in the Tanzanian government's poverty eradication strategy paper. The government levies a 6 percent tariff or royalties of the FOB price of fishery exports. The Fisheries Division is able to utilize a maximum of 75 percent of the royalties in its

budget. Stable export prices will help to secure funds needed to promote fisheries and it is anticipated to greatly affect fishery policies in future.

The materials supply of Tanzania's export products is heavily dependent on artisanal fishers. In particular, processors exported Nile perch are prohibited from engaging directly in fishing activities, and they are completely dependent on artisanal fishers for their materials supply. In turn, the fishers are entirely dependent on the processing plants to purchase their fish catch and both are interdependent. Therefore, an increased export volume and price greatly contributes to a rise in fisher income.

Tanzania's major fishery exports are mainly limited to primary processed Nile perch fillet and frozen shrimp. Subsequently, the development of exports has greatly depended on an increased production volume. Presently, there is concern that shrimp and Nile perch resources have reached their limitations. Hence an increase in export volume can not be expected in future. The small size of much of the fish landed at Lake Victoria has been particularly marked and the LVEMP has begun environmental conservation measures. As a result, in order to expand exports in future, the focus must shift away from expanded production volume to an increase in value added processed products. In addition, nearly 60 percent of Nile perch is discarded in fillet processing. Presently, these remnants are smoked and sun-dried or processed into fish powder by processors and marketed at low prices to other African countries. By improving the use of these remnants, they can be reused as an export ingredient. To successfully achieve a transition from primary processed export products to a high value added second stage processed export product, the market demands in advanced countries must be accurately assessed. Therefore, the marketing survey on fishery products is an appropriate activity.

In 1998, the export of Nile perch product from Tanzania was banned by the EU due to suspicion of heavy metal contamination, and the export value for 1999 dropped drastically. The raw fish purchase price from fishers dropped from Tsh.700/kg to Ths.200/kg, and the fishers' income also was greatly reduced. Due to this event, the government takes samples of Nile perch body and of the lake water and marshes every six months and sends them to a testing centre in South Africa to check for heavy metal and agricultural pesticide contamination and pollution. There is the constant danger of household wastewater and mercury and cyanide pollution of the lake water due to the gold mine operations. To secure the safety of exported fishery food products, these tests must be conducted frequently and over a wide area. Therefore, in view of these circumstances, a quality inspection laboratory to conduct biological and chemical testing should be quickly established. Presently, the annual cost of consigning the tests to a centre in South Africa is US$ 30,500. If an inspection laboratory that mainly conducts pesticide residue and heavy metal analysis is created, the initial investment cost to construct such a laboratory can be recovered in five years, in view of the yearly consignment costs that are presently incurred.

(3) Components and Activities

[Component 1] Marketing Survey on Fishery Export Products

The survey will be conducted according to the following procedure.

a) Implement a survey on the domestic marketing of processed Nile perch. Obtain information on the investment plan and volition of the processing plants about the production and storage capabilities, variety and types of processed products, value added products.

b) Set up a meeting about the marketing survey with processor cooperatives.

c) Implement a marketing survey by consultants on importing countries. Nile perch, Dagaa, and other products will be surveyed. Marketing related personnel dealing in Nile perch product in importing countries will be accepted as investigators or trainees.

d) Estimate the cost and improvements to processing factories needed to produce increased value added products.

e) Implement joint production of high value added fishery product with the Nyegezi Freshwater Fisheries Training Institute and private companies. Dispatch product improvement experts from exporting countries. Implement product survey using antenna shops in the importing country.

The content of the marketing survey is as follows.

a) Marketing Survey on Nile perch Product

The major exporting countries, EU (the Netherlands), the Asian market (Japan), the North American market (U.S.) will be targeted in the marketing survey. The procedure will be as follows.

① Obtain basic information from the Ministry of Trade or relevant ministry or agency in the targeted country.

② Conduct an interview survey of market related personnel and conduct a product monitoring survey using local consultants in the importing country. Marketing related personnel in the country importing Nile perch products from Tanzania will be accepted as investigators and trainees. The major survey items are as follows.

- Market and competition structure of Nile perch
- Relative position of Tanzanian products and market dominance/price determination capability
- Consumer trends and market size
- Distribution and sales of Nile perch
- Conditions demanded in materials for processing
- Policy to stimulate marketing/publicity

In the area of Nile perch exports to Japan, the active use of the Japan External Trade Organization (JETRO), which is responsible for developing trade activities with developing countries will be utilized. JETRO activities include a) survey on promising export products, b) third-country marketing surveys, c) provides information on Japanese markets, d) product monitoring surveys, e) dispatch experts to excavate promising export products, f) dispatch product improvement experts, g) set up programmes for investigators and trainees, h) dispatch buyer missions, and i) receive export missions to Japan.

b) Marketing survey on Dagaa

A separate marketing survey is needed for Dagaa Mwanza and Dagaa Kigoma. As the markets are located in Tanzania and its neighboring countries, the scope of the survey will differ greatly from the survey on Nile perch. However, the same survey items used in Nile perch survey will be utilized in the marketing surveys on Dagaa to enable comparisons between the two products.

- Market and competition structure of Dagaa
- Relative position of Tanzanian products and market dominance/price determination capability
- Consumer trends and market size
- Distribution and sales of Nile perch
- Conditions demanded in materials for processing
- Policy to stimulate marketing/publicity

c) Marketing survey on other products (aquarium fish, seaweed)

Prior to implementing a marketing survey on these other products, a selection survey on promising products will be conducted first. Presently, aquarium fish is exported to Skurido at Lake Nyasa, Germany and other European countries, the United States, and Japan. Although the volume is not large, the unit price is high and therefore, a marketing survey is required. In

the area of seaweed export, the participation ratio of women is high, and a marketing survey and market excavation will contribute directly to improvements in the livelihood of artisanal fisher women.

[Component 2] Construction of a Quality Inspection Laboratory

The disastrous banning of the processed Nile perch product from the EU market has occurred twice. Preventive measures, in the form of product trace ability, must be enacted to prevent such bans from reoccurring, and it is vital that a testing system for residue pesticides and heavy metals is created. Presently, such tests are consigned to a testing centre in South Africa; the costs are extremely large, and the testing frequency is limited to within the scope of these costs. These conditions are not in keeping with the original intent of these tests which is to be able to know about the contamination of products or the environment beforehand. To rectify this situation, a quality inspection laboratory will be set up in Mwanza to help build market trust in Tanzania's fishery products.

The Fisheries Division of the Ministry of Natural Resources and Tourism is planning the construction of a quality inspection laboratory in Mwanza, and the design of the laboratory and tendering documents have been completed. However, the equipment is not included in the design and therefore, it will be included here. The quality inspection laboratory will conduct bacterial and chemical tests, especially the analysis of pesticide residue and heavy metal contamination. The bacterial tests are presently conducted by the existing laboratory which is equipped with effective equipment that has been assessed as adequate by a EU inspector. Therefore, the equipment that will be provided under this project will focus on equipment that is needed to analyse pesticide residue and heavy metal contamination. Specific activities are listed below.

a) Confirm the specifications of testing equipment.

b) Provide and install the equipment in the designated site at the laboratory.

c) Provide supervision on testing methods and equipment manuals.

(4) Facility and Equipment Plan

The following equipment will be provided since only bacterial tests are presently conducted at the existing quality inspection laboratory.

- chest freezer 2 units
- incubator 2 units
- autoclave 1 unit
- electronic scales 1 unit
- colony counter 1 unit
- biological microscope 1 unit
- glass boats 1 set
- reagents, culture materials 1 set

The above are the minimal equipment needed to conduct bacterial tests. The following facilities and equipment will be required to conduct analyses of pesticide residue and heavy metal contamination.

[Component 2]

Facility and equipment	Number	Specification
Gas chromatography	1 unit	Capillary type, ECT and FTD detector
Atomic absorption chromatography	1 unit	Flame type and graphite furnace type
Gas tube and exhaust duct for the above	1 set	
Electric top-pan balance	1 unit	0 to 1,000g
Homogenizer	1 unit	
Distilled water apparatus	1 unit	Reverse osmosis and ion exchange
Laboratory freezer	1 unit	
Glass ware	1 lot	

Facility and equipment	Number	Specification
Spare parts for GC	1 lot	
Spare parts for AA (Spare lamp)	1 lot	

(5) Operation and Management Plan

A Management System

The export market survey for Nile perch will be conducted by the Mwanza food inspection laboratory. The new Mwanza quality inspection laboratory will be placed under the administration of the Quality Control Section, Mwanza branch of the Fisheries Division. The branch office will assign six inspectors under one director. The number of inspectors will be increased in conjunction with an increase in test items.

B Training for Staff Members

Due to the lack of qualified inspectors in the analyses of pesticide residues and heavy metal contamination at the existing quality inspection laboratory, a training programme for staff members at another institute (the Ministry of Health laboratory or Dar es Salaam University) that will cover theory to practical training is needed. In addition, the manufacturer of the testing equipment must provide supervision in the use and handling of the equipment at the time of its installation to the staff member in charge.

(6) Work Plan

[Component 1: Marketing Survey]

Main activity	Responsible Person	Schedule	Outcome
Investigate actual national processing circulation condition	Fisheries division/Nyegezi		Survey Report on present situation
Setting market survey meeting	Processing Association		Survey meeting
Market survey in importing county	*Fisheries division/Foreign consultant*		*Report on market survey*
Acceptance of reseacher and Trainer in importing country	Fisheries division/Processing association		
Producting module of Value added Product	Nyegezi Freshwater Fisheries training Institute		secondary processing product
Product improvement Expert dispatch form importing country	Fisheries division/Nyegezi		Production/selling
Setting antena shop			
Designing of module factory Institute	Nyegezi Freshwater Fisheries training Institute		Designing diagram/ Estimate of summary of cost

[Component 2: Construction of the Quality Inspection Laboratory]

Main activity	Responsible Person	Schedule	Outcome
Check method of Inspection	The head of Inspection		Tender manual
Getting equipment and setting	The head of Inspection		Inspection Facility
Instruction of how to use Inspection equipment	Full-time officer		Instruction manual

(7) Cost Estimate

A. Summary of Costs

[Component 1: Marketing Survey]

Content	Quantity	Unit Price	Amount Price (Tsh.)	Amount price (US$)
Market survey consultant cost				125,000
Observation trip	10 people	$7,500		75,000
Expert from outside	12 months	$20,000		240,000
Working on report cost	2 kinds			1,600
Meeting cost				1,600
Module production cost				-
Setting antenna cost				17,000
Total				460,200

[Component 2: Construction of the Quality Inspection Laboratory]

The total cost of the facilities and equipment is US$ 129,800 (see Annex 2.10-1).

B. Profitability

Presently, the Fisheries Division takes 8 samples of Nile perch fillet from the each processing company (8 companies) as shown in the table below, for a total of 64 samples, four times a year. Simultaneously, two samples of lake water are taken from 23 designated sites at the lake and one sediment sample is taken from the lake bed. These samples are taken once a year and sent to a laboratory in South Africa for analyses. The cost to analyze one sample is US$ 90.00 at a total annual cost of more than US$ 30,000.

Type of sample	No. of sample	Frequency	Cost (US$)	Net cost (US$)
Fish fillet	64	4	90	23,040
Water	46	1	90	4,140
Sediment	23	1	90	2,070
Transportation		4	200	800
TOTAL				30,050

The long-term burden of bearing these costs is difficult for the Fisheries Division, and it is important that these consignment costs are reduced by establishing a domestic inspection/testing system. In a comparison of the initial analysis equipment costs needed to conduct the tests and the total operating costs of a laboratory with the external consignment costs that are presently incurred, it is estimated that the initial investment cost will be recovered in about five years as shown in the table below.

Year	Expenses	Cum.Expenses	Initial cost	Operation cost	Total cost
Year-1	30,050	30,050	150,000		150,000
Year-2	30,050	60,100		1,500	151,500
Year-3	30,050	90,150		1,515	153,015
Year-4	30,050	120,200		1,530	154,545
Year-5	30,050	150,250		1,545	156,091
Year-6	30,050	180,300		1,561	157,652
Year-7	30,050	210,350		1,577	159,228
Year-8	30,050	240,400		1,592	160,820
Year-9	30,050	270,450		1,608	162,429
Year-10	30,050	300,500		1,624	164,053

Note: Initial cost is US$ 150,000. Operation and maintenance cost increase 1 percent of previous year. And out-sourcing cost to South Africa does not go up.

(8) Monitoring

The Quality Control Section, Mwanza and Dar es Salaam branches of the Fisheries Division will be responsible for monitoring the progress of the activities.

(9) Environmental Impact

This programme consists of "soft" components and has no impact or affect the exterior environment. Therefore, EIA is not necessary. Indirect impact of this programme will be to improve the fish value and thus greater financial gains from the fish resources. This will translate to better utilization of fish resources and reduce the pressure to increase production to realise the same increase of financial gains.

(10) Linkage

A. *Correlation with Other Sectors*

Coordination with the Ministry of Health and Dar es Salaam University which possess similar testing equipment should be established in the area of staff training and verifying test data.

B. Correlation with Other Projects

The JETRO office in Dar es Salaam invites Assistant Fisheries Officers and marketing survey personnel to Japan from the end of November to the beginning of December as part of the task of promoting Tanzania's shrimp exports. This project will be correlated with this activity after reviewing its content.

Annex 2.10-1

Content	Quantity	Unit Price	Amount price (Tsh.)	Amount Price (US$)
Gas Chromatography	1 unit	31,500,000	31,500,000	35,000
Atomic Absorption Chromatography	1 unit	63,000,000	63,000,000	70,000
Gas tube and Exhaust duct for the above	1set	9,000,000	9,000,000	10,000
Electronic scales	1 unit	900,000	900,000	1,000
Homogenizer	1 unit	1,350,000	1,350,000	1,500
Distilled water apparatus	1 unit	1,800,000	1,800,000	2,000
Laboratory freezer	1 unit	1,080,000	1,080,000	1,200
Glass boats	1set	630,000	630,000	700
Spare parts for GC	1set	1,575,000	1,575,000	1,750
Atomic Absorption Chromatography	1set	3,150,000	3,150,000	3,500
Contract for maintaining of equipment	1year	2,835,000	2,835,000	3,150
Total			116,820,000	129,800